D. Q. McComb.

PUBLIC LIBRARY BUILDINGS

THIER FINANCING, DESIGN, CONSTRUCTION, EQUIPMENT AND OPERATION

BY

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MARY O. McCOMB

DEDICATION

To my loyal, efficient and energetic assistants of the Building Department, Los Angeles Public Library . . .

Edward F. Wallace, Chief Engineer
Ervin S. McConnell, Shop Foreman
George W. Read, Head Janitor
Otto E. Wilkinson, Head Gardener
Wade J. Winder, Chief of Branch Maintenance
Alex. Smith, Senior Elevator Operator
and
Mildred La Faver, Secretary

. . . this volume is dedicated
by the Author.

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FOREWORD.

This book is written particularly for the librarians and the library-governing bodies of medium-sized and smaller communities charged with the responsibility of maintaining and operating library buildings already in existence, or contemplating the financing, design and construction of buildings fitted to their special needs, and the equipment and operation thereof. Its principles, however, are applicable with equal effectiveness to the problems encountered in the construction of school houses and other public buildings of similar nature in communities of the class to which reference is made above.

The greatest lessons, making the deepest, clearest, most-lasting impressions upon the minds of alert, wide-awake, thinking people are those resulting from the experiences and from the mistakes of themselves and of others. And the pity, the tragedy of the matter is that the same unpleasant experiences are suffered and the identical costly mistakes occur over and over again for lack of information or of warning given by those who lead the way in any certain enterprises, to those who follow them in undertakings of the same nature.

Over a period of five years the author assisted in the planning, standardized the specifications and supervised the construction of twenty-three buildings, costing from $7,000 to $60,000 complete and furnished, for the public library system of the city of Los Angeles, California, and for the same period he was responsible for the organization of the Building Department, and supervision of maintenance and operation of all buildings, grounds and mechanical equipment for the central library and fifty branches.

During this period the author learned certain invaluable lessons, from the experiences of architects in charge of design and construction of buildings constituting the Los Angeles Public Library system at the time he assumed charge, and from his own subsequent experiences; and the results cannot but be of very material value to many others if only these lessons are brought to their attention. Herein will be found the response to the multitude of questions of all kinds asked of the author during this period of his service, by librarians and others interested but inexperienced in the construction, equipment and operation of buildings designed especially for public libraries. And this is the reason for this volume. Confining himself strictly to the fundamental principles of the subject, applicable equally to all parts of the United States and to a great many other parts of the world, it is the confident belief of the author that the book will fill a very present need and will be of very real service to those for whom it is especially written, as set forth in the opening paragraph above.

It has been the author's earnest endeavor to present this subject in the as clearly, simply and non-technically as possible, leaving all the dry tech details to be included in the various appendices where, as Mark in once stated in reference to one of his works, the reader may read it or as he chooses. And if it appears that the author is unduly severe in his nents on certain classes connected with the building industry, please bear ind also that he is no less condemnatory of his own actions where the lat- ave failed to meet the standards established herein. While to the critical er certain of the subjects presented may seem to be exceedingly elementary, ous and trite, it should be remembered in this connection that it is usually most obvious in any situation which is most completely overlooked disregarded.

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CHAPTER I.

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Chapter I.

FINANCING.

ADMINISTRATION. The conventional practice among communities organizing public libraries is to establish a library governing body, called variously "Library Board," "Library Commission," "Board of Library Trustees," or other similar appellation. This body, which hereinafter will be referred to as the "Board," ordinarily consists of three or more members appointed by competent appointing authority or elected by vote of the people. The executive actually in charge of the institution—the "Librarian"—is appointed by, reports to and is responsible to the Board, and carries into effect and operation its orders, instructions and policies.

CONSTITUTION OF THE BOARD. The ideal member of the Board should be a public-spirited citizen, energetic, diplomatic, tactful and discreet; a man or woman of culture, of long experience in some particular vocation or avocation, and of sufficient financial meansto enable this person to devote a very considerable portion of his or her time and energy to the needs and demands of the library without being unduly distracted by his or her personal affairs.

The ideal Board would contain in its membership—

1. A banker, or financier, to advise adequately in all matters pertaining to finance;

2. A lawyer, to steer the Board clear of the innumerable pitfalls which threaten the way of every enterprise of this nature;

3. An engineer, or architect, to give competent counsel on all technical matters relating to the construction, equipment and operation of the institution;

4. At least one or more persons of recognized standing and political influence in the community, able effectively and convincingly to present the needs of the library before the local community governing body and secure 100-percent cooperation and necessary favorable action from said community governing body.

This does not imply that all the detail technical work necessary to this undertaking be performed—(usually gratis, as these members ordinarily accept these appointments solely thru a spirit of strong civic duty, and with little or no remuneration)—by these technically-qualified members of the Board. Being an institution of the local government the public library is entitled to and should receive the necessary services of the official attorney for the local government in drawing contracts and legal forms, and advice as to the legality of proposed actions of the Board, whenever request is made for these services;

the official advice of the treasurer, auditor or controller of the local community government on questions pertaining to the financial conduct of the institution; and should be free to consult the local community architect, if there be one, or to employ and commission a competent local private architect to design and supervise the construction of the proposed building—the latter of course, subject to the wishes and the instructions of the Librarian and of the Board. But a successful banker will inevitably think, talk and act along proper financial lines; the successful lawyer along legal lines; and the engineer or architect in terms of his own profession, thereby settling within the Board itself a thousand and one petty financial, legal and technical details which, cumulatively, otherwise would create a vast amount of delay, confusion and red-tape in all cases where the members of the Board were not sure of their ground and would therefore, if normally cautious and prudent, consider it necessary to ask or seek the advice of the proper local community government official each and every time before taking any definite and positive action of any kind.

OPERATING EXPENSES. The public library being a function of local government, its funds for expenditure in maintenance and operation are customarily provided by—

1. Annual appropriation by local governing body.

2. Constitutional, statute or charter provision setting aside a definite proportion of the annual taxes for this exclusive purpose.

More or less handicapped is that public library dependent wholly upon the local governing body for annual appropriation to pay operating expenses. This legislative body, giving often with reluctant, parsimonious hand, usually feels that in return it must also dictate the appointment of employees and the more important policies under which the institution is operated, resulting virtually in the reduction of the Librarian and the Board to the status of a rubber stamp, subject to the whims of a politically-minded community legislative body.

In a far stronger position is that public library having an independent income fixed by statute or charter provisions, the expenditure and control of which is invested by law solely in the Board and not subject in the slightest degree to the local legislative body. The Los Angeles Public Library is an example of this latter class. Under a provision of the City Charter adopted in 1925, an annual tax of seven cents is assessed for each $100 taxable property within the jurisdiction of the city, to be used under the direction of the Board exclusively in the operation of the present library system and in the extension thereof. This happy condition is a direct result of having had for years a successful banker, an individual of high social and political standing, as a member of the Board; this member also having been appointed to and having had tremendous influence as a member of the "Board of Freeholders"

which formulated the 1925 Charter submitted to and adopted by the voters of the City of Los Angeles.

And in any community now dependent upon the appropriations and the good-will of the local governing body from year to year, a properly energetic, aggressive, politically-influential member of the Board will know how to proceed and to secure necessary passage of state legislation or formulation and adoption of city charter conditions—either new or amendments to the existing charter—making definite provision for a fixed annual income rate and a certain measure of independence and freedom from hampering dictation of the local, sometimes indifferent or even antagnostic, legislative body.

UNIT COST OF BUILDINGS. This of course is governed almost wholly by local conditions—local cost of all kinds of building materials and equipment,—lumber, brick, stone, cement, sand, plaster; and of local labor,—unskilled, carpenters, bricklayers, cement finishers, plasterers, interior finishers and all others necessary to the completion of a building. Experienced local architects and the nearest contractors' or builders' associations are able to make a fairly close estimate of the cost, sufficiently accurate upon which to base the amount of funds to be raised, provided they can be given an idea of the type of the building, whether single-story or more, the material from which it is to be constructed and the approximate floor area or the cubic contents of the building. For instance, the unit cost per square foot of floor area or cubic foot of gross volume of buildings constructed of various kinds of material in the vicinity of Los Angeles at the time this is written, (not including the architect's fee), as estimated by the local Chapter of the Associated General Contractors of America, is as follows:

Reinforced concrete buildings, $0.40 to $0.60 per cubic foot.

Brick buildings, $0.22 to $0.45 per cubic foot.

"Volume," (cubic feet), is the **average** floor area times the total height from the lowest basement floor to high point of roof.

Frame buildings, single story, $3.00 to $3.50 per square foot, ground floor area.

Frame buildings, two-story, $5.50 to $7.80 per square foot, **ground floor area only.**

TOTAL COST OF THE PROPOSED BUILDING. When undertaking for the first time an enterprise of this nature there is a great tendency arbitrarily to fix the amount to be expended thereon, taking little or no account of all the various elements which, combined, enter into and have great influence in the solution of the problem; in this way laying the ground for considerable future embarrassment when funds so provided are found to be insufficient for present needs and imperative future expansion; and, in providing additional funds to meet those needs, entailing very much unnecessary expense which would have been avoided had adequate provision for such funds been made in the begin-

ning. The author has known librarians, even of long and competent experience, to have great difficulty in previsualizing clearly not only their immediate needs but those for the future as well. In Appendix C, "Outline," are shown in minute detail the methods used by the Los Angeles Public Library in determining the area of **floor space** necessary to carry on effectively and efficiently all the functions of the proposed project. From this area, (divided as desired between basement and upper floor or floors, and the **average** floor area taken), multiplied by the total height from lowest basement floor to high point of roof, is obtained the "volume;" and this volume times the approximate cost per cubic foot as supplied by the local architect or contractors' association will give as a working basis the estimated cost of the building, not including the cost of the site, the architect's fee or the cost of equipment.

The cost of the site will depend wholly upon local conditions—central location, land values in the community and in the vicinity and other influencing factors and will have little or no comparable relation to the cost of the building. The equipment usually amounts to approximately twenty per cent of the cost of the building and is customarily handled under a separate contract without the necessity of the architect's services, altho the latter may be employed if the Librarian or the Board so desires. The method of handling equipment is discussed at greater length and in much more detail in Chapter IV, "*Equipment.*" *The architect's fee is of course a matter of agreement* between the Board and the architect, but this fee usually amounts to six percent of the total cost of the entire work actually designed and supervised by the latter.

As an illustration—let us assume it is desired to build a library of brick, full basement, one-story, with tile roof and concrete floors; the floor space necessary for present and immediate future requirements is 12,000 square feet; the height from lowest basement floor to highest point of roof is 30 feet; the unit cost of a building of this class as estimated by the local architect or contractors' association is $0.35 per cubic foot; and site costing $10,000 fully adequate for all present needs and future anticipated extensions:

Average floor area 12,000, divided by 2 equals	6000 sq. ft.
Volume, 30x6,000 equals	180,000 cubic ft.
Cost of building, $0.35x180,000 equals	$63,000
Architect's fee, 6% of $63,000 equals	$ 3,780
Equipment, 20% of $63,000 equals	$12,600
Cost of site equals	$10,000
Total estimated cost of project,	$89,380
Or approximately $90,000.	

FINANCING THE CONSTRUCTION OF THE BUILDING. Not always can annual appropriations or current income be stretched to include the construction and equipment of a building in addition to the operating of an existing institution, in which case some additional method of financing must be used for such construction. It is not within the purview of this volume, nor is it intended, to give an exhaustive, highly technical treatise on all the various possible methods which might be used to finance the original construction of public enterprises. In this chapter will be discussed only some of the more common methods of financing such undertakings, with their relative advantages and disadvantages.

The construction and equipment of a library building is usually financed in the time-honored manner of all similar governmental activities, upon some basis of taxation, either—

1. Pay-as-you-go;
2. Term Bond Issue; or—
3. Serial Bond Issue.

Any question as to whether the method adopted for financing the construction of a library building shall be pay-as-you-go or one of the forms of bond issue, or a combination of these methods, is finally decided upon several points:

1. Present versus future benefit to the community;

2. Possibility of appropriating or transferring existing surplus funds, or of assessing sufficient tax to assure immediate purchase of the site, construction of the building and equipment of the same without violating existing state constitutional, statute or city charter provisions or ordinances restricting or prohibiting such appropriation or transfer of surplus funds, or limiting the amount of taxes which may be assessed against taxable property for any one year;

3. The proportion of the burden of first cost of such construction and equipment which equitably should be borne by the future generation in return for the advantages enjoyed by such future generation in the use of the institution.

PAY-AS-YOU-GO. By this method the entire cost of the undertaking—purchase of the site, employment of the architect, preliminary expenses such as soil tests, preparation of plans and specifications, advertising, letting to contract, construction of the building and equipping of the same—is paid directly from available resources by appropriation or transfer of funds either in reserve which may be lawfully used for this purpose, or funds which may be raised immediately by taxation and permit the enterprise to go forward without delay.

Where this is possible and where it is done the cost falls entirely upon the present community. No portion of this first cost will be borne by any future

generation, which will be taxed, if at all, only for the current upkeep and operation of the institution and for such future extensions of the library as may be necessary to keep pace with the expanding requirements of the growing community.

In the pay-as-you-go plan the entire sum set aside for the purpose is one hundred percent efficient in the accomplishment of its duty, no money being spent for interest, or in commissions, discounts, brokerage or other expenses necessary to effect the sale of bonds or to secure these funds by other methods of borrowing.

BOND ISSUE. Where insufficient funds are on hand, or where there are none which can be legally appropriated, transferred or raised immediately by taxation for the contemplated purpose it is an almost universal custom to resort to an issue of bonds for the proposed work. Even tho the aggregate amount of funds—principal, interest, and possibly discount, commissions and brokerage—is very considerably greater than the amount to be provided under the pay-as-you-go plan, a bond issue is fully justified by permitting the completion and use of the building immediately instead of being compelled to wait until the entire sum can be raised at one time by taxation or otherwise before starting construction. Also, as previously stated, it relieves the present generation of a part of the burden and places it upon the future generation, which is only fair and equitable in return for the benefits received by the latter.

Where funds are raised by bond issue the **immediate** burden is not nearly so great upon the tax-paying owners of property, who finally have to foot the bill, as in the case of the pay-as-you-go plan. Instead, by the issuance of bonds, the payment is distributed over a period of years and the tax burden for any one year is approximately in the inverse ratio to the number of years for which the bonds are to run, plus the yearly amount necessary to pay the interest on the outstanding bonds.

Only under ideal conditions is it ever possible that one hundred percent of the aggregate face of the bonds may be made available and expended in the accomplishment of the purpose for which the issue was made. In actual practice this is rarely indeed the case. In many instances the city or other corporate entity issuing the bonds has already used a great amount of its credit in this manner to raise funds for other public purposes. And these bonds, instead of selling "at par," or their full face value, are many times sold at a discount, or less than their full face value, the amount of the discount depending upon the solvency or the strength of credit of the municipality or other issuing authority in the financial field.

The standard practice in a case of this kind is for the issuing body to advertise for bids to purchase the bonds, and to accept the bid most advantageous to this issuing body. Occasionally it is true that one or more of the bidders will

offer to take the bonds at par, or even at a premium — a small amount above the aggregate face of the bonds— where the credit of the issuing body is exceptionally strong and the bonds especially attractive; but much more often the bidders will offer to purchase at a discount, in which case, in order to realize the full amount necessary for the complete undertaking, the **aggregate** of the face of the bonds will have to be proportionately greater than the **net sum** required. Suppose the most favorable bidder proposes to take the entire issue of bonds at "90," that is, at ninety percent of their face value or at a ten percent discount; and suppose that a net amount of $90,000 is needed to cover all costs and expenses set out above; then the total face of the bonds which will have to be issued is ($90,000 divided by 90) which equals $100,000.

Bonds are usually issued in denominations of $100, $500 and $1000 each, although "Baby Bonds," much more readily saleable to the general public, may be $10, $25, $50 each. Bonds may be either of two classes, Term Bonds or Serial Bonds.

TERM BONDS. In this class it is provided that all of the outstanding bonds of the particular issue are paid off at once, upon the termination of the period of time set out in the act or ordinance under which the issue is made. During the life of the bonds the interest is paid, annually or semi-annually, at the rate prescribed in the face of the bonds themselves, and it is the usual practice to establish a "sinking fund" by setting aside each year a fixed sum such that at the end of the term-period of the bonds the total amount in the sinking fund will equal the aggregate sum of the face of the bonds, permitting the payment of their principal in full at that time.

As an example: Suppose a bond issue of $100,000 is voted by the people for a period of fifteen years, bearing interest at six percent annually. During the life of the bonds under the usual method of procedure one-fifteenth of $100,000, or $6,667, must be raised each year and deposited in the sinking fund—making a total of $100,000 in this fund upon the deposit of the fifteenth annual payment. In addition to the $6,667 for the sinking fund six percent on the whole issue of $100,000, or $6,000, must be paid out as interest to the bondholders—a total of $12,667 per year or an aggregate of $190,000 over the period of fifteen years; the original principal of $100,000 and $90,000 interest for the use thereof during that period of time.

Not all of this amount need be raised by taxation. As soon as the sinking fund is started it may be put out at interest with some bank or financial institution with proper safeguards and assurances as to its security, withdrawable on or before the date of maturity of the bonds. The interest paid by the bank or other financial institution, increasing year by year as the sinking fund increases, will tend to offset or diminish the amount necessary to be raised annually by taxation to take care of the interest payments and the sinking fund deposits. This fact, however, should be borne clearly in mind—that banks and

financial institutions do not habitually pay as interest on deposits received by them as great a rate as that usually called for on the bonds themselves, the customary rate paid by these institutions being 3 to 3½ percent, rarely if ever 4 percent or more. In our example therefore, assuming the sinking fund draws 3 percent interest from the institution where deposited, at the end of the second year of the bond-issue term the interest returnable on the sinking fund (.03 x $6,667 would be $200; and increasing each year by arithmetical progression, at the date of maturity of the bond issue a total of $21,000 interest on the sinking fund would have been paid, leaving a net amount of $169,000, the original $100,000 and a gross total of 69 percent of the same as interest to be raised by taxation over the fifteen-year period for its use during that length of time.

SERIAL BONDS. Instead of all bonds falling due at a single date of maturity, the method of issue may be "serially," that is, certain of the bonds to mature in a short period of time, from one to five years as provided in the state law or local ordinance authorizing the same, and as appears upon the face of the bonds themselves; and a certain number of others of the same issue to mature each year thereafter until all have matured and have been paid off. This method, while obviating the necessity of raising the entire amount in a single year, has also the advantage, after the preliminary one-to five-year period, of paying off a portion of the bonds immediately with funds raised during the current year, in this manner reducing the amount of interest to be paid from year to year and avoiding the necessity of accumulating a sinking fund, (to be deposited at a rate of interest about one-half that stated in the face of the bonds), with which to pay off all bonds at a single date of maturity.

In the preceding example, using serial bonds instead of term bonds; total amount of issue, $100,000; period, fifteen years; interest, six percent per year; the first serial instalment maturing at the end of four years, and an equal amount each year thereafter until the end of the fifteenth year; twelve equal annual principal-instalments of $8,333 each. For the first three years it would be necessary to raise each year only the interest on $100,000 at 6 percent, or $6,000 annually; the fourth year the annual instalment of $8,333 plus $6,000 interest on all outstanding bonds, totaling $14,333; the fifth year, $13,833; the sixth year, $13,333; diminishing each year by the sum of $500, the amount of interest on bonds retired the previous year and hence no longer to be paid, until the twelfth and final instalment of principal and accrued interest at the end of the fifteenth year, $8,833, making an aggregate amount of $157,000—the original principal of the $100,000-bond issue plus a gross total interest of $57,000, or 57.0 percent raised over the whole period, effecting a net saving of $12,000 or 12.0 percent by using serial bonds instead of term bonds with sinking fund deposited at interest.

Appendix A of this volume gives in detail the methods used by the Los Angeles Public Library for promoting bond issues.

DONATIONS, LEGACIES, ENDOWMENTS AND TRUSTS. Occasionally some public-spirited citizen will give, or leave by will as a legacy, endowment or trust, a sum sufficient to secure the site and either partially or wholly construct, equip and sometimes operate the library, as a monument to himself or to some deceased person very dear to the giver; or some patriotic or fraternal organization will endow such institution as a memorial to certain members thereof who may have distinguished themselves in some manner and then passed on.

A variation of the endowment method of securing funds with which to finance an enterprise of this nature, steadily growing in favor in the United States, is by means of an insurance policy on the life of one or more citizens of great civic spirit but of limited financial circumstances; this policy payable to the Board or governing body of the institution to be favored. This method has a number of very great advantages; (1) instead of the benefactor depleting the capital of his estate by such gift, he pays out annually during his lifetime only the cost of the premium on his policy, amounting perhaps from one to five percent of his current income; (2) He pays no income tax to the government on that portion of his annual income set aside for this premium, provided this sum does not exceed fifteen percent of his total annual income; (3) Upon the death of the benefactor the proceeds of this policy form no part of his estate, and is not subject to inheritance taxes, income taxes, or administration by probate, with its attendant possibility of contest by heirs, setting aside of will, or other hazards or long-drawn-out litigation with its accompanying lawyer fees, court and and other expenses. The benefactor dies; the full sum set forth in the face of the policy is paid promptly, direct to the beneficiaries therein named, and that is the end of it.

Funds so provided may be given to the Board outright with no restrictions as to their use; but most often an endowment or bequest by will or by direct gift is made contingent upon certain conditions, such as perhaps the Board must raise an equal or proportionate amount by some other method, or that the endowment, gift or bequest may be used only in accordance with certain terms as stated in the deed of gift or the will under which the benefaction is made. For instance, in the case of the "Memorial Library," of the Los Angeles Library system, the alumni and students of the Los Angeles High School organized a corporation, purchased a tract of land adjacent to the high school and deeded it to the city with the restriction that the land should be used in perpetuity only for a park, a library site and a bandstand, as a memorial to those alumni and students who lost their lives in the World War. (See Plate 6.)

The acceptance of all sums of money received thru any of the methods above-mentioned for the endowment of a public institution must of course be legally permissible by state constitution and statutes, and by municipal char-

ter and ordinances; and should any of these conflict in any way with the acceptance of such benefits, a wise, energetic and politic Librarian or Board will know how to proceed to secure such amendment of the prohibitory constitutional, statutory, charter or ordinance provision as to permit the community legally to avail itself of such benefits.

In case also where a community has an indifferent or antagonistic council or other legislative body, or has difficulty in raising funds for purposes of this nature a properly diplomatic, tactful and sympathetic Librarian or member of the Board will know how to approach some local citizen of considerable means, of lofty civic spirit or highly inflated ego, or one who has recently lost a very dear member of his family, and convince such citizen that not only would he be rearing an enduring memorial to himself or to his departed loved one, but would as well be rendering an everlasting service and benefit to his community by assuming either in part or in whole the founding, constructing, equipping and perhaps operating a public library, by one of the methods suggested above; or such Librarian or Board member will be in a position to suggest to some organization either already existing or in prospect that it would indeed be a reverential act as well as a lasting benefit to the community to establish such library, and possibly erect the building and maintain the institution as a monument to the memory of departed members whom it may desire especially to honor.

BUDGET. A part of the set-up of any properly conducted organization is an annual budget—the estimated expenditures for the year balanced against the anticipated income for the same period. The library budget is usually adopted at the beginning of the fiscal year, conforming to the fiscal year of the local government unit authorizing or establishing and maintaining such library. It is not the function of this volume to discuss that portion of the budget having to do with the purchase of books, payment of Librarian's salary, and salaries of assistants and other attendants; but a discussion of budgetary requirements for the funds necessary to pay the annual serial or sinking fund installments, interest and other capital expenditures, and for depreciation, maintenance and operation of the building, plant and equipment is pertinent at that time.

Included in this portion of the budget should be found—

1. **Capital Expenditures:**
   a. Annual amount to sinking fund, or retirement of matured serial bonds.
   b. Interest due for the current year on outstanding bonds.
2. **Depreciation:**
   a. Building, furniture, desks, tables, chairs, shelving, stacks, etc.
   b. Mechanical equipment, furnace, fans, motors, auto trucks, etc.
3. **Maintenance:**
   Including all items mentioned in No. 2-a and 2-b above.

4. **Operation:**

Including all items mentioned in No. 2-b above.

DEPRECIATION. Immediately upon completion of a building and its equipment, deterioration commences. How fast this takes place in any particular building no person is able accurately to predict. But arbitrarily assuming the period of usefulness of the building itself and its furniture to be from thirty to fifty years, then the annual rate of depreciation of these items is from two to three and one-third percent; and assuming the mechanical equipment to be completely worn out in ten to fifteen years, the depreciation of this equipment would be six and two-thirds to ten percent per year. In all well-conducted private businesses the annual budget item for depreciation is carefully set aside from gross income in a separate fund known as the "depreciation fund" from which is purchased renewals of equipment and plant as fast as the existing equipment and plant are worn out and the annual maintenance cost becomes so high as no longer to be economical. In governmental institutions not always is such "depreciation fund" set aside each year; and in such cases the replacement of worn-out plant and equipment must of course be paid for by direct appropriation especially for that purpose from time to time as the necessity therefor arises.

MAINTENANCE. As distinguished from depreciation, maintenance is the cost of making such minor repairs as may be necessary to keep the building, plant, machinery and equipment in good operating condition; painting the machinery, roof, outside and inside of the building to prevent decay and corrosion; repairing or replacing small wornout machinery parts; waxing, varnishing or otherwise treating the floors and floor coverings to preserve them from wear; and all other work of this nature, including the salaries of janitors and assistants engaged in this work.

OPERATION. This includes the cost of fuel for heating, electricity for lighting and motive power, water for drinking, cleaning, flushing toilets and sprinkling lawns; gasoline and oil for motor trucks; soaps, cleaning powder and solvent for cleaning; and all other purchases of this nature. Operation includes also all or part of the salaries and expenses of engineer, janitors, truck driver and other employees engaged in the operation of mechanical equipment, sweeping and scrubbing floors, tending furnace, maintaining and operating motor trucks and all other work of this particular class. "Maintenance" and "Operation" may be, and usually are, included together as a single item in the budget.

CHAPTER II.

DESIGN.

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CHAPTER II.

DESIGN.

SELECTION OF THE SITE. Obviously the site for any public library building should be located near the center of population of the community—not merely as constituted today, but with thoughtful study and due regard to the direction in which the community is now growing most rapidly. Where was the center of population fifty years ago? Twenty years ago? Ten years ago? Where is it today? Where probably will be the center of population ten, twenty and fifty years hence? And somewhere between the present center of population and its probable location ten, twenty and fifty years in the future, giving careful consideration to the present direction and rate of growth of the community, should be situated the public library.

At the offices of all up-to-date Chambers of Commerce, Business Men's Leagues and local Real Estate Associations can be secured all information necessary for a fairly accurate determination of the present and future prospective population center.

It is neither desirable nor necessary to locate the building on any of the main business streets. Land values are too high, all out of proportion for the purpose used. The lots are usually too small, requiring the purchase of several parcels at the beginning of the undertaking in order to provide ample space for present needs and to **be sure** of adequate provision for anticipated future expansion. The dust, confusion and uproar of passing traffic is distracting and highly annoying to the more sensitive patrons of the library. Far better is it to secure the site on a convenient, quiet side street where traffic disturbances are at a minimum, where land values are much less and where lot sizes are considerably greater than the so-called "business" lots to be found on the main traffic thorofares.

CHOOSING THE ARCHITECT. From the standpoint of efficiency, economy of expenditure, and beauty and durability of finished results too much care can not be exercised in this matter. Political influence should not be allowed to enter in the slightest degree into the making of this appointment, but rather should the choice be made strictly upon the merits of the present reputation and past record of performance of the candidate. The prospective appointee should be a man of broad, mature, practical and successful experience in the design of public buildings; not so old as to have become "set" in any certain style of architecture, probably obsolete and out-of-date, to the exclusion of more modern architectural developments; nor yet so young, callow, immature and lacking in experience and judgment as to be unable to

determine intelligently the proper proportion and balance between architectural beautification, strength, ruggedness and security of design, cost of construction and adequacy of space necessary to be provided—proper regard of course being given to possible expansion and future enlargement of the building.

In this matter of an architect the author is reminded of a protegee of a nationally famous designer of public libraries in America; young, energetic, enthusiastic, filled to bursting with scintillant but untried ideas as to library design, commissioned to prepare plans for a modest library building to cost not in excess of $12,500. His completed design called for the construction of a wood-frame building, wood-shingle roof, and a disproportionally elaborate decorative treatment of the main entrance; and when let to contract, in order to secure the required space it was necessary to pay the lowest responsible bidder a price somewhat more than $19,000—over fifty percent greater than the original appropriation. An older and more experienced architect by using a different design could have produced a building with simpler yet wholly pleasing architectural features, of the necessary spacial requirements and at a cost very closely approximating the original appropriation.

INSTRUCTIONS TO ARCHITECT. By the time the project has reached the stage where the architect has been commissioned to prepare plans for the building, the Board and the Librarian have developed in their own minds a very definite and clear picture of what is wanted. Often these ideas are faultily imparted to the architect only thru the medium of verbal conferences—and frequently he fails to visualize the entire undertaking as clearly as do the Library authorities. In all cases the ideas of the Board and the Librarian should be written out in detail, in order that there may be no possible misunderstanding on the part of the architect concerning the ideas and desires of these authorities. Appendix B, "Instructions to Architect," indicates the nature of instructions given by the Los Angeles Public Library Board to the newly-appointed architect relating to features desired in the building for which he is instructed to prepare plans.

OUTLINE. That the architect may have a definite plan by which to work intelligently in carrying out the instructions of his client and in making his designs, it is extremely desirable that an outline be prepared beforehand. The responsibility for the successful preparation of this outline rests equally upon the Librarian and the architect; upon the former because of his or her knowledge of the special requirements in the way of economical arrangement of stacks, shelving, tables, desks and other furniture, and space required for public reading rooms, offices, rest rooms, work rooms and other necessary rooms; and upon the latter because of his special technical knowledge, experience and skill in planning the arrangement of the building as a whole, the fitting together of rooms of various sizes in order to make the most of the available site-space, and to utilize to maximum advantage the amount of funds appro-

priated for the construction of the building.

Fortunate indeed, altho comparatively rare is that community able to engage the services of a local architect who has had the experience of designing and supervising the construction of one or more library buildings; or to employ or secure locally the advisory services of a Librarian who has been all thru one or more building campaigns and therefore knows what to seek and what to avoid in the way of library building construction. Appendix C of this volume gives the outline form prepared by Miss Althea Warren, City Librarian, Miss Helen T. Kennedy, former Second Assistant Librarian, and their Principals of Branches, used by the author and his co-workers in planning the layout for the newer buildings of the Los Angeles Public Library system.

SOIL TESTS. To one fully appreciative of the responsibility of expending thousands of dollars in the construction of buildings it is indeed amazing to find these structures at times designed with sublime indifference and disregard to the character or the condition of the soil upon which the foundation rests. "Earth" has numberless sub-classifications—rock of various kind, sand, loam, clay, sand clay, clay loam, peat, adobe and a vast number of others; each having a different "bearing power" or ability to support the superimposed load and hence each requiring a different area of foundation in contact with and pressing upon the soil in order to support the building with safety and security from settling. Furthermore, that soil appearing at the surface of the ground is not at all necessarily the same as that upon which the foundation rests. As the excavation proceeds below the ground level, different classes of earth are found in strata at the different elevations; the presence of water at or above the level of the bottom of the foundations often changes very materially the supporting power of the soil; and filled soil, from its lessened compactness and consequent reduced supporting power, requires special features of design in order to insure the adequacy, permanency and safety of the foundation.

Kidder's "Architect's and Builder's Pocket-Book," gives the bearing power of various rock and soil sub-foundations as follows:

Kind of Material	Bearing Power, Tons per Square Foot	
	Minimum	Maximum
Rock, hardest, thick layers in native beds,	200	.....
Rock equal to the best ashlar masonry,	25	30
Rock equal to the best brick masonry,	15	20
Rock equal to poor brick masonry,	5	10
Clay on thick beds, always dry,	4	6
Clay on thick beds, moderately dry,	2	4
Clay, soft,	1	2
Gravel and coarse sand, well-cemented,	8	10
Sand, compact, well-cemented,	4	6
Sand, clean, dry,	2	4
Quicksand, alluvial soil, etc.,	½	1

From the foregoing discussion and from the table above it will be seen that a foundation even for the same building, designed for a soft clay sub-foundation for example would have twice the area of ground upon which to rest as one for moderately dry clay on thick beds or on clean, dry sand; four times as much as for one on thick clay always dry and compact sand well cemented; and eight times the area of bearing surface as for one of gravel and coarse sand well-cemented.

Two buildings taken over for maintenance by the author upon his assumption of duty as Superintendent of Buildings for the Los Angeles Public Library vividly illustrate the necessity of proper soil investigation before the design and construction of a building is commenced. Very shortly after its completion and occupancy one of these buildings began to separate along its axial center, one-half slowly sliding away from the other, more permanently-located half. A thoro but quite belated investigation of subsoil conditions revealed that at a depth of twenty-eight feet below the surface of the ground occurred a stratum of impervious soapy shale covered with a thin film of water, and dipping in the direction of the slide. So long as no extra heavy burden was borne thereby the soil remained to all appearances stationary; but when the load of the heavy building was imposed thereupon the earth began to slip upon the soapy shale beneath and carry with it the heavier, down-hill half of the building. The expenditure of fifty dollars in making a soil test of this site before the erection of the building would have brought these conditions to light, would have warned an alert, experienced architect to make an adequate foundation design in the beginning and would have saved in this instance more than $12,000 expended in underpinning and strengthening the foundations of this already-constructed building.

The second case is that of a building, rectangular in plan, built of brick, which within six months after its completion cracked from top to bottom at one end, and above and below the nearest window on an adjacent side. Investigation showed that the affected corner of the building projected over filled ground, which, settling much more than the original unfilled ground bearing the remainder of the structure, brought about the virtual breaking away of the corner. Again, at a very nominal cost, a careful designer would have informed himself beforehand of the actual sub-soil conditions, adequate foundation designs would have been made beforehand, and a subsequent expenditure of $4,000 in widening and strengthening the inadequate existing foundations would have been saved in this instance.

The author's instructions to those making subsoil tests are as follows:

(a) **In case of a rectangular site:** Lay out both diagonals from corner to opposite corner of the lot. At their intersection in the center bore a test hole not less than thirty feet deep, recording every change in character of the soil, the depth at which such change occurs, a description of the changed soil and

taking a sample thereof; and if this soil at the thirty-foot depth is peat, quicksand, shale or any other of suspicious character, continue boring until solid clay, sand or rock is encountered or until satisfied that no solid bearing is to be found. If the material at the bottom of the boring is shale, observe whether it is covered with water or not, and determine from other borings whether it lies in a horizontal or inclined stratum. On the diagonals of the site, one-fourth of the distance from each corner toward the center, bore a test hole at least sixteen feet deep, carefully recording the data described above and comparing the changes of character in the soil with those of the center boring in order to determine whether the subsoil is uniform or not and whether it lies in horizontal or inclined strata. In case the results are doubtful at the minimum depth of sixteen feet continue boring until a good foundation stratum is found or until assured that no satisfactory soil is to be encountered within a reasonable depth below the surface.

(b) In case of a site of irregular outline: Have the architect prepare a tentative foundation plan of the building. At the center of the proposed building plan bore the main test hole, thirty feet or greater in depth, and at each corner of the prospective building the holes of sixteen-foot depth or more, noting and recording the data and securing the samples in the same manner as described in (a) above.

TYPE OF BUILDING. Almost everyone has seen one or more communities such as newly-laid-out suburban subdivisions where the buildings were of no particular design or type—where they were thrown together helter-skelter, hodge-podge, with a resultant effect somewhat similar to that of the heterogeneous collection of canned-goods boxes and breakfast-food cartons scattered about the grocer's basement or backyard, greatly magnified. To rectify conditions such as these and to obviate them in the future many communities now have an "Art Commission" whose function it is to review and pass upon all architectural plans for the proposed buildings to be constructed in the community; to see that these buildings conform to certain architectural standards established by this Commission, without whose approval the builder is prevented by law from proceeding with the construction of the edifice. Where no such community Art Commission is in existence it is a responsibility of the architect designing a public library building to make his designs in such manner that they harmonize with the style or type of architecture generally prevalent in the community or locality. This does not mean that he shall slavishly follow any single set mode or form; but rather that his design shall be artistic and that it shall "fit in" with the general plan of the surrounding buildings, avoiding all freakish, violently contrasting designs wholly inharmonious with the architectural effects of the vicinity.

For centuries before America was discovered and settled the older civilizations of the eastern continent had originated architectural designs now well-

settled and which, modified as the architect's fancy dictates or as seems desirable on account of climatic or other conditions, are now adopted and made a part of American architecture. Subsequent also to the discovery and settlement of this country distinctive types of native architecture were developed, at first to meet conditions and satisfy needs within a comparatively restricted local area, later being adopted and used, in possibly modified form, over the whole country. And from this vast field of imported foreign designs and native forms, altered as he desires, an architect of good judgment and training will be able to select for his building that design most fitting in its environment and most pleasing to the eye. The variety of types constituting the Los Angeles Public Library system is shown as follows:

Greek Ionic.
Italian Renaissance.
Italian (Tuscan).
Modern Italian.
Romanesque, of Northern Italy and Southern Spain.
Spanish (Continental).
Northern Spanish Renaissance (Baroque Style).
Mediterranean.
English Tudor.
English Cottage.
Spanish (California) Mission.
Spanish (California) "Monterey."
Spanish (Mexican) Colonial.
California Renaissance.

CONSTRUCTION MATERIALS. The competent architect is an artist in his field, employing and combining the various construction materials in such manner as not only to produce a strong, durable, useful structure, but to achieve as well in the process beautiful, striking, decorative effects. For the less costly buildings wood of various kinds lends itself to carved, painted or natural varnish finishes. Portland cement concrete premoulded or poured in place in what is known as "inverted moulds," in which the decorative scheme is worked out reversed in plaster of Paris moulds, capable of making the most novel appearance when well done; brick all of the same kind can be worked out in patterns of different ranges of color, or combinations of different kinds and colors, or trimmed with terra cotta, artificial stone or natural stone — granite, marble, sandstone, or volcanic tufa. Concrete blocks premoulded in any desired patterns may be used, and a host of other classes of material are available from which to work out his artistic conceptions. In making his choice, however, for practical reasons, not only from the standpoint of the original construction but as well from that of repair and replacement of breakages and defective material when necessary, he should select as far as possible only those

materials produced within a reasonable distance from the project, eliminating in this manner excessive transportation costs and loss of time in bringing them from afar. It seems most absurd and foolish to specify as was done for a structure on the Pacific Coast a trim of marble quarried nowhere else than in Vermont, and a very special patented glass fabricated exclusively in a plant on the Atlantic seaboard, when a western marble and an unpatented glass produced much nearer the point of use, both of merit equal or superior to that specified, could have been used to the same advantage and at much less expense.

This principle applies with even greater force to the mechanical installation. It is most unusual to find a designer or structural engineer who has had any considerable amount of practical experience with, or more than a very vague and hazy understanding of, the problems of maintenance and operation of a completed building. There is absolutely nothing more provocative of grief, vexation,—AND SOULFUL PROFANITY!—than for a maintenance engineer to assume charge of equipment which was produced at great distance, sometimes at the other side of the continent, from the scene of his employment. And if, and when, it is necessary to make repairs or replacements of worn-out or broken parts of the installation, he is compelled either to incur a long delay while waiting for the receipt of the required repairs from the original factory, or else to have them made locally as a special job at an expense immensely in excess of the normal cost thereof.

For example: A coal-burning furnace manufactured in Pennsylvania was installed in a California library; remodeled into an oil-burner and used for eight years; the crown sheets burned out, and smoke and gas leaked into the library rooms, blackening the walls and causing hugh discomfort to the patrons. The manufacturing company during this period had reorganized and discontinued the regular manufacture of this particular furnace and the repair parts for the same. Finally after several weeks of damp, chilly mid-winter weather and after tedious long-distance correspondence back and forth across the continent, the library meanwhile with only such heat as could be supplied by portable electric heaters, the new crown sheets were received, the furnace was repaired and put back into operation. Much simpler, less expensive and better in every way would it have been to specify that the original heating plant be manufactured and installed by a heating and ventilating manufacturer of proved responsibility and experience, within the regional vicinity where if necessary spare parts and replacements could have been secured promptly and at a reasonable cost.

PRELIMINARY SKETCHES. The first work of an architect employed to design a building and given the instructions necessary to a clear idea of what is required of him is the preparation of "preliminary sketches," or drawings, not necessarily to exact scale, showing a tentative layout of the building in plan, sufficient vertical elevations to give a clear conception of its appearance

from various viewpoints, and indicating the materials from which it is proposed to erect the structure. These sketches may be merely black-and-white drawings, or more or less highly-tinted water-color pictures, according to the artist's fancy, the amount of work he cares to devote to this preliminary work, and the degree of variation in the few or many colors used in the decorative scheme of the proposed building. Customarily, only the preliminary sketches are submitted to the Art Commission for its approval.

ARCHITECTURAL PLANS. These are drawings also prepared by the architect which show the location and scale dimensions of the building on the site; the plan of the different floors; the arrangement of entrances, rooms, corridors, stairways and other architectural features; the vertical elevations of the exterior, and vertical sections of different portions of the structure, indicating the materials used, the thickness of walls, and the general type of construction in considerably more detail than shown by the preliminary sketches.

STRUCTURAL DESIGN. Just as it is the primary responsibility of the architect to conceive the project as a whole, and to picture his conception by means of his preliminary sketches and architectural drawings; so it devolves upon the structural engineer, either a member of the architect's organization or firm or a private engineer in collaboration with the architect, to prepare "structural designs," in minute detail, showing the exact length, width and depth of every member of the structure to afford the maximum degree of strength and safety with the minimum expenditure of material and labor. Foundations must be designed covering sufficient area to be upheld safely by the ground upon which they rest, without settling; walls must be of such thickness and construction as adequately to support the roof and the maximum load that the latter may be called upon to carry, and to withstand the horizontal pressure of wind equivalent to the most violent windstorm ever recorded by the nearest weather bureau; and if the vicinity is subject to earthquakes, or if the latter may be anticipated, provision should be made in designing these walls to withstand such shocks. Windows should be so detailed as to admit the maximum amount of light and air, yet exclude the most searching rainstorm; doors to operate easily, yet shut out all wet and cold; roof to bear safely the pressure of the heaviest snow and wind storms ever reasonably to be expected; and a multitude of other details, all necessary but extremely wearisome to the reader to describe here.

The average breaking strength of different construction materials — wood, steel, brick, concrete and all others—is known to a fairly accurate degree by experienced engineers. In designing, an arbitrary "factor of safety" is used, "four," "six" or "eight;" and the structure when completed has been designed and built four, six or eight times as strong as necessary barely to withstand the destructive forces mentioned above—vertical pressure on foundations, lateral pressure of wind against walls and weight of heaviest snow and wind storms on the roof—according to the conventional factor of safety adopt-

ed and used by the structural engineer for this particular job.

FULL-SIZE DETAILS AND SHOP DRAWINGS. In addition to the sketches, plans and drawings previously mentioned, still other details are necessary. How are the joints in the different members made? How fastened together? How does the more intricate portion of the work appear in full size? To answer these and other numberless pertinent questions we have the "full-size," details prepared by the architect, indicating exactly how he wants this portion of the work performed; and "shop drawings," prepared by the contractor, showing in minute detail just how he proposes to fabricate and install each separate complicated element of his contract. Shop drawings are, or always should be, carefully checked and approved in writing by the architect before the contractor proceeds with that portion of his work shown therein.

These full-size details and shop drawings bearing the architect's written approval are customarily forwarded to the contractor from time to time after the contract has been signed by both parties and the work commenced. Where the architect is negligent or dilatory in forwarding these drawings the contractor has only two courses which he may follow: (1) slow down or stop his work until such time as he actually receives his delayed drawings, thus rendering himself liable to overrun his contract time and incur the monetary penalty usually provided in contracts on public construction for exceeding the stated limit for performing the work; or (2) proceed with such scanty information as may appear on his architectural and structuraldrawings, on his own initiative and at his own personal risk of having this work condemned and ordered removed and replaced at his own expense, in case the completed work fails to comply in every minute detail with the idea the architect has in mind. On jobs under the author's supervision very often these full-size details and approved shop drawings have been unduly and unnecessarily delayed; and in order to avoid the unfair and unreasonable penalization of the contractor in this manner the following provision is included in "Instructions to Architects," (Appendix B):

> "The architect will furnish, at the time the architectural plans and structural drawings are submitted, all full-size details necessary for the complete instruction of the contractor, and the plans will not be considered complete until such full-size details have been furnished. The architect will also approve in writing all shop drawings submitted by the contractor acceptable to the architect, without unnecessary delay."

SPECIFICATIONS. As the plans and details indicate pictorially the appearance of the project and the manner of its construction, so the specifications furnish a complete and detailed description of those different features and necessary processes which can not be pictured. Specifications are intended only to supplement the plans and drawings, and are not required to describe any portion of the work adequately and completely portrayed in the drawings. In case of disagreement or discrepancy between the drawings and the specifications the provisions of the latter should prevail.

Age-old is the dispute between designers and contractors with reference to the interpretation of specifications. The latter contend that no specification is

intended to be, or ever can be, followed literally and exactly as written; that it is merely a **guide,** to be approximated and observed more or less closely, according to the best judgment of the contractor. Designers on the other hand insist that a specification describes exactly the materials and methods to be used in the construction, and should be followed to the letter. The author holds that in the first place a specification should be written in concise, unambiguous language, clearly and unmistakably describing the materials and methods the designer has in mind, omitting absolutely everything not essential or germane to the proper completion of the project, and not requiring of the contractor impossibilities or impracticabilities in the fulfillment of his contract; then it should be followed implicitly, without the slightest variation or deviation from the express requirements of the same. It is unfortunately far too true that many specifications as written are vague, verbose, containing many requirements unessential and indicating very obviously that the designer himself has no very clear idea of the final result he wishes to produce and is therefore "passing the buck," and depending upon the contractor to supply any omissions or deficiencies in the specifications; and others, patently written by theorists who may have brilliant, scintillant ideas as to design but little or no experience from a practical standpoint in the actual construction of a building, make, therefore, requirements unnecessarily difficult or even impossible to accomplish.

The latter condition is aptly illustrated in the case of a specification coming under the author's observation, calling for a flue lining to be of one-piece terra cotta, 7/8-inch in thickness, laid in sections. The volume of smoke and exhaust gases from the heating plant required a flue not less than 26 inches square in cross section—a size not made as standard by any terra cotta manufacturer within reasonable distance of the project, and which can be made for this one single job only by providing dies of the necessary special size, thru which the plastic clay is forced to form the required shape), at a very unreasonable and disproportionate expenditure of money and loss of time. To specify the flue lining of fire brick laid on edge in fire-clay mortar, with broken joints and bonded corners, would have been far simpler, more practical and economical, and would have secured a lining two and one-half inches in thickness and a much better result in every respect.

CHECKING PLANS AND SPECIFICATIONS. Being prepared by human beings, plans and specifications are subject to the same errors and mistakes as are the aforesaid human beings. Discrepancies arise. The plans may provide one thing, the specifications something else wholly different. Even tho the contract states distinctly that in case of conflict in the plans and specifications, the one or the other shall take precedence, experience and good judgment will show the governing plan or specification, as the case may be to be patently in error. When submitting a proposal for doing the work, no mat-

ter what the contractor himself considers to be the correct method or mode of procedure, he is strictly bound by the terms and wording of his contract, of which in all cases the plans and specifications form an integral part. And where a contractor can clearly show that he has been caused a serious loss thru a material error or misunderstanding in the plans or specifications, a cause of legal action will lie against the "owner" or other party to the contract. Nor can the "owner" hide behind the claim that not he, but the architect, prepared the plans and specifications; for in so doing the architect was acting as the agent of the owner, or principal, and a universal tenet of law holds the principal responsible for all acts of his agent. Therefore if only as insurance against the possibility of expensive litigation a wise and prudent Librarian or Board will demand a careful and exhaustive check and cross-check of all plans, structural designs, details and specifications, either by the architect himself or by an independent architect or structural engineer.

It is apropos to state here that in the plans and structural designs for one building of which the author supervised the construction, over one hundred errors, blunders, mistakes and discrepancies were found, varying all the way from one and one-half inches to six feet in certain dimensions of various parts of the structure; every one of which would have been discovered and corrected had all the plans, designs and details been conscientiously checked and cross-checked before final submission to the owner.

TESTS OF MATERIALS. To make certain that materials used in the construction of a building conform in every way to the specified requirements, such tests as may be necessary should be made; the fineness of Portland cement flour; the gradations in sizes of grains of sand and particles of crushed stone and gravel for concrete; the qualities, and requisite chemical and physical characteristics of the different construction materials — lime, gypsum plaster, structural steel, aluminum, bituminous roofing and waterproofing material, paint and a host of others. These tests have been devised after years of study and practical construction experience, by various societies—American Society of Civil Engineers, American Society for Testing Materials, and others — in such manner as will show clearly, positively and unmistakably whether or not the material tested will conform to the quality-standards established by these Societies for the respective materials. Without these standards, usually included in all up-to-date specifications, inferior materials or manufactured products could be used with little if any hindrance on the job. Cement manufactured with improper proportions of component materials, or improperly processed, may lack as high as sixty to seventy-five percent of its normal strength or may be unduly defective in one or more other important respects; and if it has been stored too long in a moist location, instead of a fine, flour-like material it may be received on the work in a lumpy condition totally unfit for use. Reinforcing iron may be manufactured of lifeless scrap iron, very brittle and largely de-

void of the strength normally to be expected of it. Brick, terra cotta and hollow clay tile may be under-burned, soft, porous, warped, cracked or broken, spalled and wholly unfit for use. Paint may be adulterated with clay or other substances in place of the standard white lead and zinc oxide, or it may have cheap fish oil, bean oil, peanut oil or other vegetable oil substituted instead of linseed oil required for first class paint material. Sheet copper if used at all may be adulterated or alloyed instead of pure, or may be of paper-thinness instead of proper and serviceable thickness; and a vast multitude of other possible makeshifts, substitutions and evasions are avoided and only the best of materials and manufactured products are used where the respective quality-standards, and the determining-tests for each, are required by properly written specifications.

In this chapter on design it is well to discuss the questions as to whose responsibility it is to see that all the tests necessary to a proper determination of the quality of the materials are made. In making these tests a vast amount of special equipment is employed—some strong and rugged, other light and delicate; and only a commercial testing laboratory or the mechanics department of an engineering college or university has the complete equipment and undertakes to do this work at a reasonable cost. The specifications should provide that all necessary tests of materials should be made at the expense of the contractor, by a properly equipped laboratory selected by the architect, and should set forth clearly all tests required to be made. The contract price is presumed to cover in a single sum every and all expense connected in any way with the construction of the building, and should very properly include all tests of materials and other incidental construction expenses; otherwise the owner will be showered with a host of little bills from here and there for a vast number of services, all having to do with the completion of the project and all of which rightfully belong in the contract price but are not so included unless expressly so specified.

COMPETITION IN MATERIALS AND MANUFACTURED ARTICLES. The widest possible competition in materials or manufactured articles is greatly to be desired in any construction project; otherwise when exclusively specified a monopoly is immediately created and the manufacturer or dealer in the exclusive product can, and most frequently does, charge a fancy and exorbitant price for his product. In many states and local communities it is made mandatory by statute and ordinance that monopoly be eliminated and fair competition required among the dealers of materials necessary for construction purposes. This competition may be had in one or more of the following ways:

(1) Draw the specification in such manner that, without naming any firm, product or trade mark, it accurately describes the standard of quality and the characteristics of the desired article or material, thus permitting the use of

any one of a number which comply with all the requirements of the specifications. This is the method employed exclusively by the United States Government in preparing specifications prior to letting a contract for any necessary services or purchases.

(2) Specify three or more articles or materials, all equally meritorious and suitable for the intended purpose, by the name of the manufacturer or by trade name, long established and positively known to be of the proper standard of quality and excellence, giving in each case wheresoever possible the manufacturer's catalog designation and number in order that there may be no mistake of identification and stating that the use of any of the enumerated articles or materials will be acceptable.

(3) Specify by name of manufacturer or by trade name a single article or material of each kind required, in this manner establishing the standard of excellence for the particular article or class, and including in the General Conditions of the contract a section similar to the following:

> **"Approved Equal."** Articles or products specified by name or brand are established as the standard for that product or class. The contractor may propose in writing to substitute any article or material as an 'approved equal' of the established standard. Before using any proposed substitute article or material the contractor shall have the affirmative written approval of the owner or his authorized representative for the same."

Just a word of warning as to the indiscriminate use of "approved equal" substitutes.

In practically all cases a contractor proposes to use a substitute because of its lower price than that of the specified article. The quality also is usually as much inferior as the price is lower. In a magnificent cathedral in New York City the floor of which was completed and put into use about 1914, the aisles were of green marble, specified to be imported from Italy. After the contract was under way the contractors prevailed upon the responsible officers of the church to substitute for the Italian marble an American product greatly similar in appearance and much less costly. The change was made. Eighteen months after being opened to the public the marble aisles were worn in deep grooves and had to be entirely replaced. The green coloring matter, so beautiful in appearance, was Serpentine—a midway disintegration product of a certain mineral whose final state is asbestos. The coloring matter of the Italian marble was a different mineral altogether, of far more durable nature.

ALTERNATES. Very often it occurs that some article or method of construction is particularly desired by the owner, but considerable doubt is present as to its feasibility because of excessive cost; and not until the cost estimates of the entire project are made and the proposals received from the contractors for the construction of the same, can it be definitely decided whether or not the desired article or process may be included in the building. Under these circumstances it is customary to prepare plans and specifications covering the desired article or process, and then to draw "alternate" plans and specifications describing a less costly product or method. When the contract is ad-

vertised for proposals the contractors are asked to bid on both the originally-specified material or process, and separately on the alternate; and when the proposals are received and tabulated it can be very readily determined whether the budget can afford the desired product or process, or whether financial circumstances will compel the adoption of the less expensive feature. For example—specifications for the higher class modern-day plumbing now almost universally specify extra heavy pure copper or brass pipe, of iron pipe sizes, for hot and cold water pipe beneath floors and in the walls of a building. Brass and copper pipe cost from ten to twenty percent more than genuine wrought iron pipe, and about twenty to forty percent more than the standard steel pipe now sold everywhere under the very misleading term of "iron" pipe. Where brass or copper pipe is desired as the first choice, but where any question arises as to the sufficiency of the budget to cover the same, it may be specified in the original specifications with alternate specifications for genuine wrought iron pipe. It is extremely foolish and short-sighted ever to permit the architect to specify the standard commercial "iron" water pipe for concealed locations, as shown in the case of a Library building erected in Los Angeles in 1916, in which the water-piping system comprising this class of pipe was buried in the wet soil beneath the concrete floor of the basement. Pipe of this kind is actually made of Bessemer or open-hearth steel, containing among its other impurities from 2½ to 4 percent of uncombined carbon in the form of small particles scattered thruout the mass. When properly excited each small carbon particle acts as one pole of an electric battery, of which the surrounding iron is the other pole; and a so-called "electrolytic action" is thereby set up, speedily causing small pits and holes to develop in the steel at each carbon particle. This action, accelerated by the grounding of return electricity from the rails of an electric street railway directly in front of the building, caused corrosion and leakage within two or three years after installation, requiring each time the cutting and relaying of the basement floor when making repairs, until in 1928, twelve years after the occupation of the structure, the complete disintegration of this piping system necessitated removal and replacement in its entirety. In direct contrast to this illustration is the example of water piping of pure wrought iron, containing no free carbon particles, handmade in this country in Colonial times two or three hundred years ago, recently exhumed and found to be in a perfect state of preservation except for a slight coating of rust on the exterior and interior surfaces. Likewise, piping and other articles made of pure copper or brass, buried for many hundreds of years, have been recovered and found in equally good condition.

PRECAUTIONS AGAINST SETTLING. Repeatedly has been emphasized the importance of adequate foundation design to prevent settling of the building and cracking or breaking away of the walls. This may be done in two ways:

(1) Carefully calculating the width of the foundation such that the weight of the superimposed building is equally distributed over every square foot of foundation subsoil where the latter is of uniform character thruout; and inversely proportional to the assumed or ascertained supporting power of the sub-soil where the latter varies in character under different sections of the building;

(2) Strongly reinforcing the foundation footings with deformed steel reinforcing bars, of total cross-section aggregating at least 0.5 percent of the cross-section of the footings, in such manner that should any portion of the subgrade be softer and of less bearing power than other portions, the reinforced foundation will act as a bridge or a beam over the softer spots and the building will be adequately supported by the firmer, more solid sections of the subgrade with no unequal settling at any point.

A third method where the subgrade is exceptionally soft and unstable is to drive piles along the line of the foundation; these piles penetrating thru the softer strata until they come to rest upon firmer earth beneath, or until the friction of the earth in contact with the surface of the piles becomes so great as to prevent any further sinking or settling of the latter. A properly designed foundation will make use of one or more of these methods where necessary and will give equal consideration to each.

Where doubt or uncertainty exists as to the actual supporting power of the subfoundation a test is made. A wooden timber one foot square in cross-section is strongly braced in a vertical position, free to move up or down. A platform is built on top, and, without any load the elevation is referred by a fine level observation to a nearby fixed benchmark. The platform is then slightly loaded and after twenty-four to forty-eight hours, accurate elevations of the platform are again taken by level. The load is increased and the process continued until a settlement of the timber begins to be noticeable; whereupon the load on the platform at the time the settlement becomes noticeable is considered to be the ultimate bearing power of that particular soil, measured usually in tons per square foot. With the application of a proper "factor of safety" these test-results are used in the design of the building. The load may be placed upon a strongly-built table, the legs of which rest upon horizontal plates one foot square, and the total load causing settlement, divided by the number of legs of the table, will give the ultimate bearing power of the soil instead of applying the entire load to a single vertical timber as described above.

PREVENTION OF DAMAGE FROM EARTHQUAKES. It has been the author's good fortune to examine quite carefully the effect of severe earthquake on buildings very shortly after shocks had occurred, at Santa Barbara, California, in 1925 and in Long Beach and Compton, California, in 1933. In all cases examined the buildings of Class A construction—structural steel, or reinforced concrete, or a combination of the two—suffered very little if any dam-

age whatsoever, and apparently little additional strength-design is necessary for buildings of this class to withstand safely ordinary earthquake shocks. But buildings of Class B and Class C construction, of brick, cement concrete block, burned tile and unreinforced stone masonry, were affected to a very considerable degree; the walls of the buildings breaking loose at the eave-line, opening outward on all sides and falling flat as tho hinged at the bottom, leaving the rooms behind these walls exposed in a manner somewhat similar to uncapped honey-comb cells. In every case coming under the author's observation of buildings of these two classes no effort had been made to stiffen the brick, tile or cement block wall near the top, and cement it strongly together to resist the sinuous, "whipping" action of possible earthquakes.

As a result of the 1933 earthquakes in Southern California certain cities in the affected area — Los Angeles, Long Beach and others — adopted rigorous ordinances governing the construction of buildings within their respective jurisdictions; stiffening their design requirements as to horizontal load stresses in walls, trusses and girders, requiring the substitution of fifty to seventy-five percent of portland cement in lieu of the weak one hundred percent lime content in mortar heretofore used for brick and masonry construction, and putting into effect various other methods to produce stronger, safer, earthquake-proof buildings. These ordinance provisions in complete detail are extremely technical, excessively lengthy and are not germane to the purpose of this volume; but those interested in the subject may secure a copy of the "Earthquake Ordinance" (No. 72,968) from the City Clerk or the Department of Building and Safety, Los Angeles, California, or a copy of the Los Angeles Daily Journal for Wednesday, September 6, 1933, in which this ordinance is printed in full.

Prior to the formulation and adoption of the above-described ordinance, and quite effective for buildings not exceeding one story, is the author's design requirement of a concrete belt course built in with the brick, concrete block or stone masonry just above the line of high windows in the reading rooms, horizontally and continuously without break or offset around the building; the full thickness of the wall minus one course of veneer, and strongly reinforced, the cross-sectional area of the reinforcing steel being not less than 0.5 percent of the area in cross-section of the belt course itself. (See paragraph 10, Appendix B, "Instructions to Architects.")

NATURAL LIGHTING. The primary purpose of a library being to provide facilities for reading and study, the question of lighting becomes one of paramount importance. Too often we see rented store buildings imperfectly adapted to library purposes, deep, narrow, with the natural light all coming from one or two windows of more or less restricted area at one end. It is indeed difficult to provide too great an area of window openings in the exterior wall space. And yet this very wall space for a height of about seven feet from

the floor upward is urgently required for book shelving. These two important and conflicting requirements can be reconciled in very large measure by designing the windows of the reading rooms with sills at least seven feet above the floor levels, reserving the wall space beneath for the necessary and important book shelves. Windows in Stack Rooms should extend from floor to ceiling, of width the same as the aisle between two rows of stacks.

A building designed with the administrative portion—office, workroom, restroom, and others—lower than that portion devoted to public purposes can well be provided with clere-story windows above the roof level of the administrative section, not only increasing the natural lighting in the reading rooms, but presenting as well a very pleasing and effective appearance architecturally. Children are especially sensitive to the depressing effect of darkness or dullness, and to the opposite buoyancy of bright sunlight. Children gather at a public library usually in the afternoon; therefore special effort should be made so to design the building as to secure the greatest possible amount of direct afternoon sunlight in the children's reading room.

No circular or semi-circular windows or transoms should be permitted in the design of a library unless they are to be of clouded or colored glass, due to the excessive difficulty of providing them with properly-shaped, properly-fitting curtains, free from bunchiness and general cheapness of effect. Casement and architectural projected windows should invariably open outward in order not to pre-empt valuable wall space needed for shelving. By all means if possible it is better to keep the sills of basement windows above the adjacent ground level, to prevent flooding the basement. Where it is impossible or impracticable to keep these sills at this height, then these windows in all cases should open out into areaways, **adequately drained,** as described in greater detail later in this chapter, under the caption—"Draining and Waterproofing Basement Windows, Walls, Floors and Entrances."

ARTIFICIAL LIGHTING. Second in importance only to the question of natural lighting is that of providing artificial light. Architects and illumination designers are ordinarily obsessed with the idea that beauty—(meaning their conception of beauty,)—must be preserved at any cost, most frequently to the sacrifice of efficiency of lighting fixtures installed. The normal procedure seems to be, first, to calculate the amount of light required; second, to provide illuminants sufficient to supply this light with an adequate factor of safety; then, third, to surround and incrust these illuminants with opaque brass, hammered copper or gilded iron bands and straps and other gadgets such that the actual efficiency of the installation is reduced anywhere from thirty to sixty percent of the necessary calculated illumination.

The author's initiation into the question of lighting efficiency arose when, first entering the service of the Los Angeles Public Library, a complaint was registered from one of branches in regard to poor lighting and disproportion-

ately heavy electrical bills for the same. Thru the courtesy of the City Bureau of Power and Light an illuminating engineer was loaned to the Library, scientific tests were made—and the system was found to be only twenty-three percent efficient; the other seventy-seven percent of light expending itself within the surrounding imprisonment of metal bands, bars, gilding and other ornamentation, unduly heating the fixtures, and vainly trying to escape and perform its duty in the manner for which originally designed. In this particular case an exchange of fixtures increased the lighting efficiency of this installation from twenty-three to eighty-eight percent, with a corresponding decrease in bills for electricity.

The author's specifications for lighting fixtures of direct or semi-direct type require that there shall be no metal, gilding or opaque obscuration of any kind below a horizontal plane passingthru the filaments of bulbs in each fixture. (See Appendix D, paragraph 3702.)

The efficiency of the artificial lighting system is immensely increased and the expense for electricity proportionately diminished by unbroken walls and ceilings, and by white or light-colored interior painting and decoration. Conversely, the efficiency is greatly reduced and the expense augmented by broken walls and ceilings and by very dark woodwork and interior painting. Pure, glossy white is glaring, dazzling, deathlike and more or less depressing to a sensitive patron. Light ivory or cream tinted ceilings and walls present a warm, cheerful aspect, and combined with very dark green trim, furniture and shelving, with a slight silvery sheen, make a very effective and restful combination.

Considerable controversy arises over the respective merits of direct versus indirect artificial lighting. The author's actual experience proves that in a library with a color scheme such as that described above the expense of indirect lighting is about twenty-five percent greater than that of direct lighting under similar conditions; and this increased expense is more than offset by the restfulness, relief from eye strain, and the appreciation and gratitude of the patronizing public.

In the author's practice it is customary to set aside a lump-sum amount for this purpose, and to reserve from the general construction contract and from the architect's contract the design, fabrication and hanging of all lighting fixtures; this work being done by the manufacturers, who are asked to submit competitive designs for the same designated amount, from which is selected that design most pleasing, most efficient and best suited to the particular building.

CONCRETE STEPS. Everyone has seen the unsightly crack or gap which frequently opens up between a building and the concrete steps approaching the same. These gaps or cracks arise from the formation of a weak joint when the building and the steps are constructed a different times, and the latter of

the two shrink away as the concrete sets and hardens; or they may be caused by unequal settlement of building and steps, arising from disproportion in the allowable unit foundation pressure between the one and the other. The prevention of these gaps and cracks is obvious; make the reinforcement of the building foundation continuous with that of the steps, or strongly anchor the steps to the foundation of the building; pour the concrete of the steps simultaneously and monolithically with that of the building; and be sure in the design of the building that the unit pressure per square foot of area for the foundation of the steps is the same as that for the building foundation.

Concrete steps in time wear smooth and excessively slippery unless special precautions are taken to prevent such conditions. This may be done by a rough finish left on the concrete by a wooden float before the former has set; by providing a series of shallow transverse grooves, close together, in the concrete of the treads before it has hardened; by the insertion of cast iron or aluminum non-slip treads set flush with the surface of the concrete and with transverse grooves filled with lead or other non-slippery material; or, simplest and most effective of all, as well as the most pleasing, to sift granulated emery or carborundum with grains about the size of coarse granulated sugar, at the rate of about one pound for every four square feet of superficial area very quickly after it is placed, and trowel very lightly into the plastic concrete. Great care must be taken to distribute the abrasive evenly over the surface otherwise the latter will be streaky, with slippery spots where the abrasive is thinly scattered.

STREET SIDEWALKS. Most usually a building of the kind discussed herein is located at the intersection of two streets. And nearly always the sidewalks in place are of very poor construction, often too narrow and unsuitable for use as approaches to the building. During the construction also notwithstanding any care taken to protect them, they are usually so damaged as to necessitate their removal and replacement by new sidewalk.

In many communities this removal and replacement is reserved by ordinance or community regulation as a function and a duty of the local government, the cost of the same however being assessed against the abutting property owner. In other cases the owner is permitted, or required, to remove the old sidewalk and replace it with new at his own expense under the supervision of the Building Department of the local community government. In any case the new building should have new sidewalk, from curb to property line, on both street fronts.

Sidewalks on inclined grades are likely to become quite slippery when worn smooth and when wet; especially the latter for people wearing storm rubbers, rubber heels or shoes with composition soles. A simple, permanent method of overcoming this condition yet leaving a pleasing appearance is to sweep the surface, immediately after trowelling and while still plastic, transversely with a stiff, coarse fiber broom, producing a finely corrugated effect.

This method is also very practical for inclined concrete driveways.

DRAINING AND WATERPROOFING BASEMENT WINDOWS. WALLS, FLOORS AND ENTRANCES. Previously in this chapter it has been mentioned that basement windows should be entirely above ground level in all cases where possible; and where impossible they should open out onto areaways adequately drained. Far too often this drainage is weakly attempted merely by the construction of a sump or "drainage well," filled with boulders and gravel, and covered with straw and a layer of sand. The theory of this makeshift is that the water accumulating in this sump will seep away into the adjacent ground as fast as it is collected and conducted to this reservoir; but where the adjacent ground happens to be of stiff, close-grained clay, or when the straw-sand-gravel layer in the sump becomes silted up and impervious to water, then the latter coming into this sump does the only thing left to do under the circumstances—pile up and overflow the area and the nearby basement. A little more expensive but far more effective method is to connect the *sump (without the boulder-gravel, etc. filling,) with a nearby storm sewer; or* if there is none at a lower elevation than the basement sump, then the latter should be drained into the nearest street gutter by an electrically driven, automatically-acting pump, starting when the water in the sump reaches a certain height, (the pump being adjustable to any height of water,) and stopping when the sump has been emptied. A light, simple, strongly-constructed pump can be secured for this purpose at a cost of fifty to sixty-five dollars; attached to a convenient lighting socket, and will last as long as the building which it serves, with proper care, oiling, etc. of course.

The above discussion for waterproofing basement windows applies with equal force to basement entrances.

In practically all cases the floor of a basement is below the level of the "water table" in the ground immediately adjacent; or else the water table rises during the rainy season to an elevation higher than the basement floor; and in either instance the basement is flooded unless extra precautions are taken to exclude the water by carefully waterproofing all basement walls and floors below the ground-surface level. Frequently this matter is given no consideration at all during construction, dependence being placed wholly upon the natural density and waterproofing qualities of the concrete or other material used for these walls, which fails sometimes with exceedingly damp and unpleasant consequences, as will be shown in Chapter III hereafter. Too much reliance also should not be placed in merely painting the exterior of the wall, or upper surface of the floor, with one, two or three coats of so-called water-proofing paint; very slight settlement or shrinkage opens up cracks, the water finds its way thru, and the waterproofing qualities of the paint are destroyed for a very considerable distance in all directions from the cracked or broken surface.

The author specifies for this purpose the so-called "membrane water-

proofing;" a preliminary coating of light asphaltic oil is applied as priming to the perfectly dry surface to be waterproofed. A heavy coating of hot waterproofing asphalt follows, upon which is laid five layers of asphalt-impregnated felt weighing fifteen pounds per square yard, overlapping joints and with a heavy coat of asphalt between each two contiguous layers of felt; a final heavy coat of hot asphalt, and the whole covered with a four-inch layer of concrete, if a floor is being waterproofed, or by a one-inch layer of 1:3 cement-sand plaster in the case of a wall, in this latter instance to prevent injury to the membrane by the backfilling of the surrounding excavation or by the gnawing of gophers, ground squirrels or other underground rodents. Creosote oil, tarred felt and coal tar pitch may be used instead of asphaltic primer, asphaltic felt and waterproofing asphalt.

DAMP-PROOFING EXTERIOR WALLS. One of the most horrifying disheartening and discouraging things which can happen to the proud occupant of a clean, newly-constructed, freshly-painted building is the appearance, about a month or six weeks after its completion, of blistered, scabrous, peeling, discolored patches on the painted plaster walls. In appearance a wall may be perfectly innocent and dry-looking; but woe be unto the builder who takes a chance, and who paints his plaster wallbefore every trace of moisture has evaporated, which may reach this surface subsequently! To this reason principally is due the practice of the United States Government deferring for one or two years or longer after completion of its public buildings the painting of their interior plastered wall surfaces.

The condition described above may be brought about by failing to have the wall perfectly dry before painting; by failing to "size" the surface, or seal the pores and insulate the paint film from the burning action of the lime in the plaster; or by failing to damp-proof the outside wall, breaking the chain of capillarity which conducts the moisture during damp weather from the outside thru the wall to the inside of the building.

The conventional practice in sizing is to cover the wall with a coat of shellac; but a better, more effective and far safer method is to paint the wall with at least two heavy coats of shellac before applying the paint coat. Damp-proofing may be done either by painting the rough outside wall of the building with two or three heavy coats of bituminous damp-proofing paint before the plastering is done, or by "furring,"—lining the interior surface of this outside wall with hollow burned clay tile, or a light steel channel framework covered with expanded metal lath, or wooden studding and wood lath; the furring in any of the three cases mentioned being covered with plaster and finish coat. The theory of furring is first class in the case of steel-channel-and - metal - lath or wood-studding-and-wood-lath, leaving a continuous air space between the furring and the outer wall to insulate the interior of the building from dampness working its way thru from the outside; the hollow tile method is not so good however,

the material being joined to the outer wall by mortar joints which themselves are of a high degree of porosity and readily conduct the moisture from the outer to the inner surface, in this manner nullifying to a great extent the very purpose for which designed.

Not only is a furred wall built of proper materials thoroly efficient in damp-proofing the interior of a building, but the furring lends itself to beautiful and artistic architectural effects. Shelving, which otherwise would stand against a blank wall, accumulating dust on its top, can be built into a furred wall in such manner that the surface of the wall above the shelving lies in the same vertical plane as the outer edges of the shelves; indirect lighting fixtures can be so concealed in window ledges and in furred pockets in the wall as to be wholly invisible to and difficult to discover by a person standing on the floor; the ceiling may be treated in an infinite variety of arches, groins and other decorative effects, and many other ornamental uses may be developed by a skilled and competent architect.

ROOFING MATERIALS. Not only is the roof of a building intended to keep out snow, rain, heat, cold and wind coming into contact therewith, but it lends itself as well to infinite forms of decorative treatment in the hands of a skilled architect. In tropical regions, and the sub-tropical climates of southern and southwestern United States we find gaudy, colorful effects in red, brown and purple clay tile or artificial asbestos tile; red, gray, green and blue composition shingles, or bituminous composition roofing laid in bands or patterns of various bright colors, wholly appropriate and in keeping with the brilliant exterior walls of buildings in these sections. Such roofs, however, would be as inapt and unsuitable in the soberer, more staid communities farther north as would be the modern young flapper with all her brilliant-colored dress, rouge and lipstick in a Quaker meeting. The following table indicates a wide range of the more commonly used roofing materials from which may be selected one suitable for every community and fitted to every budget:

ROOFING MATERIALS.

Type	First Cost	Cost of Maintenance	Appearance	Durability
Wood Shingle	1	7	6	7
Bituminous Composition	2	2	5	5
Asphalt Shingle	3	3	4	6
Corrugated Metal	4	1	7	4
Burned Clay Tile	5	6	1	3
Natural Slate	6	5	3	2
Asbestos Slate	7	4	2	1

WOOD SHINGLE ROOF. This type of roof has only its first cost and ease of construction to recommend it. In appearance it is rather cheap, not especially beautiful. A shingled roof lasts only from seven to ten years, then it must be reshingled or replaced by a more durable type. The heat and lack of humidity during a long summer season suck the moisture from the shingles, causing them to curl, crack, split and creep; and dries them out until they are as inflammable as tinder, causing a roof of this material to be a real fire hazard,

with correspondingly high fire insurance rates for buildings with roofs of this kind. The curling from the effects of dryness and heat, and flattening again when cooled off or moistened tends to loosen the nails, causing them to drop out and leave the empty nail holes thru which rain finds its way and forms leaks within the building. Even for a structure of very cheap construction intended only for short temporary use the author prefers to use one of the other less expensive roofing materials listed above.

BITUMINOUS COMPOSITION ROOF. This type of roof is composed of layers of felt bound with asphalt or tar, and may be either a prepared roofing ready to lay or it may be of built-up composition. The former type comes in various colors, produced by the crushed rock or slate rolled into the composition while hot and plastic, and for an inexpensive building it can be used with considerable decorative effect. The built-up type of three, four or five layers of felt with bitumen mopped thickly between layers and a final heavy coat into which gravel is worked while still hot, is used almost universally for flat roofs concealed from view behind a parapet wall.

Bituminous composition roofs are rather cheap-looking, gaudy and not especially pleasing in appearance. Well-laid of good material, they are customarily guaranteed by the manufacturer for ten, fifteen or twenty years depending upon the quality selected by the purchaser at the time it is laid. Properly constructed over concrete, or wood sheathing with tight joints such that wind may not work its way beneath the material, loosening and tearing it, the cost of maintenance during its guaranteed life-time should be nil, and at the end of the guarantee period a single heavy coat of hot bitumen and more gravel will extend its life for almost as long again, at a comparatively slight expense. Only with great difficulty is this material set afire; but once afire it burns with a fierce, hot, smoky blaze not easy to extinguish.

ASPHALT SHINGLE ROOF. This type differs from the plain bituminous roof only in that the shingles are cut in fancy patterns from the sheet composition, and laid in a manner similar to a wood shingle roof. For buildings of wood-frame or frame-stucco it is very ornamental, suitable and appropriate. Its cost of maintenance is slightly greater than that of plain composition roof, and its life is somewhat shorter, altho it is covered by the manufacturer's guarantee for the same period of time. Like the bituminous composition roof the asphalt shingle roof is of low inflammability, but once afire it burns with a fierce, hot, smoky flame quite difficult to extinguish. Fire insurance on both classes—bituminous composition and asphalt shingle roofs—is somewhat lower than on wood-shingle roof.

CORRUGATED METAL ROOF. The only advantages of a roof of this type are utility, ease of construction and low first cost. Used extensively in the construction of schoolhouses and government buildings in tropical regions with excessively heavy rainfall, this material has never been used in the United

States by the author for roofing purposes. Its durability is fair; maintenance expense not excessive; and its appearance—hideous!

BURNED CLAY TILE, NATURAL SLATE AND ASBESTOS TILE ROOFS. There is not a great deal to choose among these three classes of roof. All lend themselves readily to decorative architectural effects, the more brightly-colored clay tile probably being more suitable for warmer climates, the sober gray natural slate to cooler sections, while the less brilliant asbestos tile may be used either in sub-tropical or temperate climates. Their chief maintenance trouble is drawing of the nails holding them in place, with consequent displacement of one or more units, permitting a leak to develop in the roof unless carefully watched. This trouble is avoided by fastening the units together with soft copper wire in addition to nailing. Roofs of these three classes are long lasting, and as they grow older they develop a weathered effect which is especially pleasing. Being fireproof, the insurance rate on a building having a roof of one of these materials is low. All openings in clay tile roofs should be filled with cement mortar to prevent flocks of pigeons from using the roof of the building as a homing and resting place and in this manner becoming an extreme nuisance.

ROOF DRAINAGE. Closely related to the type of roofing used is the problem of draining the runoff from the roof as fast as it accumulates thereupon. Not very sightly is the all-too-common spectacle of rain dripping from the point where it reaches the eaves—neither is such drip especially helpful to the appearance of the lawn beneath, or very comfortable to any person passing below a dripping eave during a storm. Neither is the conventional type of tin gutter and cylindrical downspout especially beautiful. For appearance the gutter should be concealed within the eaves, and the downspout hidden within the wall, or should be of rather flat rectangular cross-section, closely hugging the wall to be as inconspicuous as possible. Neither gutter nor downspout should ever be made of so-called commercial "sheet iron." This is not pure iron at all, but steel, which will rust thru in not more than one or two years, allowing the water to leak thru the rust holes and work its way down into the building. Pure ingot iron, copper-bearing iron, sheet copper or sheet lead, of adequate gauge or thickness to insure ruggedness of construction and long life should be used instead; and the capacity should be ample to care for the heaviest rainfall to be expected in the vicinity. All openings into concealed gutters and downspouts should be screened with heavy copper wire screen of half-inch square mesh, so designed as to be easily accessible in case of clogging or stoppage from accumulation of fine material — dust, leaves, twigs or other matter causing overflow.

FLOOR SURFACES. Provision for taking the wear of heavy traffic on floors is made either by the construction of the floor itself with a highly resistant as well as ornamental surface, or by making of very much less costly con-

struction covered with a more durable and decorative floor covering. The table below gives a list of different types of floor surfaces used in public buildings, with their relative desirability from the standpoint of first cost, cost of maintenance, appearance, wearing qualities and noiselessness. In preparing this table it is assumed that all surfaces are applied to concrete floor slab on earth fill, or to a reinforced concrete structural slab on sub-floor, except hardwood which is constructed on wooden sub-floor over wood joists.

FLOOR SURFACES.

Type	First Cost	Cost of Maintenance	Appearance	Durability	Noiselessness
Hardwood	1	7	6	7	7
Cement Finish	2	1	5	1	5
Bituminous Mastic	3	2	7	2	1
Unit Wood Block	4	3	2	3	2
Terrazo	5	6	3	5	4
Quarry Tile	6	4	4	4	3
Marble	7	5	1	6	6

HARDWOOD FLOOR. The cost of maintenance of an unprotected hardwood floor subjected to heavy traffic is unduly high. It must be frequently varnished, and kept clean and waxed; and a waxed hardwood floor is very slippery. This type of floor is not very durable, tending to wear in splinters more or less dangerous to barefooted children who patronize the library. Bridging as it does over the sleepers and joists beneath, it resounds with a noisy, hollow "thump, thump," to the fall of passing feet; and its appearance is garish and cheap.

CEMENT FINISH FLOOR. For a floor constructed on earth fill or on a reinforced concrete structural slab the cement finish surface is by all odds the least expensive. This is made by smoothing the freshly poured concrete very carefully to the exact level required, working the coarse stone aggregate downward out of sight, applying a drying mixture of one part cement and two parts sand to absorb the excess water rising to the surface, trowelling and marking off into squares, diamond-shaped or other desired figures. If color is wanted, the desired color-pigment is mixed dry into the cement-sand drying mixture before the latter is applied. The life of the floor-surface is greatly increased if a concrete hardener is added, either in dry form mixed with the drying mixture, or as a liquid applied in two, three or four coats with a brush in a manner similar to paint.

It is possible also to lay a floor of this class in two layers — the first with the surface about one and one-half or two inches below the finish floor level, and a top layer of very dry mixture to bring it to the proper elevation. The author does not favor the latter method as much as he does the integral-surface method previously described. It is practically impossible to secure perfect, uniform adhesion between the two layers of concrete; and to one walking over a section of floor where these layers are separated there is a hollow drumming sound underfoot intensely annoying to all who hear it. There is also a grave

likelihood of cracking, breaking and extra-rapid wearing out of the top or finish layer of concrete.

Second in point of first cost, a properly constructed cement finish floor is easily first in low cost of maintenance and in length of life. Practically all the maintenance necessary is to keep it clean by washing, with possibly an occasional waxing to prevent from rising the fine, impalpable dust from the lime in the concrete, intensely irritating to the sensitive eyes and nasal passages of human beings. When waxed this type of floor is quite slippery, and must be used with great care by small children and elderly people.

A cement finish floor is rather noisy, with its annoying "clack, clack," of narrow leather heels on women's shoes, and with the nerve-shattering "scr-e-e-a-a-k" of metal gliders on chair bottoms when the latter are drawn out from reading tables. In appearance all other types of floor surface are more pleasing with the exception of hardwood and bituminous mastic.

BITUMINOUS MASTIC. This is a floor surface composed of asphalt mastic—an emulsion of asphalt in water—mixed with sand and laid on the concrete sub-floor. In noiselessness this type is easily first, the resilient mastic absorbing the footfalls with no sound whatsoever. In first cost and cost of maintenance it is second only to cement finish floor, being simple and inexpensive to lay, and when laid requiring only sweeping and occasional washing to be kept clean. It is not greatly softened by heat, but it MUST NOT be cleaned with an O-cedar mop or any other kind of oil mop, nor must any oil be allowed to come into contact with it; for oil of any kind "cuts"—dissolves or softens —the asphalt in the mastic, causing it to wear or shove into irregular waves, or humps and hollows, in the floor.

A floor surface of this class, properly cared for and avoiding oil coming into contact therewith, is long-wearing, second only to a cement finish floor. In appearance it stands at the bottom of the class, being merely a dull, monotonous, dirty-looking, gray-black or gray-green mixture, somewhat like a section of sheet asphalt street pavement.

UNIT WOOD BLOCK. Of all the floor surfaces listed in the table above the unit wood block is the author's favorite. This type of floor is composed of artificial blocks, approximately nine inches square and one inch thick, of hardwood—maple or oak—made up of three or four strips tightly tongue-and-grooved together, with a groove about one-fourth of an inch deep in the sides of the block and a corresponding tongue across the end of the grain; or in the "Ironbound" type of block the groove extends around the four edges, with an iron spline one-half inch wide inserted therein, keying each block with the next adjacent block on all four sides. The concrete sub-floor is first thoroly primed and covered with a thick layer of asphalt mastic, free from soap or soap solution. The blocks are laid with the grain horizontal, and that of each block at right angles to the grain of all other blocks immediately contiguous, the

natural variegations in coloring of the individual wood blocks producing an irregular pattern infinitely pleasing to the eye. After laying, the floor is then sanded to a uniformly level surface and treated with a combined varnish and wax known as "Lignafold."

Varied effects are produced by staining the blocks in different shades and laying in patterns. Additional variety is also obtained by laying the blocks diagonally to the axes of the room.

Next to asphalt mastic a wood block surface is the least noisy of all listed in the foregoing table. The first cost, and, if thoroly treated with "Lignafold" when first laid, the cost of maintenance, are very moderate. A floor surface of this type is as enduring as the building in which laid.

TERRAZZO. This type of surface is composed of marble chips embedded thickly in a special cement matrix, allowed to harden, then ground to a smooth level surface. By the use of different colored chips an endless variety of patterns may be produced; and by separating the different colors with strips of brass or zinc set on edge the colors are sharply defined and the most beautiful effects are secured. The chief defects are the muddy-yellow tinge showing where white is desired, and the constant cleaning necessary to keep it in presentable condition; and for this latter reason the cost of maintenance is rather high. This surface compares quite favorably in durability and noiselessness with the others listed in the table above.

QUARRY TILE. Quarry tile is aburned clay tile about six inches square and one inch thick, bright red, or deep red shading off into purple in color. The tile are laid in a dry cement-sand bed, the vertical joints filled with sand to within about one-half inch of the top, then pointed with a cement-sand mortar to which red pigment is added. The effect is rich and pleasing to the eye, and is greatly intensified by occasional waxing of the floor. The finished surface is quite rough and irregular, due to the warping of the individual tile in burning. It is fairly low in cost of maintenance, and, due to its rather porous, spongy character, is somewhat less vibrant and noisy than terrazzo or marble.

MARBLE. For the class of buildings discussed in this volume this material is the most expensive and the least suitable for floor surface. No one questions its beauty—the rather soft, pure white crystallized calcium carbonate, crushed or broken aeons ago by titanic seismic disturbances, the seams and fractures infiltrated by water solutions of red, green, black and other colored minerals arranging themselves into beautiful patterns and the whole fused again into one solid mass. These beautiful markings and impurities form areas of different degrees of hardness in the finished surface, the softer, less durable portions of which wear much more rapidly and cause unevenness to appear. Being non-resilient, it resounds to the intensely annoying "click, click, click," of women's heels and the "S-c-r-e-e-e-e-e-c-h!" (like sharpening an old fashioned slate pencil,) of metal gliders on the bottoms of chair legs when drawn across

the floor. To maintain its maximum beauty it must be kept constantly cleaned and free from spots and streaks of dirt. The wear of passing feet soon removes the high polish from the rather soft material, leaving a luster of the eye of a fish which has been a long time dead.

FLOOR COVERINGS. A much less expensive method of floor treatment in public buildings is to construct the floor of second grade wood in a wood-frame or frame stucco building and of concrete in a brick, concrete or masonry structure, and finish with some type of floor covering; those most commonly used being listed in the following table:

FLOOR COVERINGS.

Type	First Cost	Cost of Maintenance	Appearance	Durability	Noiselessness
Cork Carpet	1	1	4	5	1
Battleship Linoleum	2	2	3	1	4
Asphalt Tile	3	3	5	4	5
Cork Tile	4	4	1	2	2
Rubber Tile	5	5	2	3	3

CORK CARPET. For a plain, noiseless, inexpensive, fairly durable floor covering this material is easily first. Made of coarsely-ground cork glued and pressed together in a sheet with a burlap backing, it is soft, resilient and extremely comfortable to those walking thereupon. It usually comes in a single natural brown color. Its greatest defect is its tendency, when laid on concrete, to absorb the moisture from the sweating sub-floor or take up water used for cleaning; swelling, forming blistered humps and softened, rapidly-disintegrating spots from such absorption. Occasionally polished with floor wax this material makes a very sightly and presentable floor surface.

BATTLESHIP LINOLEUM. Of all floor coverings mentioned in the above table battleship linoleum is the most desirable. In first cost it is lowest of all except cork carpet. Its maintenance is not unduly expensive. It can be laid as a single, uniform color in gray, red, green, brown or black, or in combinations of these colors in body and in border. Being of somewhat harder texture than cork carpet, cork tile and rubber tile, linoleum is slightly more noisy. A good quality of battleship linoleum one-quarter of an inch in thickness will outwear any other type of floor covering mentioned in this chapter.

ASPHALT TILE. This material has only a fairly low first cost and maintenance cost to recommend it. The material is extremely brittle, and easily cracked and broken by any irregularity in, or settlement of, its supporting sub-floor. Its color is a dull, dingy, dirty-looking green or gray-black, which no amount of washing will improve. The volatile and oily ingredients of floor wax, O'Cedar oil and soap, or oil of any other kind, act to soften it, tending to make it gummy, sticky and unduly hastening its wear. Once laid, about the only maintenance possible is to wash frequently with CLEAR water and keep free from dirty, smeary streaks and spots. Being quite hard it is objectionably noisy from the same causes as those stated for marble floor surface above; except that the effect of metal gliders drawn across the asphalt tile is greatly

intensified, being that of a heavily-rosined bow drawn roughly across the strings of an untuned 'cello—"Setting the teeth on edge!" to employ a commonly used expression.

CORK TILE. From the standpoint of comfort a soft, noiseless, resilient, well-laid cork tile floor covering is second only to cork carpet. This material, a ground cork composition pressed into squares one-quarter of an inch thick and from nine to twelve inches on a side, lends itself to beautiful effects, either untreated or varnished and polished. In the San Francisco, California, Public Library, thru years of use the untreated cork tile floor covering in the reading rooms has developed a soft, velvety, mat-effect patina most harmonious with the surrounding dark-colored woodwork.

Where attempt is made to keep this material varnished, waxed and polished the maintenance cost runs unduly high. The tile itself is yielding underfoot; the rather brittle varnish coat soon cracks, scales and peels loose under continued wear, leaving a scabby appearance which can be remedied only by removing entirely, either by sanding the whole surface, or by the use of varnish remover; and if re-treated in the same manner the process will repeat itself in a recurrent cycle—treat, crack, scale, remove,—and so on ad infinitum. The durability of cork tile is considerably lessened by the tendency of water when cleaning to work its way down the joints between the squares, softening the cement in which it is laid and the glue holding the particles of cork together, making it swell, blister, soften and wear with undue rapidity.

RUBBER TILE. This material consists of sheets of rubber about one foot square, one-eighth of an inch thick, laid in a special cement upon the properly-prepared sub-floor surface in patterns having a very rich marble effect. The first cost and cost of maintenance are higher than those of all others mentioned in this chapter. The rubber itself is of organic origin, and its flexibility is due to certain volatile ingredients which, evaporating in due course of time, shrink the rubber and leave it brittle. The variegations in color are produced by mixing with the softened rubber in the course of its manufacture certain inorganic mineral pigments and coloring matters which do not shrink proportionately when the pure rubber shrinks; in this manner tending to leave uneven humps in the surface after the material has been in use for some time. The use of hot water in cleaning not only tends to soften the rubber itself, but also to soften and loosen the cement, producing blisters in this type of floor covering. Unless carefully and frequently cleaned there is great likelihood of unsightly, dirty, smeary streaks and spots showing on the surface.

A rubber tile floor covering is quite noiseless, easy and comfortable to the people standing and walking thereupon, and with ordinary care is fairly long-lasting.

LATH AND PLASTER. The author does not favor the use of wood lath for any construction purpose whatsoever. The difference in its cost as compared

with expanded metal lath is wholly negligible. Expanding and contracting by its absorption and evaporation of moisture during the corresponding damp and dry seasons, it is most likely to cause long, unsightly parallel cracks in the surfaces of walls and ceilings. Being exposed in the studding spaces, and being highly inflammable, it increases very markedly the fire hazard whereso-ever used.

In contrast to these objectionable defects, the metal lath is non-absorptive, and does not expand or contract due to fluctuations in the humidity of the atmosphere; and covering uniformly the surfaces of walls and ceilings, it reinforces rather than diminishes the strength of the plaster work. Being of itself absolutely non inflammable, it tends rather to hinder than augment the effects of fire during a conflagration.

ACOUSTIC PLASTER. One prolific source of annoyance and vexation to high-strung, nervous patrons of the library is the reverbrant echoes of different noises within the building. Whispering and giggling of youth in a corner; people talking in a low tone at the charging desk; patter of footsteps across the floor; all these and many other noises are thrown back and forth from one smooth, hard wall surface to another, again and again, to the vast distraction of those trying to concentrate their attention upon some reading matter in hand. And all this noisy echo in the reading rooms is wholly unnecessary, and preventable by the use of so-called "acoustic" plaster on the walls and ceilings of these public rooms. This material, one form of which is made from volcanic ash or pumice, is laid on the plastered surfaces in a very rough, open, porous texture, entangling, breaking up and preventing the rebound of any sound waves impinging thereupon; presenting a rich matt appearance capable of most beautiful decorative treatment.

A variation of this for ceiling treatment is the use of "Celo-Tex," a fiber board of compressed bagasse, the waste stalks of sugar cane after the juice has been expressed. Formerly disposed of only by burning, this bagasse is now made into sheets one inch or more in thickness about four feet wide, and eight to twelve feet long; very light tan in color, strong in texture, light in weight, when used in its natural body color, in panels with a conventional dado frieze in brightly-colored aniline dyes, it not only produces a most effective sound-proof ceiling but is highly decorative as well, and not unduly expensive.

WALL BASE. This feature should be designed to harmonize with the floor surface or floor covering used in the building. With a cement-finish floor, particularly in the basement, a cement base should be designed and the scheme carried out in cement plinths for door casings. For marble, terrazzo or quarry tile floors, marble base of harmonizing or contrasting color should be used. Hardwood or wood block floors require a wood base, of the same material as the floor surface itself. Bituminous mastic, asphalt tile, rubber tile and battle-

ship linoleum should have a wall base of linoleum, either straight or coved. Cork carpet will have a base of wood or cork carpet, straight or coved; and cork tile, a base of cork carpet or of marble.

Not only will base be placed around the walls of rooms, but for uniformity and harmony of appearance a base of the same material should be provided for the charging desk, and all shelving, stacks, book cases and other equipment in the reading room having bases.

METAL DOORS, WINDOWS AND SCREENS Only recently has metal —steel and aluminum—been increasingly employed in the construction of doors, windows and screens. Wood, while very appropriate for these purposes in the less expensive wood-frame and frame-stucco buildings, is in its nature impermanent as a building material. During long spells of dry weather it shrinks, warps, cracks and tends to sag; the veneer of panels becomes loose and curls, or peels in strips and sheets; and in wet weather the door, window or screen swells and sticks. And these features of wood must be replaced every ten to twenty years because of decay; also they must be painted frequently to keep in presentable condition, as well as to ward off, partly at least, the effects of encroaching decay.

Metal used for these purposes is light, strong, rigid, unaffected by heat and cold or dry and moisture if properly protected. There is no swelling or shrinking; no sticking or rattling; no permitting the entrance of driving rainstorms forced thru cracks. The construction is simple, and not unduly expensive, and the appearance is pleasing indeed.

The metal screens most satisfactory to the author are those of flexible type, on spring rollers, with edges of the screens sliding up and down in narrow metal channels on each side of the window opening. Where casement windows are used, opening outward, metal window closers are provided, working back and forth thru the bottom of the screen and capable of being fastened to hold the window in place.

FIREPLACE. Previously in this chapter has been mentioned the cheerful effect of sunlight in the Children's Room of a library. On dark, chilly days a bright fire in a fireplace has an equally inspiriting action upon young children gathered for a story hour or for some other purpose; and if possible the Children's Room of every library should have a fireplace, not only for its utilitarian purpose just mentioned, but as well for the beautiful architectural effects which may be produced, in tile, terra cotta or other materials used for trim. Children are especially interested in plaques, of the same material, above the fireplace—sailing vessels, pioneer scenes, biblical, historical or allegorical illustrations, fairy pictures, or such other as the fancy of the architect may dictate.

And now from sublime to ridiculous—and to mention a small but very important detail; the neglect of which can be the cause of a vast amount of inconvenience, annoyance and vexation; the surface of the hearth should be con-

structed at the same elevation, or very slightly higher, and never lower than the surface of the floor or floor covering.

CONCEALED SAFE. Moneys collected from fines for overdue books and from other sources amount to quite a tidy little sum each day. The library closing usually late at night, it is not possible or convenient to deposit this sum in a bank at the close of each business day. To keep it locked in the desk overnight is not safe, as libraries are easily broken into, and desks readily "jimmied" or pried open. Some libraries conceal their daily intake within the hollowed-out covers of a book, placed upon the open shelves among the other books of the library; but a watchful person of thieving tendencies soon discovers this book, its location among the other books, and makes away with the money hidden therein.

For the safekeeping overnight of all moneys collected during the day a safe should be provided in the office of the Librarian. This safe should be strongly constructed, and built-in, either in the wall or in the floor of the building—for even a thief of moronic tendencies will know that the collections only for one or two days will not amount to any sum sufficient to wreck the building in order to open the safe, even tho he might feel justified and sufficiently rewarded in breaking the door and prying a desk. Where a built-in wall safe is provided a painting of sufficient size completely to cover the safe is often provided, hung on a clever framework which will swing around out of the way whenever it is desired to open the safe. A floor safe is of course covered by the rug, or by the rubber chair mat in front of the Librarian's desk.

If a combination safe is used the combination should be known only to the Librarian and to the most trustworthy assistant; if key locks are used, only the Librarian and this assistant should be intrusted with the keys to the safe. And in either case, where a change of Librarian or assistant occurs, or where a key is lost or the combination unwittingly disclosed to an unauthorized person, the Librarian should be instructed how to change the lock or the combination.

KITCHENETTE ACCESSORIES. For the greater convenience of the library attendants and to relieve them of the necessity and unpleasantness of having to go out of the building for their mid-shift meals, particularly at night, a kitchenette should be provided wherein they may prepare lunches brought with them from home; adding greatly to their comfort and well-being, increasing their efficiency, and thoroly justifying the expenditure made for this purpose. The kitchenette should be provided with built-in accessories—gas plate, with shelf and hood, or ventilator; dish cupboards, coolers or ice chests for food storage, sink, table and benches hinged to the wall or to the cupboard. This kitchenette should be designed of material easy to be kept clean,—tile, or Sanitas,—and cheerful and restful to the brain-fagged attendant during the half-hour or so of occupancy.

INCINERATOR. Aside from the sale of discarded, wornout books, magazines, old papers, which during the year brings in a very gratifying sum for old paper, disposition must be made of other waste such as scrap paper, emptyings of waste baskets, clippings from the repair and binding of books and other material of similar nature but unsaleable value. For this purpose an incinerator should be provided, of sufficient capacity to care for all inflammable waste material accumulated daily in the building. The incinerator should be located inside the building, in the basement where such basement exists, connected with the flue of the heating plant, and provided with a door on each—basement and first floor. A simple arrangement of firebrick-lined shaft with cast iron dumping grates and ash space beneath, and cast iron door at the bottom of the shaft to remove the ashes, is thoroly adequate; there is not the slightest need of any expensive, patented affair, such as the author has seen installed, with complicated reversal of direction of the draught driving it downward beneath the floor of the incinerator, thru narrow, tortuous channels which within fifteen to thirty minutes will choke up with light flaky paper ash—and smoke out the whole building.

FINISH HARDWARE. A mistaken idea of economy is to attempt to save a few dollars by the purchase of cheap, ugly hardware—hinges, locks, door closers and stops and other articles of this nature. Such material is usually made of brittle cast iron, easily broken or gotten out of order, and the final result is far more expensive in repairs and replacements than would have been the first cost of a good quality of cast bronze hardware. An experienced and conscientious architect is thoroly competent to select the proper kind of building hardware, and even tho to the uninitiated Librarian or Board the price may seem unduly high, it should be remembered that appearance, long life and low maintenance cost should be given more importance than the first cost of this portion of the building.

PLUMBING DESIGN. Previously in this chapter has been made a comparison of the cost and the relative desirability of using heavy copper or brass pipe, or genuine wrought iron cold and hot water pipe in the inaccessible portions of the building. Of equal importance also is the question of cast iron or clay tile pipe connecting the plumbing of the building with the community sewer system. Altho somewhat more costly, a cast iron drain pipe or soil pipe properly laid, with thoroly caulked lead joints, will endure practically forever, not subject to stoppage such as occurs many times when the clay tile pipes, or cement pipes, with cement joints, are used. In landscaping the grounds of a building trees and shrubs or bushes are planted near the underground pipe line; roots, seeking moisture or fertilization creep toward this line, enter thru small cracks in the pipe until the passage of sewage or drainage is no longer possible therein.

ENAMELED IRON FIXTURES. At some time during the occupancy of a building there probably has been occasion to use a solution of acid for some purpose and when thru the unused remainder was poured into an enameled sink; or perhaps vinegar used in the preparation of a meal has been spilled onto the enameled iron surface of a table; and the microscopically-thin layer of enameling was dulled, corroded or perhaps in the course of time eaten entirely thru; all of which at the present time is wholly unnecessary, if the original design of the building calls for **acid-resisting enamel** where enameled-iron plumbing fixtures are used. This material is not unduly expensive, and is practically indestructible and fool-proof against the actions of a thoughtless attendant or ignorant janitor using acid solutions or strong alkalis on such surfaces.

CHROMIUM PLATED FIXTURES. All faucets and exposed plumbing connections in kitchenette, toilets and elsewhere thruout the building should be of brass, plated with nickel and replated with chromium. Nickel plate, used exclusively until just recently, is subject to rapid corrosion, becoming dull, yellowish with small green spots, and generally unsightly in appearance. Chromium plate is not unduly expensive, costing very little more than plain nickel plate; it has a beautiful polished surface of rich bluish tinge, and never fades or corrodes when the plating is done in a proper, careful manner.

SEPARATE FIXTURE CUTOFFS. It is elementary and banal here to state that every plumbing fixture in the building should be provided with a separate valve for shutting off the water when something goes wrong; and yet it is astonishing to know how many new buildings, particularly of the older type, are not so provided. And in such cases it is necessary to close the valve of the main water supply to the entire building while a single fixture or two is being put into service again.

HEATING DESIGN. The heating plant of a building should be of the utmost simplicity consistent with longevity, and economy of first cost and cost of operation. For small buildings the author greatly prefers floor furnaces, burning gas for fuel, requiring no basement for their installation, and no conduit pipes from which heat may be lost by radiation in its passage from the furnace to the register in the room where used. The operation of a floor furnace is simple, and the cost of operation not excessive—entailing expense for fuel only during the actual time it is in operation.

For medium-sized buildings the author favors the hot air furnace, set in a basement below the center of the building, requiring only a minimum length of conduit runs to distribute the heat uniformly thruout. The hot air heating system is especially advantageous for libraries in that the outlet registers may be located in the wall above the shelving, or brought thru the base of the wall shelving, or located in the floor, in this manner not taking up precious wall space required by the shelving itself, as is done in the case of steam or hot water radiators set against the walls of the building. With hot air furnace

the heat is quickly generated and transmitted with minimum loss to the point where needed, and when no longer needed it is quickly shut off; there being no necessity to use up a large proportion of the units in heating a cumbrous, slow-acting cast-iron heat-distributing system. The regulation of the heat in any room may be done by an attendant; but should be done far preferably by an automatically-acting thermostat located in the room and set at the temperature desired to be maintained.

These furnaces may be operated by whatever fuel is cheapest in the community—coal, fuel oil or gas. Gas for fuel is clean, leaving no smoky or oily soot on the chimney pot, roof of the building, or window sills; it burns with a steady, moderate flame, causing no unduly violent expansion and contraction of the walls of the firebox, with ultimate crystallization and cracking of the latter; consequently a gas furnace may be constructed of heavy, sheet, genuine wrought iron, at much less cost and with far greater heating efficiency than the steel or cast iron fireboxes demanded by the more variable, fierce-burning coal or fuel oil. A gas furnace requires no complicated pressure-pumps to force the fuel into the firebox, and is not subject to choking and clogging of the fuel lines from dust and impurities in the fuel as in the case of fuel oil; and requires no stoking of the furnace nor removal of ashes as in the case of coal or coke-burning furnaces. Gas is as nearly fool-proof as any fuel can possibly be, and its sole disadvantages are its likelihood of explosion where carelessly or improperly handled, and its prohibitory cost in regions where it must be manufactured, or the natural gas brought long distances thru pipe lines.

Next to gas, fuel oil is the most desirable for heating purposes. It requires no firing, being automatic in its action; and when the trash screens in the fuel lines are kept constantly clean and the oil flowing freely and uniformly, its operation is quite satisfactory. The heat generated is intense and tends to fluctuate in its intensity, causing constant expansion and contraction of the furnace walls and firebox, with consequent cracking, damage and necessity of renewal within a greater or less period of time, in order to maintain the maximum degree of efficiency.

In communities where neither gas nor fuel oil is obtainable at reasonable cost, dependence must be placed upon coal as fuel. In addition to the increased annoyance and dirt caused by the necessity of frequent removal of ashes and cleaning heavy deposits of soot from the interior of the furnace and flue, the same disadvantages inhere to a coal-burning furnace as set forth above for one burning fuel oil. The destructive effect of fluctuations in the heat, intensified by the periodic hand-firing and by the blast of cold air rushing into the fire box each time the fire door is opened, can be almost entirely eliminated by the installation of a mechanical stoker, which feeds a constant small supply of fuel to the **underside** of the flame, leaving the top of the latter clear, free from smoke and soot, and prolonging immeasurably the life of the furnace, as well as re-

ducing the cost of the fuel thru more efficient consumption, and the cost of labor in keeping the furnace and flue clean.

One of the most potent causes of destruction of a furnace is the corrosion of the firebox and metal flue by sulphuric acid. Sulphur present in the fuel is converted by burning into sulphur dioxide; hydrogen in the fuel, into water; and the two combine to form the acid; and this absorbed by the ashes and soot in a dirty furnace, held in contact with the metal thereof, soon eats small pits and holes—and we blame the manufacturer for selling us a short-lived furnace when the fault lies not with the manufacturer nor with his furnace, but in our own negligence. And the only prevention of destruction by such corrosion is to keep those portions of the furnace and flue in contact with the flames thoroly and everlastingly **clean!**

As a part of the heating equipment should be installed a hot water tank of sufficient capacity adequately to serve the needs of the library. The tank should be equipped with a heater, a pilot light and thermostatic control such that as the water in the tank reaches any desired temperature (at which the thermostat is set), the heat will be automatically shut off. The tank should be covered with a thick coat of insulating material to avoid loss thru radiation of heat from the tank wall.

Where gas-burning equipment is used the gas meter should be outside the building; preferably in a specially-built niche at the rear, provided with a glass-paneled door thru which the meter may be easily read.

If fuel oil is used the top of the buried storage tank should be well below the level of the basement floor at its lowest point; so that in case of leakage from the storage tank, the leaking oil will not find its way into the basement. In many communities this provision is a statutory or ordinance requirement.

VENTILATION AND AIR-CONDITIONING. Recently in the construction of public buildings of the latest type much attention has been given to the quality of ventilation supplied to the occupants and patrons. Not content merely with forcing the untreated air into the building and heating it in cold weather only, paying no attention to its treatment of any sort in moderate and warm weather, today architects and ventilating engineers provide the appropriate mechanism for cooling the air in summer as well as warming it in winter, filtering or washing out all impurities, and regulating the "humidity" or percentage of invisible water-vapor contained therein.

With a hot-air furnace is usually provided a centrifugal fan operated by an electric motor, the fan of such capacity as to supply a complete change of air thruout the building at least every twenty minutes; bringing the air thru a supply duct from the outside, passing it over the heating elements of the furnace to raise it to the proper temperature and forcing it thru the distribution ducts to the various sections of the building. Where cooling is also desired it is a very simple matter to provide, in a by-pass in the main intake air

ducts, a system of cooling elements or coils, similar to those of an electric refrigerator, over which the air may be passed in excessively warm weather when the heating apparatus is not in operation.

The atmosphere of a city usually carries fine, impalpable, imperceptible impurities which we normally breathe as we go about our daily affairs. When cleaned from the basin below the spray of the air-washers in the Central Library at Los Angeles, these impurities amounted approximately to one cubic foot of sludge accumulated every ninety days; and a microscopical analysis showed these impurities to be made up of the following recognizable materials:

Dust.
Cloth fibers.
Filaments from feathers.
Fine fragments of leaves.
Hair.
Manure.

Besides other substances unidentifiable under the microscope.

Three methods of removing these impurities are commonly used: (1) forcing the air thru several layers of loose, open-mesh cotton batting or similar material, changing the latter frequently as it becomes clogged with impurities; (2) forcing the air thru a heavy, fine spray of water, wetting the impurities and causing them to fall to the basin below the spray while the purified air goes on to the heating plant or cooling coils and thence on into the building; (this is the method used in the Central Library of Los Angeles; and in warm weather the mere passing of the air thru the water spray cools the former oft from ten to fifteen degrees F. below the outside temperature;) and (3) impinging the current of air upon a series of metal vanes set at an angle to the direction of the air current such that the latter is deflected. A colorless, odorless film of oil flows slowly over the surface of the vanes, to which adhere the impurities, carrying them to a receptacle beneath, where the impurities are filtered out and the oil used again.

The greatest defect of the air-washer, where the air is not dehumidified, not applicable to the filter or to the oil cleanser, is the lack of control of humidity absorbed by the air passing thru the washer and into the building; super-charging the air with moisture, producing a dead, stuffy odor and a heavy "feeling" in the atmosphere of the rooms, greatly depressing and annoying to the more sensitive patrons of a library. The author's experience has shown that where this super-humid air is introduced into stacks where the ventilation does not circulate briskly, such as bound-newspaper stacks, the formation of mold and mildew on the backs of these volumes is greatly promoted. The permanent remedy for or prevention of these conditions is obvious to the reader—provide drier air for ventilation.

Where it is desired to exercise more perfect control over the percentage of humidity in the atmosphere within the building, increasing the moisture in excessively dry weather, removing a portion in very humid weather, certain patented air-conditioning equipment may now be secured from companies making a specialty of this class of work.

This equipment is provided with the air-washer previously mentioned. From the washer the super-humid air is passed over refrigerating coils, similar to those of the household electric refrigerator but of sufficient capacity to reduce the temperature of all the air to a pre-determined "dew-point," forty degrees Fahrenheit or less, condensing and precipitating the excess moisture therein contained. From the cooling chamber it then passes to the heating elements, where its temperature is raised to that necessary for comfort in the rooms where finally delivered. The dryness or humidity of the air in the rooms is controlled by raising or lowering the artificial "dew-point" in the cooling chamber.

The expense of the original installation is quite high. In the case of a two-story office building at El Centro, California, having approximately 100,000 cubic feet of volume, the cost in 1934 was about $15,000.00. And from the description given above it can readily be seen that the day-by-day operation is also unduly expensive — artificially reducing the temperature of all the air used in the building from an average normal of 70 degrees Fahrenheit to a "dew-point" of 35 degrees, and immediately heating again to the same original temperature, every day thruout the twelve-month year.

This process is still practically in its infancy, and needs very considerable improvement to give perfect satisfaction under all conditions. Indeed, in the desert sections of southwestern United States it has been found much more satisfactory to omit entirely any attempt to humidize the air then remove the surplus moisture; preference being given instead to the method of cleaning the air by means of the filter or the oil-covered metal vanes, then tempering—passing over the heating elements or cooling coils—without any regulation of the humidity content whatsoever.

A simpler and much less expensive method, both as to first cost and cost of operation, for humidizing is to pass the air, after heating, over a tank or vat containing a large area of water surface; the air in its passage absorbing moisture in a slight proportion to its dryness and its temperature. While giving a fair degree of satisfaction in some cases, of course the degree of humidization by this method is far less than where the air is forced thru the water spray; neither has any method been devised, so far as the author is aware, for controlling, increasing or diminishing this humidization to meet the varying atmospheric conditions.

In designing the air ducts for the building great care must be taken to make them of sufficient cross- sectional capacity. Otherwise the air will be

forced out into the rooms at a very high velocity, creating a strong draft accompanied by a blowing, soughing, whistling sound intensely annoying to the patrons of the Library trying to concentrate on their work. For quiet satisfactory operation the ducts should be designed for a velocity of air passing thru them not to exceed 800 to 1000 feet per minute, and the register-outlets not more than 500 feet per minute provided the latter are not less than eight feet above the floor. In small rooms and at floor level the velocity of air passing thru register-outlets should never be greater than 250 feet per minute to avoid unpleasant drafts.

For most efficient and economical service the register-outlets in reading rooms and stacks should be placed in the wall, over the shelving and about eight feet above the floor. If for any reason this is not practicable then these registers should be placed in the base of the wall shelving, or the conduits brought thru the shelving itself and the registers set flush with the edges of the shelves. Experience proves the least satisfactory location for air outlets to be in the floor. However, one floor outlet for heating should be located in the space at the rear of the charging desk. In office, work room and club room, usually with low ceilings, hot-air registers should be in the wall, preferably near the floor.

For every cubic foot of heated and conditioned air forced into the various rooms another cubic foot of stale, used air must find its way outdoors. Provision is made for this by means of metal louvers with movable, adjustable vanes, capable of being tightly closed when necessary; placed in the base of wall shelving in reading rooms and beneath windows in stack rooms, work room, club room and office.

ELECTRICAL INSTALLATION. The question of the general lighting system for the building has been discussed previously in this chapter under "Artificial Lighting," and need not be repeated here. Careful consideration should be given to the location of lighting outlets for stack lighting. These outlets should be placed in the center of the aisles between the stacks, and low enough to obtain the maximum efficiency and avoid casting a shadow of the person using the stacks, yet high enough to keep from being broken by bumping with the head. A large number of small lights is far more efficient and much less costly to operate than a few lights of greater combined wattage.

A standard form of design with a view to future expansion is to provide the first tier opening off from the public reading rooms, with a mezzanine over at some future time for the second tier, and proper lighting outlets in the ceiling of each tier above the aisle centers. Where the upper tier is not built immediately, the ceiling outlets for the same are installed at the time the building is constructed, and for the first-tier stacks a series of temporary ornamental metal arches bridging the aisles from stack to stack, with the lights

suspended from these arches over the aisle centers.

One of the prolific sources of waste in the use of electricity, and corresponding increase in the expenses of operation, arises from unnecessary stack lights left burning during the daytime by careless attendants. Stack light switches should be operated exclusively from the panel boards. Each individual stack light fixture should be provided with a pull chain. Strict regulations should be put into effect, that only necessary lights shall be used at any time, and those for only so long as needed; unnecessary lights to be promptly extinguished. Suitably severe penalties should be provided for violations of these regulations.

Mischievous children, and not a few grown people, are greatly tempted to tamper with the light switches, or with the electric thermostat controlling the heating plant, where it is at all possible for them to do so. To avoid trouble from this source it is advisable to locate the main switch panel in a place inaccessible to the public yet convenient to the desk attendants; and the thermostat in an inconspicuous location well above the level of the eyes of the library patrons. Experience proves it to be most unsatisfactory to locate the main switch panel in the charging desk.

The electric meter should be so located as to be easily readable from the outside of the building, in this manner eliminating the necessity for the meter-reader to enter the building for this purpose. The author recommends a cupboard high in the exterior wall at the rear of the structure, with a glass door for this installation.

A buzzer communicating system connecting the charging desk with the office and with the janitor's room should be installed; also outlets in the wall base, and in the floor, under the desk or elsewhere required for the operation of vacuum floor cleaners, floor lamps and electric desk clocks. At least one outlet should be provided for an electric clock in each public reading room, and in the lecture room or assembly room; about nine feet above the floor level and plainly visible from every part of the room where located. The old-fashioned "key-wind," spring-operated clock is as passe as the dodo, and almost universally replaced by one operated by electric motor, synchronized to the local light and power system. This electric clock never requires winding, and must be set only when the power is off in the entire building for a period of time longer than the auxiliary spring mechanism within the clock is designed to run in just these emergencies.

UNDERGROUND SPRINKLING SYSTEM. In those regions where artificial irrigation is necessary to maintain a lawn and shrubbery, it is advisable to install an underground sprinkling system, either as a part of the general contract or under separate contract. Thru a mistaken idea of economy the author omitted this very necessary feature in several library buildings for the

design of which he was responsible. After occupying the building, it was found that from twenty to thirty percent of the janitor's time was taken up in sprinkling and attending to the lawn. Receiving an average of $90.00 per month, from $18 to $27 a month would be spent for this out-door work; in two years the saving in labor would far more than offset the added expense of installing the sprinkling system, and after that these savings would inure entirely to the direct benefit of the Library.

LANDSCAPING. Not all architects are landscape experts. And the landscape planting by the architect who designs the building may be satisfactory and pleasing to the Librarian and the Board—and it may not. The procedure usually followed by the Los Angeles Public Library with respect to the landscaping for its branch buildings is to reserve this work from the general contract for the building; to set aside a certain definite sum, and to invite competitive proposals from landscaping experts, to do the work for the amount appropriated for the purpose. From among the competitive designs furnished the Board selects that which is the most artistic and pleasing, and the landscaper submitting such design is given a contract to proceed with the installation.

PEST CONTROL. The proper time for taking such measures as may be necessary to combat and circumvent pests is at the time the designs of the building are being made. Rats and mice spread disease, and gnaw and destroy the woodwork and books of the library. Termites, increasing their area of activity year by year over the United States, ruin the wood portions of buildings. Cockroaches, with the slime and filth of sewers and drains adhering to their feet, run over the sinks, lavatory bowls and food supplies in cupboards. Silverfish attack the covers of clothbound books, seeking for the thin film of starchy paste that binds the cover to the book. Gophers dig long tunnels in the lawns, gnawing and killing the grass, flowers and shrubbery. Yet with a proper knowledge of their habits it is not excessively difficult to cope with these pests, and others, either before they become firmly established or afterwards. Chapter VI of this volume, "Pest Control," shows in detail certain precautions which should be taken in the design of a building to prevent annoyance and loss from this source, and measures to be adopted to rid the premises of pests once they have become established.

COMPENSATION OF THE ARCHITECT. Architects' fees range from five to ten percent of the entire cost of the building designed and supervised by them. As previously stated in this chapter the usual rate for designing and supervising the construction of public buildings is six percent.

It sometimes occurs that the architect is required by the terms of his contract to wait for his fee until the project is entirely completed, the exact cost determined and bonds sold just sufficient to cover the cost of building, equipping, architect's fee and all other necessary expenses. This procedure is neither

just nor equitable to the architect, whose burden of operating expenses continues during the whole time the construction is under way. The fairest arrangement both to the architect and to the Library is to include in the agreement for the services of the former a schedule of payments similar to the following:

1.—**Preliminary:** Upon completion, submission, acceptance and approval of Preliminary Sketches by the Art Commission—1 percent of the estimated cost of the building.

2.—**Design:** Upon completion, approval and acceptance of Plans, Specifications, Full-size Details and all necessary designing work; securing the General Permit; Advertising and Letting to Contract,—3¼ percent of the estimated cost of the building.

3.—**Supervision:** Upon completion, approval and acceptance of the building, 6 percent of the actual, final contract price, including all adjustments, minus previous payments made under (1) and (2) above.

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CHAPTER III.

CONSTRUCTION.

METHODS OF CONSTRUCTION. When the necessary funds have been raised and set aside; and all plans—preliminary, architectural, and full-size drawings—and the specifications prepared, approved and accepted by the Board, the building is then ready for construction. This may be done by any one of four methods, or combination of two or more thereof, as follows:

(a) **Force Account,** by placing in charge a superintendent or foreman, who purchases all material, employs all labor, sub-contracts portions of the work too complicated or requiring too expensive plant and equipment for him to handle economically, and personally directs the progress of the work.

(b) **Lump Sum Contract,** where the job is properly advertised, written proposals are received and opened, and contract is entered into by a contractor who agrees to furnish all necessary labor and material and to perform all the work set forth in the plans and specifications for a definite fixed sum stated in his proposal; this fixed sum to cover all costs and to include the contractor's overhead expenses and his profit.

(c) **Actual Cost Plus Percentage,** where the job is let to a contractor, who keeps careful and accurate account of the cost of all materials used, as shown by the dealers' receipted bills, and of all labor employed as shown by his payrolls; to the sum total of which is added a certain percentage, agreed upon in the contract between the Board and the contractor, to cover the latter's overhead expense and his profit.

(d) **Actual Cost Plus Fixed Sum,** which is the same as method (c) above except that instead of a percentage calculated upon the aggregate cost of the job, a definite and fixed sum of money is named in the contract to pay the contractor's overhead and profit. Discussion of these various methods, with their relative advantages and defects, follows hereafter.

FORCE ACCOUNT. Theoretically, by this method the Board is in close control and direction of the undertaking. The superintendent or foreman, appointed by the Board, must function with one hundred per cent efficiency or be dismissed and replaced by another who will be satisfactory. Likewise each laborer on the job, presumably, must give one hundred cents' value of labor performed for each dollar of wages received, or else give way to another who will do so. By this method no ten, fifteen or twenty percent of the total cost is to be figured in as the contractor's (hypothetical) profit and overhead—for there is no contractor. Material dealers know that they are dealing with a local governmental agency, and that their money for materials furnished will be,

or should be, paid for promptly and in full; therefore the Board should be able to purchase all materials fully as cheaply as could a private contractor.

In actual practice these theoretical Utopian conditions vary widely from the real situation. The superintendent or foreman is usually hired by the month, paid on local government payrolls, and has no particular incentive to rush the job along or to save expenses inany way. The situation is often intensified by the fact that this employee is aspecial friend of one or two members of the Board, a political appointee with no special executive qualities or technical attributes which may make him invaluable on the job; and frequently by the very fact of being a special friend of part of the Board he incurs the jealousy and ill-will of the remainder of the Board. Being only a subordinate hireling, he is under the command of various bosses, each with his individual idea of how the work should be done, and each insistent that it be done in just his way.

The laborers, too, are many times selected not from any technical excellence which they may possess, but rather from the degree of friendship toward them possessed by the Librarian, or by some member of the Board or some powerful local official. As a consequence of these conditions the work is often performed in a slow, wasteful, haphazard manner and the final results are anything but happy.

Material dealers, knowing that it is a public works project, charge for their materials on the theory that the tax-payers pay the bill anyhow and they might just as well "get theirs," as this will in all probability be the last library constructed in the community, at least during their lifetime. And unless the Board, either directly or thru its superintendent or foreman, has the foresight to contract for all of its construction materials at the beginning of the job, with the usual trade discounts, it will be at the mercy of any material price-fluctuations and of any overcharging material dealers, unable to forecast with any precise degree of accuracy just what the building will cost until the latter is entirely completed.

In modern building construction a large amount of expensive mechanical equipment is an absolute necessity if the work is to be done with the utmost economy. To tie up a large proportion of capital in the purchase of this equipment, use it for a single job and then store it or sell it at a greatly depreciated value is indeed absurd. Machinery kept solely for rental purposes is usually old, worn-out, obsolete and practically always demands a disproportionately high outlay—at the expense of the renter—both to place it in initial condition for fairly efficient operation and to continue during the progress of the work.

Owing to the lack of necessity for speeding up the work in order to come within a certain definite cost; the difficulty of making accurate forecasts of the cost then keeping within this estimate; the impracticability of securing and moulding an efficient organization of skilled workmen during the construction of a single project; the necessity and high expense of procuring the proper ma-

chinery, coupled with the extreme likelihood of scandals and complaints of wastefulness and inefficiency, particularly by newspapers and periodicals inimical to the political administration at present in power, the force account method of construction for works of public character is but seldom used on occasional projects.

LUMP SUM CONTRACT. By far the greater portion of all public works construction is done by this method. In fact, many states require by law that this procedure, only, be followed. Once proper, full and complete plans and specifications are adopted and the contract signed, the Board can tell almost to a cent what the building will cost when finally finished. The contractor, employing only men of long experience each in his respective trade and thoroly accustomed to the former's methods of procedure, can work much faster and more efficiently and can complete the job usually in much less time than can the more leisurely superintendent or foreman on the force account project. The proper kind of contractor will not be influenced by the Librarian or by any member of the Board to employ lazy, inefficient, inexperienced men; for in practically all cases this contractor secures his job only by being the lowest of a large number of bidders; and he knows that his only chance of making any profit whatsoever is by buying his materials at the lowest possible price, using equipment of the most efficient type and employing labor of the highest skill procurable in order to stop the outgo and finish the job as early as possible.

Material dealers, recognizing that they are dealing with a shrewd business man and hoping for continued business in the future, allow the contractor discounts on his purchases which any local governmental body can rarely hope to receive; and by the low material-prices he is able to secure, and the fast, efficient work from his up-to-date equipment and trained organization he is able to produce, even with his overhead and profit included a reliable contractor can complete a construction project in considerably less time, at a total cost not exceeding, and many times much less, than a group performing the same work by force account.

COST PLUS PERCENTAGE. By this method the job is organized and directed by a contractor. He runs no risk of loss in case of sudden advance in material prices, of unanticipated "Acts of God,"—caving in of unsupported trenches, shaking down of unfinished brickwork by earthquake, or damage to his uncompleted project in any way; for his profit is calculated as a percentage of the actual cost of the completed undertaking. He, too, has no special incentive to keep the costs down; on the contrary, the greater the cost of the work, the more he receives as his percentage of that cost. At the outbreak of every war in which the United States has been engaged, in order to speed up as quickly as possible the preparations therefor, enormous contracts have been let by the Government on the cost-plus-percentage basis for food, clothing, tents, guns and ammunition, and for the construction of camps — invariably

followed by an aftermath of recriminations, investigations, indictments, convictions and imprisonment of contractors found guilty of padding their expenses and defrauding the Government thru this class of contract.

COST PLUS FIXED SUM. Of all methods used for the construction of a public or private project, this is by far the fairest both to the contractor and to the owner. The contractor's profit and overhead are usually calculated as a certain percentage of the **estimated cost** of the project, based on the architect's preliminary cost estimates and checked from the plans and specifications by the contractor. During construction the contractor has not the slightest object in padding the cost of the work, or in using cheaper, more inferior material than that called for in the plans and specifications, for his remuneration is the same whether the final cost of the completed undertaking is great or small. It is greatly to his interest to speed the work along as much as possible, the sooner to complete the job and be ready to undertake something else. By his reputation and standing in the commercial world a reliable, conscientious contractor is able to secure advantageous discounts for material used on a contract of this nature and pass these advantages on to the owner. The contractor is not penalized in any way by the occurrence of any unforeseen, unfavorable contingency—"Act of God," for under the terms of a contract of this class the owner bears all the expenses of whatsoever nature in connection with the project, the contractor merely directing the performance of the work and receiving his "fixed sum" as full compensation for such services.

ADVERTISEMENT. In order to secure the widest and fairest possible competition in cases where the work is to be performed by contract, the usual custom is to advertise for proposals in local newspapers, technical journals and engineering magazines. In some states such advertising is a mandatory requirement of the law for projects constructed by public funds.

The form of advertisement should be concise, giving all necessary information clearly but in as small compass as possible. After all, the sole purpose of such an advertisement is to furnish prospective contractors with certain facts; and it is partly humorous, partly pathetic, and vastly vexatious to an extremely busy contractor to be compelled to scratch thru a mountainous stack of verbal straw hunting here and there for a grain of information in his attempt to learn whether the advertised job is such that his organization, his equipment and his financial backing are suitable for the same and whether or not it is worth his while to prepare and submit a proposal and all other necessary accompanying documents for the particular project. Far too often we see in a local newspaper or other periodical a whole column advertisement reading somewhat as follows: "Whereas, on this nineteenth day of January, in the year of our Lord one thousand nine hundred thirty-four, in the City of X, County of Y and the State of Z, the Honorable the Library Board of the said City of X, County of Y, did, by its resolution adopted . . . " and so on and on, ad nau-

scam. Much more to the point and gratifying to busy prospective bidders is an advertisement reading somewhat similar to that given in Section 1, Appendix D, of this volume.

As much time as possible, two weeks at the very least, should be given the bidders in which to secure prices on material required, sub-bids on those portions of the contract necessary to be sub-contracted, and to prepare a proposal which will be fair both to the bidder submitting it and to the owner.

USE OF LOCAL LABOR. The extent of advertising will of course depend upon whether or not the Board desires to employ only local contractors and local labor, and purchase material from local merchants. A public library building is strictly a local institution, serving a local need and paid for by funds raised within the local vicinity. Where a number of skilled, competent contractors are available in the community, capable in every respect to finish the work in complete accord with the architect's original conception, employing only mechanics and laborers who live permanently in the community, own property and bear their proportionate share of the cost of local government, then the advertisement should be restricted only to local newspapers and trade journals. Where these ideal conditions do not exist—where proper competition can not be secured or where competent contractors and skilled workmen are not available locally, under these circumstances the Board will be compelled to advertise more widely.

But bear constantly in mind these facts: the low bidder is able to submit his "low bid" only by virtue of his having an absolutely dependable organization, one in which he can place perfect trust and confidence—skilled mechanics, and reliable sub-contractors; and he has likewise formed business connections with material dealers from whom he is able to purchase his materials at specially favorable prices. And if he is not a resident of the community in which the work is to be done, it is most unlikely that any of his labor, other than the roughest, most unskilled, will be employed locally or that any considerable proportion of his material will be bought from dealers in the community.

These facts are vividly illustrated by the author's experience in a small community near a large city. Funds were secured for the erection of a public building. The contract was duly advertised, and secured by a contractor in the neighboring large city. Local enthusiasm and hope ran high, that the unemployment situation would be relieved and trade stimulated by the expenditure of these funds entirely within the community. But it did not work out that way. The contractor's supervisory force of course was sent out from the city office, bringing with it its most dependable mechanics—also from the city. The sub-contractors, too, were also from the large city, and brought with them in turn their trusted employees—from the city. The contractor purchased all the materials, except sand, stone and lumber, from his acquaintance dealers — in the city; and the net result was that the money for all materials except sand, stone

and lumber, and all wages except those for the hardest, roughest occasional labor, went promptly back—to the big city! The smaller community having the advantage of less than fifteen per cent of the whole cost of the project expended for local material and labor. And day after day the boundaries of the site were lined with men, American citizens, residents, home-owners and taxpayers in the community, looking wistfully and anxiously for even a few hours' of the dirtiest, hardest kind of labor, while the regular crew on the job, speaking a foreign language, some not even citizens of the United States, worked regularly, cheerfully and singingly along, making rough jests and sport of the bystanders.

For reasons illustrated above, where necessary to advertise for bidders outside the local sphere, binding clauses should be incorporated in the contract that all materials shall be purchased locally and that only local labor shall be employed; and where it is claimed that this is not possible, the burden of proof of such impossibility should be placed upon the contractor to the complete satisfaction of the Board.

GUARANTEES. To assure the full and complete performance of all conditions and obligations imposed upon the contractor by the terms of his contract, certain guaranties are required, either by law or by the agreement itself. The Board has gone to great expense of time and money in the preparation of specifications and plans, and advertising for bids. Proposals have been received and tabulated, and the contract awarded to the "lowest responsible bidder," in accordance with law. Suppose this low bidder should change his mind and refuse to go ahead with the work? The owner then can only go to additional expense of money and a year or so of time in a suit at law to **compel** the performance of the contract or the payment of damages in lieu thereof, or he can take his medicine, cancel the contract and readvertise. To avoid just such occurrences, in practically all contracts of any considerable importance each bidder is required to furnish a guaranty that, if awarded the contract he will actually enter into the latter, furnish bond and comply with all other requirements, and proceed to perform the work. As an earnest of this guaranty the bidder furnishes a "bidder's bond," or a cashier's check or certified check, payable and acceptable to the owner, in amount not less than ten per cent of the bid, to be forfeited in case he fails to enter into the contract as he agreed to do in his proposal.

Once the contract has been awarded it is the customary practice on all public construction contracts to require further bond or guaranty that the contractor will pay when due, promptly and in full, all expenses incurred for materials purchased and labor employed in the performance of the work. In case he fails or neglects to do this he forfeits a surety bond of twenty-five to fifty per cent of the total amount of his contract, as provided therein, or so much thereof as is necessary to pay these expenses in full.

A third guaranty not ordinarily required is a bond to insure, for a reason-

able length of time—one or two years—against the use of defective materials or workmanship. In practically all contracts is to be found the conventional clause that, if within the period therein specified after the job is finished any portion of the material installed or workmanship performed proves to be defective, the contractor shall remove the defective portion of the work and replace with that of the grade and quality specified, at no additional cost to the owner. BUT—once the hidden defects of the structure have been passed over undetected and uncorrected until the building has been accepted and the contractor paid in full, the latter is in a position then to ignore any demands that he make good any defects discovered within the period of the guaranty; and again the owner has no recourse other than an expensive, time-wasting lawsuit. Far simpler and much preferable it is not to require so large a "material and labor" bond, and to include in the contract an additional "workmanship bond," of perhaps twenty-five percent of the total contract price, effective for the full duration of the period for which the guaranty is provided, to insure that if such defects do develop within the stated period the correction thereof will be paid for by the contractor and the owner will not be compelled to spend additional money in making good the contractor's defective work.

Sections 5, 6 and 7, Appendix D, of this volume illustrate bond forms which may be used for "bidder's bond," "material and labor bond," and "workmanship bond," respectively.

COLLUSION AFFIDAVIT. In any community having a large number of contractors it was absurdly easy for them to conspire together, figure the cost of various jobs advertised for bids, and adopt some system making certain that the members of the conspiracy secure the jobs in rotation; each knowing beforehand the amount of the others' bids, and each very carefully preparing a dummy bid he knows to be too high in order to leave a clear field for the bidder selected by the combine to perform the particular job; the latter preparing a proposal with no actual competition and at a price such as only his conscience, if any, might limit.

To forestall and provide against such conditions some community governments require by ordinance that every bidder submit together with his proposal and bidder's bond an affidavit, sworn to before a notary public, that his proposal is bona fide and that there has been no collusion between this bidder and his fellow-bidders in the preparation and submission thereof. A suggested form for such collusion affidavit is included in Section 4, Appendix D.

QUALIFICATION OF CONTRACTOR. In cases where public projects are constructed by lump sum contract the law—either state statutes or local ordinance, and sometimes both—requires that the job be awarded the "lowest responsible bidder." Who is a "responsible bidder"? Upon what basis is this responsibility determined?

Until a few years ago, before it became a common practice to award con-

tracts amounting to many millions of dollars to a single contractor, this responsibility was judged only by the balance the bidder had in his bank account at the time of submitting his proposal; the ease with which he might secure a performance bond, and borrow sufficient capital, if necessary, to finish his job; his reputation among material dealers for paying his bills promptly and fully; and his general reputation for performing an honest, workmanlike job. Today those governmental agencies which do a tremendous amount of contracting work, such as state Public Works Departments, approach the subject much more scientifically, delving deeply into a prospective contractor's past history of performances and accomplishments by means of an exhaustive questionnaire of some eighteen or twenty pages, under sworn affidavit, before a proposal from him will be accepted.

The necessity and advisability for such investigation in every instance is well illustrated in the case of one contractor who, at different times, constructed three buildings for the Los Angeles Public Library system. When awarded the first contract a careful and thoro inquiry gave him an A-1 rating. At the award of his second contract again favorable reports were received as to his responsibility. Thru carelessness engendered by excess confidence in his two prior contracts, on the third occasion the author did not go so thoroly into his financial condition as previously—and one month after beginning the third project the contractor failed and went into bankruptcy. After a vast amount of confusion, worry and red tape, and a delay of six or eight months, the job was finally completed by the bonding company.

It is very improbable that any single contractor will ever be engaged on more than one building for any Library Board at any one time, or that an excessive amount of capital, resources and equipment will be required; and for these reasons the minuteness of investigation necessary to determine the dependability of the prospective contractor is not so great as that for huge public works undertakings costing many millions of dollars. Section 3, Appendix D, covers a "Questionnaire for Bidders" wholly adequate for our purposes.

INVESTIGATING THE SURETIES. The same degree of care observed in checking up on the contractor should be exercised in determining the responsibility of the sureties who guarantee the performance of the former. Due to intense competition among these companies they are not always careful about selecting their clients, or in determining the degree of risk involved in bonding any particular contractor. As direct consequence, after a series of contractor-bankruptcies, and having to make good on the various bonds, a surety company itself becomes of rather doubtful acceptability on the bond of a contractor.

Approximately fifty per cent of the bonding companies in the United States have their home office in New York City. Before being authorized to do business in another state, it is necessary for a company of this class to file ar-

ticles of incorporation, and to secure a license from the Secretary of State wherein it seeks to do business. When checking up, therefore, on a bond-ticles of incorporation, and to secure a license from the Secretary of State wherein it seeks to do business. When checking up, therefore, on a bonding company these questions should be answered satisfactorily:

(a) Is the bonding company licensed and properly authorized to do business in this state?

(b) Does the bonding company have a record for prompt settlement of claims where necessary to make good on its bonds?

(c) Does the bonding company have an unduly large list of client failures?

INDIVIDUAL SURETIES. Heretofore the subject of guaranty bonds has been discussed upon the basis of surety companies regularly incorporated for this particular purpose. It is possible, as well as perfectly lawful, that the bond be furnished by private individuals, usually two or more of the contractor's friends. Under the laws of the Federal Government, and those of many states and lesser governmental units, these bondsmen must make affidavit that their aggregate liquid assets, not exempt from execution of judgment, are in excess of double the amount of the bond.

The author does not favor the acceptance of bonds given by individual sureties. Even with the best of intentions the plans of the contractor go wrong, and his bondsmen are compelled to make good. Just as is usually the case of endorsers of a promissory note for a friend, the bondsmen receive nothing for their accommodation, and the loss falls upon them without any compensating return. Too often lifelong strife, bitterness and hatred are engendered as a result. The price of forfeited friendship of a lifetime is entirely too high to pay in order to save the inconsiderable premium required for a surety company bond; and the businesslike contractor will include the cost of such premiums as a legitimate part of the cost of the project, to be paid by the owner, instead of imperilling the friendship of his neighbors and acquaintances by asking them to take such uncompensated risk The owner, too, will gain by having the bond secured by a company regularly in the business, handled in a strictly businesslike way, rather than by a group of amateurs who, once the necessity arises to make good on the bond, will delay and seek by every possible means to avoid their obligation, in the vast majority of cases compelling the owner to resort to a suit at law to enforce the bond provisions of the contract.

APPROVAL OF SUB-CONTRACTORS. Even as a careful Board will make thoro investigation of the low bidder before awarding him the contract, so, too, should the right be reserved, and exercised, to pass upon the qualifications and approve or disapprove of the sub-contractors, who in the aggregate perform a larger proportion of the total work than does the general contractor himself. Let us repeat once again that the contractor secures his contract only by being the "lowest responsible bidder." He is able to submit

his low bid only thru his ability in turn to secure low bids from his various sub-contractors. The latter make these favorable prices from one or more of these causes:

(a) Exceptional advantage in purchasing materials of standard quality.

(b) Extra efficiency of their workmen, or their organization as a whole.

(c) Use of the cheapest, most inferior materials which will comply with the minimum requirements of the specifications.

(d) Employment of low-paid, inefficient labor.

A clause of the contract should make specific requirement that the contractor, before commencing work on the project, shall submit for the approval of the Board a list of all sub-contractors to be employed on the work. A little diligent inquiry by the Board or by the architect will indicate among the sub-contractors listed those who have the reputation of purchasing material advantageously and performing their work efficiently, and those who have the reputation of using cheap, inferior material and low-paid, inefficient labor. Obviously the latter class of sub-contractors should be promptly and unconditionally disapproved and not allowed to take part in the work.

RESERVATIONS. It is often advisable that certain portions of the work be reserved, either from the architect's contract or from inclusion in the general contract for a building. Mention has heretofore been made of reservation of equipment. Where a plain cork carpet or battleship linoleum is provided, there is also no especially good reason why an architect's commission or a general contractor's profit should be paid for this absurdly simple operation. All negotiations for permanent public service facilities — telephone, electricity, water and gas—should be exclusively between the Board and the respective community government department or public utility corporation, and not thru the architect or the general contractor. The installation and testing of electric lighting fixtures should be thru the submission of competitive designs, within a previously fixed limit of cost, and a contract separate from the general contract. Underground lawn sprinkling system may or may not be separated advantageously from the general contract.

Landscaping should be withheld for at least one year after the completion of a building. It usually happens that the new library building is erected upon a site which has been vacant and uncultivated for a long period of time. Weeds have flourished, the ripened seeds falling to the ground from year to year, waiting until the ground has been thoroly stirred to burst forth into enthusiastic splendor and produce a fine crop of new weeds; and if the stirring of the ground happens to be for the purpose of planting a new lawn, the first year of lawn will be a healthy and vigorous weed patch, requiring more of the janitor's time in pulling weeds from the lawn than attending to indoor duties. The breaking and grading of the ground for the construction of the building is in itself sufficient stimulus for the germination and growth of the major part of

the seeds dormant in the ground; and if permitted to grow unchecked until just before seeding, then cut off close to the ground or turned deeply under, there will be very little trouble from weeds thereafter when the landscaping is installed.

On certain occasions in the experience of the author it has been found greatly advantageous to reserve from the general contract the plumbing and electrical sub-contracts. The advisability of such reservation depends strictly upon local conditions at the time the general contract is awarded.

REJECTION OF PROPOSALS. A clause now commonly to be found in nearly all contracts reserves to the owner the right to reject any and all bids, and to waive all defects and irregularities therein. Many times during the past it has been found upon investigation that the contractor submitting the lowest bid did not have a record of satisfactory past performance; or that his finances or resources were not as adequate as could be desired; or that he was a "broker," i. e., all his work is sub-let to sub-contractors, he himself being only the general contractor, furnishing bond, taking his profit, if any, but doing no part of the work himself whatsoever. Once a project has been advertised for contract, without a clause similar to that above-quoted the low bidder, if not given the contract, can bring a suit at law and have an excellent chance of winning and of forcing himself upon the unwilling owner. Where this right of rejection is reserved, however, the owner can select any of the bidders he chooses, even the highest, provided, of course, he can show that those lower are not responsible, or are otherwise unacceptable for any reason.

In the haste and confusion of preparing and submitting a proposal a contractor will very often violate some technical requirement of the notice inviting bids, or other preliminary document. He may be the low bidder, thoroly responsible and capable of doing the work to the satisfaction of the owner. Shall his proposal be rejected on account of the violation of this technical requirement? Yes—if the owner has not reserved beforehand the right to waive such technical defects in bids received; No—if such reservation has been previously made.

CALENDAR DAYS. One most important requirement of any contract is that it shall be completed within a certain specified time. If that time is exceeded and if any material loss to the owner is occasioned by such over-run of the contract time, most contracts provide that a certain sum shall be paid by the contractor as liquidated damages in compensation of the owner's loss, for each day's delay in completing the work after the specified contract period. Formerly this period was set at so many "working days;" and no little confusion arose in determining just upon what date it should end and when the owner's compensatory damages should commence. Should holidays be considered "working days?" Should Saturday and Sunday be included as "working days?" In case an emergency arose demanding work to be done on these days in

order to save the partially-completed project from serious damage or destruction?

In the contracts of today the time of completion is determined much more accurately and exactly by stating therein that the work shall be completed, not in so many "working days," but in so many "calendar days."

CHANGES IN THE WORK. Even tho the utmost care and forethought may have been observed in planning the building and working out its requirements, it is only human to overlook certain very important and extremely desirable improvements until too late to include in the original plans and specifications It must be constantly remembered that there are three parties vitally interested in this contract—the owner, for whom the work is being done; the contractor, who does the work; and the surety company, who bonds the work, guarantees the quality of material and workmanship, and that it will not cost more than the contract price. And in so doing, the surety company binds itself to pay out, if necessary, real money, not exceeding the amount set forth in the bond.

Present-day contract forms in most instances provide that the work may be changed, and state the manner in which the corresponding price-adjustments shall be made. If any part of the original work is left out, of course the contract price is also proportionately reduced; and conversely, if additional work is to be done, extra payment will be allowed in accordance with the method set forth in the contract.

These contracts usually provide further that such changes shall be made "with or without notice thereof to the surety company;" in other words, the latter virtually agrees beforehand to certain changes in the contract of which it has no knowledge. Within certain limits no doubt this is perfectly lawful, and agreeable to the company; but when these limits are exceeded, and where the changes in the aggregate are so extensive as practically to change the entire contract, then a grave question arises as to the legality of such changes and as to the further liability of the surety company on a contract so changed as to be virtually an entirely different agreement.

In fairness to the surety company and in order that there may be positively no question as to its continuing liability on the contract, including all of its changes, a limit should be stated in the bond and in the contract itself, which the total amount of the changes shall not exceed.

Sections 6 and 7, Appendix D, "Material and Labor Bond," and "Workmanship Bond," respectively, fix such limit of change at a maximum value of twenty percentum of the original amount of the contract.

"EXTRAS." Despite the fact that an undertaking of this kind is limited in cost to the amount set aside in the budget for the purpose, and that almost invariably certain very desirable features are omitted from the original contract in order to bring its price within the limits of the budget, very often the

owner will suddenly find some feature "absolutely indispensable!" but not a part of the project as let to contract. The contractor has obligated himself to buy materials of a certain class and in a certain quantity. If he makes a very marked change in either class or quantity of material ordered, the dealer will be entitled to some recompense or anticipated profit on his materials contracted for, but not accepted. Additional materials of entirely different nature, wholly unanticipated when making up his estimates, must be bought by the contractor without the advantages of favorable discount given for purchases in much greater volume. Unexpectedly greater payroll expenses for labor must be met. The contractor himself is entitled to additional compensation for his increased expense and work involved in installing these extra features.

In most cases the extra work is so intimately connected with that of the original contract that it is not possible to have it done by a separate agreement. Knowing that in this instance he has no competition, the contractor is in a position to fix the price of these extras at a far greater proportionate figure than if they had been included in his original contract. No contractor is in the business from motives of pure philanthropy, or from any great love for the owner. If these were the sole considerations he would not continue long in the contracting field. And a great many times in his years of construction experience the author has heard from contractors the statement that the expenses of the job were paid by the contract, and the profit from the "Extras."

HI-JACKING THE CONTRACTOR. Many owners regard the contractor as a good-natured Santa Claus, ready and willing at all times to donate at his own expense those features of the building which seem desirable or indispensable but which have been omitted for budgetary reasons, or from the uncertainty of the designer or his failure to include just what he wanted to show in his plans or to describe in his specifications. As a general rule the average contractor is of generous, large-hearted disposition, anxious to please the owner and build up good-will for himself in the community. Accustomed to making large expenditures of money, taking as a matter of course the risks which come to them in the course of their business, impatient of insignificant, unimportant details, the majority of contractors will gladly accommodate the owner, install at their own expense and make no charge for such extras within reasonable limits and not involving the forfeiture of too great a proportion of their profit on the job.

Many standard specifications contain a clause similar to the following: "The contractor shall supply such materials and perform such labor as may be required to complete the entire building in a satisfactory and acceptable manner, even tho such material and labor may not be shown in the plans or described in the specifications." Aside from its very questionable legality, such provision leaves a broad way open for the owner to demand almost anything as being "required to complete the entire building in a satisfactory and acceptable

manner," and in case the contractor dares to question such broad, arbitrary authority and refuses to perform some of the more expensive work demanded of him but not included in either the plans or the specifications, the owner enforces his demand by withholding all subsequent periodical progress payments until the contractor **does** perform the work or brings a lawsuit to compel payment by the owner. No contractor should ever be made subject to the arbitrary whims and demands of the owner, or liable for the stupid mistakes and uncertainty of design in any building, by the inclusion in his contract of any such clause as that quoted above.

ADEQUATE INSPECTION. Asheretofore stated, the architect's contract with the Board includes not only the design of the building but also supervision of the construction. No matter how excellent the material by tests may prove to be, if hastily, carelessly and improperly thrown together a weak, ill-constructed building is bound to result. The job superintendent is budgeted by the contractor as to expenditures for materials and labor payrolls, and as to time within which to perform each element of the work. He is instructed to finish the job as quickly as possible; and it is not for him voluntarily to waste time in super-refinements. By the terms of his contract it is the responsibility of the architect, as authorized representative of the owner to see that every detail of the plans and specifications is carried out in complete accordance with the architect's original conception.

This may be done by the personal supervision of the architect himself, or by an inspector employed for the purpose. If the architect attempts to perform all the inspection work himself, he should devote sufficient time to the project to make sure that every detail is carried out strictly according to the contract. And this most certainly can not be done by his visiting the job only once or twice a week and spending from ten to thirty minutes at each visit, as is done in many instances.

Where an inspector is employed in a great many cases it is the custom to hire an undergraduate student or a recent graduate from an engineering college to do the work. This is ideal experience for the untrained inspector, but sometimes exceedingly unfortunate for the contractor. Almost hourly questions arise as to the interpretation of the plans or specifications; and afraid to use his own judgment or to venture an untried opinion, such inspector will often give a vague, indefinite decision, putting the contractor on his own responsibility as to the point involved, at the risk of being overruled and compelled subsequently by the architect to change that portion of the work in question.

Happy is the lot of that contractor whose architect is of fair-minded disposition and has at his disposal all the time to spend on the job necessary for its adequate inspection, or who has for an inspector one of long experience, good judgment, capable of forming immediate decisions and giving correct interpretations of the plans and specifications.

PROTECTION OF THE PUBLIC. With horrifying frequency we read in the daily papers of some person or group of persons killed outright or permanently injured thru the gross carelessness of some contractor, in his failure or neglect to provide proper safeguards for the protection of the innocent public during the progress of construction of the project for which he is responsible. The collapse of the grandstand at the Rose Parade on New Year's Day in Pasadena, California, in 1926; the killing or maiming of a transcontinental bus-load of pilgrims returning from a religious conference in Texas in March, 1934, when running into an unguarded and unlighted highway excavation in the night-time; these and a host of other instances testify to the possibilities consequent upon the relaxation, even for an instant, of carefulness and caution on the part of the contractor. In practically every case the failure takes place in work intended only for some temporary purpose; and where such catastrophe actually occurs, a criminal indictment, conviction and long-term imprisonment results, in which the "owner" of the project is held equally guilty unless he can positively show his innocence by having taken beforehand the proper thought, and has included in the contract provision for the construction of even temporary work adequately strong; has provided necessary barricades to protect the public from falling material and from dangerous excavations; and has supplied a sufficient number of red-colored lights to warn passing motorists and pedestrians and keep them from colliding with piles of construction materials not ordinarily to be expected in that place. And not alone for the general public, but equal care must be taken to provide for the safety of workmen employed on the job, in the way of adequate shoring, bracing, runways, hoisting towers and all other work of temporary nature; even though these employees may be taken care of in a measure at least by the provision of liability insurance discussed in the following paragraph.

LIABILITY INSURANCE. Until within recent years any person who worked at a dangerous occupation of any kind did so strictly at his own risk. A laborer falling from a scaffold; a carpenter wounded by one of his own tools in the performance of his task; a workman hurt from any cause—all were presumed to receive injury as a direct result of their own carelessness; and in order to compel the employer to assume any responsibility for such injury their only recourse was to bring a suit at law for damages, with the chances even that the decision would be against them.

Today this is wholly changed. In practically all states laws are now in effect, protecting all employees in every class of gainful occupation, with a few exceptions such as household employees, agricultural laborers and others. Where the law requires the protection of any class of employees against injury from accidents arising within the scope of their employment, the employer is compelled to take out insurance covering his entire group of employees; either from

a private insurance company, or in some instances from a state department handling such matters, or he may elect and agree with the state to assume the risk and himself to pay the amount awarded the injured employee. No red tape, no litigation necessary; the employee is injured, while at work for the employer; he receives his weekly aid, and medical care as required by law; and thereafter he receives his weekly or monthly payments from the insurance company, the state or from his employer, until he has recovered sufficiently to go to work again. And practically all modern construction contracts contain a clause which compels the contractor to maintain adequate liability insurance.

FIRE INSURANCE. In addition to liability insurance the up-to-date contract also requires the contractor to maintain fire insurance, to protect himself —and secondarily the owner—from loss thru fire occurring in the uncompleted building. Altho it is the theory of the law that the building belongs entirely to the contractor until it is completely finished and paid for, and that he alone is responsible for any damage which may occur to the uncompleted structure; when a fire occurs and seriously damages or destroys the latter, and so impairs the capital and resources of the contractor that he is unable to rebuild the portion destroyed and continue with the construction, it does not help the situation very materially for the owner to disclaim any ownership or any part of the loss.

Altho the owner has not yet accepted the destroyed building, it is very probable that he has been making periodical progress payments as the construction proceeded. With the making of these periodical payments the owner has acquired an equitable interest in the building, this interest becoming greater as the total amount paid to the contractor increases over the time intervening since construction was started. Where adequately insured therefore, not only is the contractor reimbursed for his loss sustained in the destruction of part or all of the unfinished building, but the owner is fully protected as well for his equitable interest.

In sections where earthquakes occur it is also a measure of justifiable prudence to take out earthquake insurance on a building under construction. If the building is properly designed however, and adequately constructed to withstand earthquake shocks, there is not likely to be excessive damage from this source, and usually the contractor can well afford to carry this risk himself.

PERMITS AND LICENSES. Paternalistic Government in its steady growth has extended itself to the point where the people of any community are now almost universally restricted as to what they may and what they may not erect within the local governmental jurisdiction in the way of buildings. These restrictions are enacted into ordinances, or promulgated by legally-constituted authority as regulations, and every structure built within the community limits must conform to a definite, minimum standard of safety and excellence. To see

that this is actually done, a corps of governmental experts is maintained, each an expert in his line and each thoroly acquainted with all laws and regulations affecting his particular specialty. The work performed conscientiously by these inspectors inures to the direct benefit of the owner, not only compelling him to conform to the established standards, but protecting him as well from any possibility of damage arising from slip-shod, inferior construction on the part of his neighbors. The salaries and expenses of this corps of inspectors are paid therefore thru fees assessed for the issuance of permits, by the proper governmental department, to proceed with the construction of the building. Before such permit will be issued, the owner, or the architect, or the contractor must submit to the issuing governmental department a complete set of plans and specifications, in order that this department may check and determine whether the building is designed with the necessary strength and safety, and whether the plans and specifications comply in all respects with the requirements of the community building ordinances and regulations.

These latter are altered so frequently and so materially that it is indeed difficult for even an architect or a contractor to keep fully informed of all such changes. A building is advertised and the contract let to the lowest bidder; this contractor, customarily required to secure and pay for the general permit, submits his plans and specifications for this purpose. Meanwhile the requirements have been materially changed, unknown to the architect when preparing his plans, or to the contractor when submitting his bid. As a result of these changed requirements very considerable alteration must be made in the plans and specifications, involving also changes in the quantity, or in the quality, or even the kind of material itself which must be used in order to conform to the required standards. Supplementary agreements between the owner and the contractor, involving price changes in the contract, must be made and approved in writing by the bonding company, and all this time the contractor's organization is kept idle while the necessary alterations in plans, specifications and terms of the contract are being effected.

This situation, which occurs with vastly vexatious frequency, is absurdly easy to avoid, by the simple methed of requiring the architect himself to secure the general permit for the building **before** the contract is advertised and let; in this manner any changes necessary to be made in the plans and specifications can be made beforehand, the contractor's force is not kept idly waiting, and no alterations in the contract, or supplementary agreements involving changes in the price subsequent to letting the contract, are thereby made necessary as a result of changes in the community's standard building requirements.

In addition to the general permit described above, certain special permits or licenses, such as those for plumbing, heating and electrical work, are required in many communities. Standard forms of contract usually require that

these shall be secured and paid for by the contractor.

PATENTS AND ROYALTIES. One prolific source of trouble in the construction profession to be guarded carefully against is the inadvertent infringement of patents held by others. One hundred fifty years ago our forefathers, conceiving and charting the course of an entirely new form of government, provided in Section 8, Article 8 of the Constitution, for the promotion of the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries. In consequence, during the above-mentioned period full advantage has been taken of this constitutional privilege, and a person using a new material or a new method of construction can fully expect to find a patent involved therein somewhere. In the case of materials the patent is usually purchased by the manufacturer, or licensed and a royalty paid by him to the patentee, which the consumer or customer pays in the final analysis as an included part of the selling price itself. But where methods are patented, unless the architect designing or the contractor constructing the work is very careful, he is most likely to find himself brought into litigation and a suit for recovery of damages, as well as the payment of royalties for using a method the exclusive right to which the government has awarded to the patentee. In order to forestall this situation and to protect the owner against such litigation as well as from the consequences arising from any use of patented machinery, materials or construction methods by the contractor unauthorized by his contract, practically all standard contract forms now contain a clause similar to the following:

"The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of patent rights and shall save the Owner harmless from loss on account thereof, except on account of such patented products as are expressly called for in the specifications."

ADVERTISING SIGNS. When a structure of pleasing lines and beautiful construction is in the process of erection, the passers-by are naturally curious to learn who designed it, and the name of the contractor building the same. In order to satisfy this curiosity on the part of the public it is a customary procedure to erect upon the site a sign, large or small, plain or ornate, costly or inexpensive, according to the fancy of the architect, setting forth the names and businesses, and addresses of the architect, the general contractor and all principal sub-contractors.

This is a legitimate form of advertising and under rightful circumstances very commendable. Too often, however, this sign is made an integral part of the contract; its description included in the specifications for the job, and the cost figured by the contractor as a part of the cost of the entire work. In other words, the owner, receiving no benefit whatsoever from such advertising, pays for a sign erected for the exclusive benefit of the designer and the builder of the structure. Such inclusion at the expense of the owner is "cheap," and not

in the least in keeping with the dignity of the architectural and contracting profession. If the architect and the various contractors desire to advertise their respective businesses by means of a sign on the site, then they should provide and pay for that sign themselves, and remove the same when the owner accepts and occupies the building.

ENGINEERING SERVICE. The erection of a new building very much resembles a jig-saw puzzle, with this exception—all of the separate parts of the jig-saw puzzle are cut out and separated from a finished picture, and all these parts are found together in the box in which received; whereas the different parts of the new building must be cut out, fabricated, shaped and finished sometimes many thousands of miles from the place of their final assembly. For a building in California or Montana the structural steel may be fabricated and shipped from Bethlehem, Pennsylvania or Birmingham, Alabama; granite from Vermont; limestone from Indiana; marble from Alaska; ornamental metal work from chicago, Illinois; and other materials from as many different and widely-separated sections of the country.

In order to reduce the freight charges to a minimum these various materials are made ready at the factory to install without further preparation immediately upon their receipt at destination. To guide the manufacturers in their original preparation are the full-size details and shop drawings, previously mentioned in this book. But merely this is not enough; from the instant of commencement of work on the building until the last piece of decorative material is set, step by step accurate measurements must be taken, careful checks must be made and the entire structure kept to its exact dimensions, or else the materials arriving in their finished state will not fit into the respective places for which designed. And for the purpose of making these daily checks and measurements skilled and competent engineering services are absolutely imperative.

Certain contractors, inherent gamblers by nature, if permitted will attempt to have this work done by their foremen or their superintendents. Such procedure is exceedingly risky, as these employees are not usually trained in work of this class and are too prone to make mistakes or to perform careless work, both of which may be exceedingly expensive later to correct, besides infallibly producing an unsightly botch job where the corrections have had to be made. In order to insure that the necessary engineering work is done in a proper and efficient manner, the specifications should require that all survey work should be done, and all lines, grades and elevations given, checked and certified by a competent practicing engineer.

CONSTRUCTION DETAILS. In the preceding chapter the reader was warned of the more common mistakes and pitfalls to be encountered and avoided in the **design** of the building. In construction as well, certain details must receive more than merely casual attention if we would produce a structure

of the very best quality obtainable from the materials used. Discussion of some of the more important details of construction follows hereafter in this chapter.

INSERTS. One detail often overlooked in the preparation of specifications, or purposely omitted by the contractor's superintendent as too much trouble, is that of metal inserts to tie together various portions of the building constructed at different times or of different materials. This feature is important in walls, particularly in regions affected by earthquakes. The ideal method would be to construct all walls, interior and exterior, of the same material, all at the same time and all of equal unit strength, as one continuous whole. Obviously this ideal method is entirely impossible and impracticable. When therefore it becomes necessary to join any section of wall, or any other part of the building, with other work previously finished, the juncture between the old work and the new becomes a point of weakness in the structure, which can be very materially strengthened by providing in the specifications and including in the work the metal ties aforementioned.

These must be of adequate size, number, strength and distribution to carry their proportionate load or stress. They must be built into the work as it progresses; for if, as an afterthought, and as is all too frequently done, they are carelessly thrust into a concrete mass which has already partially or wholly set, or if they are driven roughly into the mortar joint between bricks or units of masonry which has partly hardened, not only is the existing concrete, brick or masonry work weakened by such process but the value of the inserts themselves is nil and the purpose for which they are used is wholly defeated.

CONCRETE. As the strength of a chain is limited to that of its weakest link, so is the strength and durability of any structure determined by the quality of material, consistency of mixture, method of placing and resulting density of the concrete used in its foundations and walls. Its component materials must be clean, hard, and with surfaces sufficiently rough to afford good adhesion with the cement. Reinforcing steel must be free from dirt, rust-scale, oil or any other substance which will prevent perfect contact with the concrete Sand must not contain an excessive proportion of earth or clay, and both sand and water must be wholly free from organic acids resulting from decay of leaves, plants and other vegetable matter. The presence of these acids is very quickly and easily ascertained by mixing a small sample of the suspected material with a 3 percent solution of sodium hydroxide. Normally a light yellow or straw color, if the mixture of sample and solution changes to brown, the presence of these acids is infallibly indicated, and the darker the resulting color, the greater the percentage of organic acid present.

The effect of these acids on concrete is clearly illustrated in the case of a reinforced concrete schoolhouse coming under the author's observation in the Philippine Islands approximately 25 years ago. All tests of materials required by the specifications at the time had been made by the Government Bureau

of Standards, and all materials were presumably satisfactory. When placed however, the concrete persistently refused to harden, and remained in a semi-mushy condition, easily penetrated with the blade of a pocket-knife. Instituting a research and an exhaustive series of laboratory tests, and eliminating the suspected materials one by one, the Bureau of Standards finally proved that the water used for mixing the concrete was to blame, and that the trouble arose from the presence in the water of organic acids resulting from the decay of vegetable matter.

The average person pictures concrete merely as a mixture of cement, sand, crushed stone or gravel, and water, which after mixing and placing turns in some miraculous and unexplainable manner to stone. Very few realize that this hardening is brought about by a natural recrystallization of the cement, which, before it hardens, acts in precisely the same manner as glue in binding the sand and stone aggregates together. When proportioning the various ingredients, in order to obtain the maximum density and consequent strength, the interstitial spaces or voids between the individual fragments of the stone or gravel aggregate are carefully ascertained, and filled with other stone fragments of smaller size and sand grading from coarse to fine, mixed together in sufficient quantity just to occupy these voids with a slight excess to care for any possible error in the calculated percentage of voids in the stone. Cement, in quantity a little more than the volume of the interstices in the sand and smaller stone, is dissolved in water—partially at least—coating every portion of the surface of each stone fragment and grain of sand with this cement-glue solution, and filling all voids theretofore unoccupied by sand or small stone fragments.

Having been poured into the forms, after two or three hours this plastic concrete mixture begins to "set" or crystallize; and after twelve to twenty-four hours the so-called final set or hardening is complete. This process was exhibited by means of slow-motion micro-movie pictures at a meeting of the American Society of Civil Engineers, in January, 1916, in New York City. Small, short transparent crystals suddenly appeared thruout the mass shown on the screen; and as the audience watched, these crystals grew slightly thicker, and increased rapidly in length, intermingling, interwinding and intertwining in and out among the adjacent crystals in a manner exactly similar to the angle-worms carried along for bait in a tin can when we used to go fishing in our youth. Gradually the process continued until at last the whole interstitial space among the aggregates was seen to be filled solidly with this intertwined recrystallized cement, giving to it the appearance of an original crystalline stone.

Many years of research and experimentation by different engineering societies, the Portland Cement Association, American Society for Testing Materials and other technical organizations have proved to a definite degree

of exactitude that the proportion of water producing the strongest possible concrete, makes a mixture of such stiff consistency as to be exceedingly difficult to place properly in forms. The standard method adopted for measuring its relative consistency is that of the "slump" test; filling the frustrum of a sheet iron cone, 12 inches high, 12 inches in diameter at the bottom and 4 inches in diameter at the top, with concrete taken from one of the batches at the mixer: placing in the cone in three layers of uniform height, and tamping each layer as placed with a certain definite number of strokes of a pointed iron rod, then lifting off the cone immediately and measuring the settlement or "slump" of the fresh, unsupported concrete. And mixtures designed to produce the strongest concrete would have practically no slump whatsoever; would not pour freely, fill the corners of the forms completely and surround with perfect contact the intricate web of reinforcing steel in the rather narrow space within the forms.

Until very recently, in order to increase the fluidity of the concrete, more water than necessary for maximum strength was used, producing a mixture with a slump not exceeding 3 to 6 inches and weakening the gluing power of the cement to a degree far disproportionate to the extra quantity of water used, in a manner exactly similar to weakening library paste by excessive dilution with water.

When poured too wet into the forms the various ingredients separated or "segregated;" the stone fell in a pile directly beneath the point where the pouring occurred; the liquid mortar drained away, and flowed to a lower point in the forms; and over all floated a scum of diluted cement, or "laitance," which, slowly settling as the mixture hardened, left a skim surface, a plane of separation to prevent the cohesion of this pouring and the next, and produced a concrete of most ununiform character—"honey-comb" and air-pockets where the stone had fallen and a weak, porous dried mortar where the sand had collected and the water dried out.

This condition was most emphatically illustrated in the case of one of the earlier branches of the Los Angeles Public Library system. The contract with the architect included also the inspection of construction by his office, and an inspector was assigned under his direction to do the work. When pouring the basement walls was started the concrete mixture was of the character described in the paragraph immediately preceding. Over the protest of the author this portion of the basement wall was allowed to remain; and therein was the author greatly delinquent in his duty to the Library Board, in not DEMANDING that the forms at this point be taken down, and the defective concrete removed and replaced with a mixture of the proper consistency as provided in the specifications; for upon the advent of the first storm of the succeeding rainy season the water, working its way downward between the ground and the outer wall of the building, poured thru this honey-combed section and

flooded the basement.

Until only a year or two ago attempts were made to use a mixture of much stiffer consistency which would hold together and not segregate when poured into the forms; then to insure its uniform distribution by "tamping" with a long-handled spade, or an iron bar, or a slender wooden pole, to break up the air-pockets and honey-comb spots; but rarely even with the utmost care was this result ever secured to a perfect degree. Today the up-to-date and forward-looking builder is able to use a concrete of far drier, stiffer, stronger consistency, having a slump not to exceed 1½ inches, and to fill all sharp corners and surround the reinforcement completely by vibrating the forms with a fairly heavy electric hammer or vibrator, acting in a manner somewhat similar to the massage vibrators in beauty parlors. The stiffest, most stubborn, sullen-looking pile of concrete, feeling the soothing effect of the vibrator tapping lightly but with extreme rapidity the form in its vicinity, will begin to weaken, settle down and in a few seconds will drive out all air bubbles, surround its reinforcement completely, fill up its form in a much more perfect manner and produce a finished material of far greater solidity, density and strength than was ever possible to secure heretofore by the wet-concrete-and-tamping method. And all up-to-date concrete specifications should unequivocally require that all concrete in the contract be tamped, puddled and settled by thoroly vibrating the forms with an electric hammer or vibrator especially designed for this purpose.

MASONRY, STONE AND TILE WORK. The raison d'etre for a masonry building is two fold: (1) strength, and (2), beauty. The strength is provided by proper design and specifications; by taking careful precaution in the choice of materials, testing after their receipt, and their incorporation in the proper manner into the building. The beauty of the finished structure is brought about by the careful and faithful execution of the architect's conception, as set forth in the drawings and details. And it is the responsible duty of the inspector on the construction, whoever he may be, to co-operate in every respect with the architect, and to require of the contractor the proper carrying out of the most minute detail of the plans and specifications. Brick must be supplied of even hardness and uniform color, except where otherwise required in order to permit the working out of patterns in this material. Stone must be hard, non-porous, and of even color over the whole surface, except, as in the case of marble, where variegations in color are designedly used by the architect in his decorative scheme. Terra cotta and tile must be evenly burned, true to pattern and with no variation in colors from those shown in the architect's drawings. All material must be very carefully sized, to produce joints of uniform width, and all exterior masonry units must be set evenly spaced with joints so aligned as to produce perfectly plumb vertical lines from top to bottom of the wall, and not resemble the track of a snail in the morning after a rainy night. A per-

missible variation of this last requirement is in the case of the so-called "Mexican architecture," (See Plate 9), of considerable vogue in the southwestern portion of the United States, where lines of masonry joints in the walls of a building, both vertical and horizontal, are purposely made wavy and jumbled.

One feature woefully slighted by a great many masonry sub-contractors *if given the least opportunity is that of properly joining the face work*, or decorative work, with the brick or concrete backing. Careful and constant watch must be kept thruout the construction to insure that they do not use mortar which has been mixed so long as to have become "set," and therefore valueless, that all joints are filled completely with mortar, and not a mere dab here and there, to be concealed later by the "pointing" or touching up; that the metal inserts, set (presumably) beforehand in the backing to which this masonry is joined, are properly connected and incorporated as the masonry work proceeds; and that the space between the masonry and its corresponding backing is solidly filled with liquid cement grout, cementing the two together; first wetting the surfaces of both the facing and backing to insure the perfect adhesion of the grout. A building may be of the most beautiful, imposing and solid appearance; but unless the foregoing precautions are taken, an earthquake or other violent disturbance may come along, shake off the masonry facing and disclose it to have been merely a thin shell, weakly, imperfectly and insecurely fastened to the backing of the building, a constant menace to the unsuspecting passers-by.

Material must be suited to the locality where used. Obviously an open, porous stone, for instance, should never be used for exterior trim in an extremely damp climate, particularly where frost occurs. The pores of the stone become saturated with water, which, freezing, expands, disintegrates this material and quickly causes its total destruction. Nor is this disintegration uniform in its effect all over the face of the building, being much more rapid and severe at the bottom near the ground than at the higher elevations. In the case of a public building erected in the state of Washington, on the west coast, an open, porous sandstone was used for trim. Originally of a deep red color, the portion in contact with the ground quickly became a vivid streaky green, where the material absorbed water and moss started to grow; outlining the separation planes of the different laminae or strata, and producing a general effect of the most sickly and unsightly character. And with the regular occurrence of the freezing winter months the finished outer surface of the stone began to spall, loosen and fall to the ground, from the expansion and wedging of the ice crystals forming from the water with which the stone was saturated.

ORNAMENTAL METAL. In metal supplied for the interior and exterior ornamentation of the building—cast iron, wrought iron, aluminum, copper or brass—the same degree of care in its fabrication should be demanded as that required for brick, stone, tile and masonry in the paragraph immediately

preceding. It is true that hand-wrought metal is considered far more beautiful than machine-wrought, and that a certain amount of imperfections left in the work is the hall-mark of hand-wrought metal. Hammer marks in wrought iron, brass, copper or aluminum may show to a very slight extent without too much marring of the effect; a few small blowholes in cast iron are inescapable; but there is not the slightest excuse for careless, hasty, illfitting workmanship, with corners slovenly rounded and with gaping spaces and holes where the work should be tightly joined, or for depressions and joints filled with putty in a clumsy endeavor to conceal gross defects in workmanship, and no work of this character should ever be permitted in the building.

CLEANING UP. At the conclusion of construction work special care should be taken by the inspector or representative of the owner to see that the building is thoroly cleaned and left in a condition suitable for occupancy. The contractor's superintendent, after months of working on this project, is in a hurry to leave and begin a new job if one is available. He and the sub-contractors squabble as to the responsibility for this pile of trash or that heap of debris; and in the confusion there is every likelihood of this waste material being left right where it is unless the owner's representative personally demands that it be removed and the premises properly cleaned, as required by every correctly drawn set of specifications. The question of the responsibility of this person or that person is no concern of the owner's representative; for the contract deals only with the general contractor, and to him only shall the owner look to have every detail carried out, including the final cleaning in an acceptable manner.

And the specifications should provide not only for the final clean-up when the building is finished, but as well as for any intermediate cleaning whenever necessary. This is vastly important in the case of a building with a wooden floor and a vacant open space beneath. Blocks, sawdust, pieces of wood, sacks, scraps and sheets of paper, and other material of this nature fall between the floor joists to the open space below. Backfilling the foundation buries this waste material, forming a perfect paradise in this warm space, when the building is finished, for wandering termites seeking a place to make their home. In a building of this kind the rule should be made and rigidly enforced, that all blocks, sawdust, pieces of wood and accumulations of all cellulose material of whatsoever nature shall be removed immediately from the space beneath the floor, and this space kept clean and absolutely free from all materials of this class.

CHAPTER IV.

EQUIPMENT.

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CHAPTER IV.

EQUIPMENT

EQUIPMENT REQUIRED. Long before a new library building has been contemplated and begun the Librarian from time to time has wished that the present establishment had this piece of furniture or that article of equipment. It is even possible that a written list of such desired equipment has been kept, in anticipation of the time when a new building should be erected.

Even tho such list might not have been kept, those in the business of supplying library equipment when requested are glad to send a representative to consult with and to assist the Board in determining what equipment should be selected and used in a new building in process of construction. This consultation and assistance are a regular part of the service rendered by responsible companies of this kind, and the Librarian or the Board need not feel the slightest hesitancy in asking for such service.

When, with the advice of a representative of a library equipment agency, the list has been completed, the Librarian and the Board will then check it over and determine which items are actually necessary and which may be omitted without detriment to the service expected to be given in the new building. It will be remembered that these representatives are in the business of selling, and are anxious to sell as much as possible to each purchaser. On the other hand a conscientious representative of a reliable, reputable firm will never advise the purchase of any equipment which does not have a distinctly desirable use; and coming in contact daily with libraries all over the country and keeping informed with all the latest developments designed to increase the Librarian's efficiency, they are much better able to advise intelligently what equipment is up-to-date and necessary, and what is superfluous, in furnishing the new building.

Of immense assistance to the Librarian in finally determining the amount and kind of equipment required is to secure a scale-drawing of the floor plan, which will be gladly furnished by the architect upon request. Ascertain from equipment catalogs and from representatives of library equipment agencies the area and dimensions of floor space required for each piece of furniture desired. From cardboard or paper cut out templates, to the exact scale of the plan furnished, representing each piece of equipment. Arrange these moveable cardboard or paper templates on the floor plan, moving them about until that arrangement most satisfactory is secured. This method will infallibly disclose whether or not too much furniture is contemplated, overcrowding the available space and interfering unduly with the character of service to be rendered to the prospective patrons of the new building.

Being an institution of the local community government, no doubt the

Board is required by law to purchase all equipment by competitive bidding. The thought may occur that the consultory representatives of library equipment agencies may advise the purchase of such equipment as may be supplied only by them, in this manner defeating any real competition therein. In five years' experience building and equipping libraries the author found no suspicion of any such action on the part of these representatives. On the contrary, they assisted in the preparation of specifications and lists of required equipment admitting the widest and fairest competition; depending upon the superior merit and quality of their product, and the reputation of their firm, to overcome any slight disadvantage in prices submitted. And very rarely has this confidence been misplaced; for these representatives usually secured their full share of the business in supplying this equipment, and in a few cases where, on account of unusually low prices submitted by competitors the product of the latter was accepted, the purchaser regretted his acceptance of this cheap equipment because of it rapid deteroriation after installation.

QUALITY OF EQUIPMENT. After the completion of one library building it is most improbable that in the average community a second will be built, at least for two or three generations. The architect, as a matter of professional pride, specifies materials of the best and most durable nature and workmanship of the highest quality, consistent with the amount available for this purpose, in its construction. When completed the structure is a monument to the progressive spirit and a credit to the community.

To an equal degree the question of quality in the equipment should be given most profound consideration. It is most inconsistent to spend a large amount of money in erecting a building, taking a vast pride in making such expenditure, then grow close and niggardly in the purchase of furniture and equipment for the interior thereof. Furthermore, great differences in price usually represent corresponding differences in quality, for the purchaser ordinarily secures exactly what he pays for, no more and no less, and cheap equipment is almost always of proportionately inferior quality, requiring a high expenditure for its repair and upkeep during its short life in addition to the cost of its early replacement.

This is forcibly illustrated in the purchase of certain tables for public reading rooms. One competitor offered his wares for $12.50 each. Another asked $16.50 apiece for his product. The former was of light, skimpy construction, poorly glued and fastened together, and within ten years of its purchase was completely scrapped despite expensive maintenance costs meanwhile in attempting to keep it in repair. The latter, of strong, heavy construction and honest workmanship, used in a different library, cost nothing for its upkeep after its original installation and bids far to last as long as the building in which it is installed, and possibly during the life of one or more subsequent buildings as well.

QUALIFYING THE BIDDERS. Where the Board is required by law to purchase equipment thru competitive bidding, and to advertise and let contracts for that purpose, the procedure is very similar to that for the construction of the building as outlined in Chapter III altho much simpler. The amount involved is less. The bidders must have qualifications of far different nature than building contractors. Adequate plant, favorable reputation and actual experience over a certain period of time and reasonably assured financial standing should be the criterion rather than an immense bank account, and other features required in the case of the contractors for the building; and if the equipment manufacturer is found upon thoro investigation to produce library equipment of a quality satisfactory to his clientele; if his output is continuous and steady, and if he is given a satisfactory credit rating by his bank, or his local credit association or by Dun and Bradstreet's credit reporting agencies, then the Board may dispense with the voluminous, complicated questionnaire required in Chapter III for building contractors and proceed with a reasonable degree of assurance to award him the contract.

All bidders should be required by the specifications to have had a minimum of not less than two years of actual, successful experience in the manufacture of LIBRARY FURNITURE of a quality not inferior to that described in the specifications, and as proof of this experience to be able to refer to complete installations of this equipment made within the preceding two years, which may be seen by the Librarian if within a reasonable distance, or of which otherwise the purchaser may be asked to make a confidential, detailed report.

This actual experience in manufacturing equipment can not be too strongly stressed. Every local furniture maker and cabinet manufacturer is imbued with the idea that he is thoroly capable of making this equipment, and many of them proceed to submit proposals for the work whether properly experienced, equipped with the necessary machinery and supplied with the required materials or not. His chamber of commerce endorses him; local public spirit or patriotism is invoked; and every possible political influence is used to secure for him the job. His prices are sometimes, tho not always, lower than those of skilled, experienced library equipment manufacturers; but if he can not demonstrate finally, conclusively and unmistakably that he is able to turn out furniture and equipment of the class and quality demanded by the specifications, then a wise, prudent and cautious Board will ignore all appeals and demands, made solely on the score of local influence and public spirit, and will award the contract to another bidder better qualified according to the requirements of the specifications, for reasons which will appear hereinafter.

GUARANTIES. Guaranties also may be simpler. A bidder's bond should be required to insure that, if awarded the contract, the low bidder will not back out and refuse to proceed with his contract. Customary practice fixes

the penal amount of this bond at a sum not less than 10 percent of the amount of the proposal. A bidder's bond is no more trouble to secure than a certified check or a cashier's check; it does not have to be cashed, and if the bond is lost it will be of no value to the finder, and the possible consequences of the loss may not be quite so serious. The cost to the contractor is not excessive, and in the case of the successful bidder is usually nil, this bond being written by practically all companies without cost in consideration for the issuance of the performance bond by the same surety company.

A performance bond should be required for a reasonable amount, not exceeding twenty-five percent of the amount of the contract, to insure the quality and durability of the equipment and its freedom from necessary repairs and replacements due to defects in workmanship and materials, for a stated period, not less than two years, after its installation.

SAMPLES. Bidders should be required to furnish the Board, on the day of opening the proposals, with certain samples of equipment designed and built exclusively for library purposes, affording a visual demonstration of the comparative merits and defects of the products proposed to be installed by the respective manufacturers and to show the quality of materials, method of joining and general excellence of workmanship. Standard specifications usually include among these samples a section of table top, a section of table leg, a reading table, a library reading room chair, a section of shelving with one end upright, one intermediate upright and a full complement of shelves, a complete card catalog cabinet and if available a sample book truck.

DRAWINGS. No matter how carefully and exhaustively drawn, specifications at best can but imperfectly describe the appearance and method of construction of some of the more complicated equipment such as charging desks and similar furniture. Different manufacturers have certain differences in their methods of technical procedure in fabricating this furniture, making the joints and doing other necessary work. In each factory a drafting force is employed, which makes drawings in detail of every step followed by the particular factory in its manufacturing processes; and the workmen are far more familiar with these drawings and are able to turn out a much better class of work than if furnished drawings from a different source and prepared perhaps by a draftsman employed by the purchaser and possibly unfamiliar with the technical details of such construction. For the purpose therefore of clarifying and supplementing the specifications bidders are required to furnish drawings, cuts or sketches, of certain designated equipment such as the charging desk, book display rack, map case, and book truck if a sample of this article is not available for exhibition.

ALTERATIONS IN THE CONTRACT. As in the case of the construction of the building, it sometimes happens that changes may appear desirable

after contract has been entered into and work started thereon, and provision is usually made for such changes, increasing or diminishing the quantities to be purchased, with a proportional increase or reduction in the contract price. In the preceding chapter it was pointed out that the power to make such changes should be limited to a certain maximum percentage of the contract price, which in the case of manufactured equipment should not exceed possibly 25 percent.

Where a manufacturer is engaged in making a certain number of each article and has already purchased his materials for the contract, it is very probable that he can secure additional materials at the same unit prices. His unit labor costs are no greater. There is no additional selling expense. His manufacturing and accounting overhead is not disproportionately augmented, and any increase in his order is likely to render him a profit in approximately the same proportion, or perhaps even a little more, than if he should turn out only the quantity provided in the original contract. But where his contract is reduced, and particularly in case he has made a specially favorable price basing his total profit on the original volume of business to be done, and taking into account his selling overhead which will be approximately the same whether the order be large or small, an unlimited reduction in his contract could very easily cause him to lose not only all of his anticipated profit but on the total transaction as well. And in such circumstances his bonding company also would have an important voice in the matter, notwithstanding that the agreement might provide for unlimited increase or diminution in the quantity of equipment to be furnished, and that such changes might be made with or without the consent of the bonding company; for such grossly unfair procedure would receive very little consideration or have very little likelihood of approval in any court of law or equity should litigation arise as the result of such unlimited change in the contract.

MATERIALS. It is exceedingly interesting to compare the respective merits and defects of steel and wood used in manufacturing furniture. Steel of special chemical composition is rolled in sheets of varying gauge or thickness for this purpose. Furniture of this material is lighter, more rigid, and with electric welded joints is stronger than wood with its glued and tenoned joints. The cost of steel furniture is from 10 to 25 percent greater than wood.

It has been argued that steel furniture is more fireproof; but the author's conclusion based upon direct observation of wood furniture in the fierce, intensely hot flame of an explosion and conflagration of nitro-varnish, brought too near the open flame of a gas-steam radiator in the reading room of a library building, proved that the polished hardwood surfaces catch fire only with extreme difficulty, and that the greatest damage resulting from such fire is the charring, blistering and removal of the varnish, necessitating its cleaning and refinishing. Under similar conditions of most intense heat steel furniture would

warp, twist, bend and buckle, with no possibiity of straightening out again, in addition to requiring cleaning and refinishing.

The greatest objection to steel furniture is its garish, cheap, imitation-wood finish. A hard wood used in furniture construction is capable of the most beautiful, natural finish effects, enhancing the grace, dignity and tout ensemble of the building wherein installed. Steel, of a dull, even, uniform color, enameled, colored and grained to represent wood, the imitation evident to the most unobservant, used in reading rooms and other portions accessible to the general public, is most highly discordant and objectionable. These objections do not apply with equal force to the use of steel equipment, wall shelving, stacks, filing cases, card catalog cabinets and other similar furniture, in stack rooms and other rooms of strictly utilitarian purpose.

Wood library furniture is manufactured commercially of 3-ply or 5-ply veneer, the outer veneer in most cases being of white oak, the inner core of softer woods with the grain of each ply at right angles to that of the grain on each side to prevent warping and buckling from fluctuations of temperature and humidity. In cheaper grades of furniture soft gumwood is sometimes used, either for the outer veneer or in its solid state, and finished in imitation of oak or other hardwood, but the imitation is so obvious and so palpable that its use is even more objectionable than steel for such purpose. With a thoroly skilled and competent corps of cabinet makers the author was able to turn out complete installations of solid white oak shelving for certain buildings of the Los Angeles library system at a cost averaging approximately 65 percent of the lowest bid price for veneered oak commercial equipment of the same kind. In the uniform, equable climate of southern California it was possible to do this with every assurance of safety from unpleasant consequences; in regions of much greater fluctuations of temperature and humidity thruout the year however, it is quite inadvisable to risk the almost certain warping, buckling, cracking and twisting of furniture made from solid wood, due to the effects of alternating heat and cold, dampness and dryness.

The thickness of the outer veneer should never be greater than 1/16 of an inch at the most. When of this thickness or less the veneer will then accommodate itself to the slight variations in volume due principally to expansion and contraction from heat and cold. The hair-line joints between the separate sections of the thin veneer will never separate, always appearing as one single piece of wood over the whole surface of the furniture. Veneers of 1/8 inch or more, particularly when exposed daily to the heat of the sun shining thru the reading room windows, will shrink, and the joints will pull open and form parallel "V"-shaped grooves about 10 or 12 inches apart, as occurred in the installation of a local manufacturer who sincerely believed that he was giving the purchaser extra value by making his veneers 1/8 of an inch thick instead of 1/20 of an inch as specified in the contract.

One of the most serious handicaps of the local cabinet maker or small furniture manufacturer is his lack of equipment for proper kiln drying and seasoning his material before making it up into furniture. In one instance a contract was awarded to a firm this kind, the lowest bidder, for furnishing a complete installation of wall shelving. Within eight months after acceptance the veneer on the end uprights began to form huge blisters, separate from the interior core, split and hang loosely somewhat like the decorative fringe of a portiere of former days. The trouble was due wholly to the use of a wood insufficiently dried and seasoned which, on being subjected to the artificial warmth of the reading room where installed, shrank unduly with the above disastrous consequences. These effects in this particular instance were aggravated by the use of a veneer about 1/8 inch thick, much too stiff and rigid to shrink equally with the core. Altho the work was fully covered by the manufacturer's guarantee against defective materials and workmanship, and was taken out, repaired and replaced in the proper position at no expense to the purchaser, yet the imperfectly covered scars of this repaired work will stand thruout all the future years during which this reading room may be used, a mute testimony of the cheap, shoddy equipment furnished by this contractor.

JUVENILE EQUIPMENT. As a rule the equipment furnished for the Juvenile Department is designed and built for this particular purpose, of sizes different from those of similar equipment furnished for adult use. Specifications for Juvenile tables and chairs, however, should distinctly specify that this equipment be specially made, and not furniture built for adult use, cut down to meet the dimension requirements of furniture for the Juvenile Department and resembling in appearance a person with his lower limbs amputated.

CHAPTER V.

OPERATION.

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CHAPTER V.

OPERATION.

RESPONSIBILITY. The City Librarian, as the official representative of the Board, is primarily responsible for the proper maintenance and operation of the structure, grounds and mechanical equipment of the institution. And a stranger, entering the building for the first time, can tell at a single glance with what efficiency the Librarian functions in this respect. Weedy, unkempt lawn; untrimmed hedges and trees; unclean sidewalks and driveways; shabby, unpainted exterior trim and rusty iron work; dirty windows; unpolished floors; grimy walls; accumulations of dirt in corners and out-of-the-way places; dust on furniture and shelves; all shout aloud to the sharp observer the degree of efficiency of the Librarian in charge as to this aspect of his or her personal responsibilities. It is never intended that the Librarian shall actually perform the physical labor attendant upon these duties; nevertheless he or she should have a good general working knowledge of every detail included therein. The actual labor of course is done by employees trained each in his respective line of work. This mere fact, however, does not in the least excuse the Librarian from exercising eternal vigilance in order to insure that the work is properly done, and the building maintained in strict accordance with predetermined standards adopted for this purpose.

Of special importance is it to see that every employee, be it engineer, or janitor, or page, or assistant, is thoroly trained in operating the heating plant. This is, or should be, as nearly automatic in its operation as it is possible to secure. But even the most automatic of heating plants requires human assistance to start it into motion, to stop it when necessary, and to know when it has passed beyond the even tenor of its ways, is running wild and beyond its automatic regulatory devices and must be stopped or brought under control again. For instance — thru untrained mis-manipulation it occurred that unignited gas was permitted to flow thru a furnace with the pilot light turned off. An unthinking janitor inserted a lighted match into the furnace—"to see if the gas was turned on!" The resulting explosion, mashing the janitor against the opposite wall and wrecking the entire furnace room, wholly convinced him that "the gas was turned on." Thoro instruction in the proper and orderly procedure in the case of a gas furnace with unlighted pilot would have saved the replacement of the entire heating plant for that particular building, and a two-weeks' hospital sojourn for the janitor. And it is the Librarian's responsibility to see that such instruction is actually given; also that the important control valves and mechanisms are plainly marked in such way as to reduce confusion and mistakes to a minimum.

With the long working hours observed by the average library, (usually from 7:00 a. m. for the earliest employees to 9:00 or 10:00 p. m. for the latest) it is very unlikely that any member of the operating force will be on duty when the library closes for the day. In such instances it is at once obvious that the pages or assistants required to close the building at night should have also an understanding knowledge of the proper methods in shutting down and making secure the lighting and other mechanical equipment of the institution.

REGULATIONS. As a general rule the maintenance and operation of any building are simple, requiring a fair degree of experience and training and a large fund of practical common sense. Nevertheless these functions should be organized upon a strictly systematized basis, and proper regulations, setting forth in exhaustive detail every duty and every contingency likely to be met, should be drawn up, adopted and submitted to the Board for its approval and sanction. These duties and contingencies should be apportioned equitably among the members of the operating staff in such manner that each will be constantly employed thruout his daily working period, without opportunity for dawdling, idleness and aimless gossip with his fellow employees. Appendix F of this volume—"Regulations for Operation of Public Library Buildings," is compiled from the author's experience in the maintenance and operation of public buildings over a period of twenty-five years.

OPERATING PERSONNEL. The ideal method of developing an operating force would be to hire a specialist for each different position or class of positions; a mechanical engineer to operate the heating, lighting and all mechanical equipment of the building; one or more janitors to do all the cleaning and other janitorial work; a gardener whose duties would occupy him exclusively with the landscaping; a chauffeur to operate and maintain the motor vehicles; a cabinet maker to do all the furniture repair work; and so on. Practical considerations forbid such procedure in the case of buildings of the class considered in this volume, it being necessary to combine in a single individual the duties of two or more of these experts. When preparing a schedule of duties therefore it will be necessary for the Librarian to determine the most economical number of employees to be hired for this work; just how the requirements for each, as above enumerated, shall be combined; and, when accepting applications for the various positions, to make certain that the applicants receiving consideration shall actually have had the practical experience and the qualifications required for the work involved.

Just as in the case of the selection of an architect to design the building, politics should have absolutely no effect in the choice of applicants for positions in the operating force. The surest way for the Librarian to store up future trouble for himself or herself, and discord and dissension in the ranks of the employees, is to hire one or more whose sole merit or qualification is that the

appointee is a nephew of the City Mayor or a brother of a member of the Board —then have him boast about it, and presume upon such relationship to relieve him of the most onerous duties, placing them upon his less fortunate fellow employees. There is no objection to the employment of such persons PROVIDED, ONLY, they keep the fact strictly to themselves and prove their worthiness of the job by exhibiting proper qualifications and training therefor, and complete willingness to assume and bear their full share of the work and the responsibility.

The nomenclature of the various positions should also receive careful study and consideration. It is a well-established quirk of human psychology that to appoint the average person to a high-sounding position immediately inflates his ego tremendously, and gives him an overpowering sense of his importance in the organization and the impression that all HE has to do is TO DIRECT—and his fellows perform the actual work. For this reason instead of flowery, complimentary titles the name of each position should describe as simply and briefly as possible the actual duties to be performed—Engineer, Janitor, and so on—without any honorary prefixes or suffixes..

The number of operating employees will necessarily depend upon the amount and variety of work to be done in each separate case. Table A, Page 109, prepared by Mrs. B. M. Veazey, Assistant City Librarian, July, 1930, shows the amount of work required by full-time, half-time and part-time employees for the Los Angeles Public Library. When considering these figures account must be taken of the fact that all repair of furniture, electrical and mechanical equipment is done by the shop force of the central library; issuing and accounting for supplies and equipment by the Head Janitor; and that no motor vehicle operaton, or chauffeur service, is included.

In the case of Federal Government buildings, post offices, etc., averaging 15,000 square feet of floor area and 10,000 square feet of lawn surfaces, one full-time employee with engineering training does all necessary repair work, is responsible for the operation of the mechanical and electrical work, and has time also to assist one full-time janitor in keeping the building clean, the windows washed, landscaping in proper condition, and all other necessary work. These buildings also usually have no motor vehicle operation and upkeep.

TABLE A.

LIBRARY.	FLOOR AREA, SQ. FT.	LAWN SPACE. SQ. FT.	NUMBER EMPLOYED.	TIME EMPLOYED.
Hazard	540	See Note A.	1	20 hrs. per Mo.
Mark Twain	1148	See Note B.	1	20 hrs. per Mo.
Annandale	666	See Note B.	1	22 hrs. per Mo.
Henry Adams	1280	See Note B.	1	30 hrs. per Mo.
Los Feliz	1848	See Note B.	1	40 hrs. per Mo.
Sawtelle	1972	See Note A.	1	50 hrs. per Mo.
Angeles Mesa	4750	6050	1	52 hrs. per Mo.
El Sereno	2250	See Note B.	1	66 hrs. per Mo.
Bret Harte	1832	See Note B.	1	72 hrs. per Mo.
Hyde Park	1200	10200	1	72 hrs. per Mo.
Ascot	2100	See Note B.	1	78 hrs. per Mo.
Palms	1728	4872	1	78 hrs. per Mo.
Figueroa	2278	4222	1	130 hrs. per Mo.
Echo Park	3138	See Note C.	1	Half-time
Sidney Lanier	3777	See Note A.	1	Half-time
Felipe de Neve	5094	See Note A.	1	Half time
Helen Hunt Jackson	1830	3970	1	Half-time
Memorial	5895	See Note A.	1	Half time
Jefferson	1966	4284	1	Half-time
Edendale	1978	4622	1	Half-time
John Muir	4608	1192	1	Half-time
Richard Henry Dana	3080	4832	1	Half-time
Allesandro	2057	7568	1	Half-time
Gardena	2251	8999	1	Half-time
Canoga Park	1730	9520	1	Half-time
Pio Pico	4275	3525	1	Full-time
Vermont	8000	See Note A.	1	Full-time
Arroyo	8736	See Note D.	1	Full-time
John C. Fremont	4276	4995	1	Full-time
Wilshire	6258	4038	1	Full-time
Robert Louis Stevenson	4474	5926	1	Full-time
Eagle Rock	5892	4708	1	Full-time
Washington Irving	3918	8232	1	See Note E.
San Pedro	6510	6490	1	Full-time
Moneta	3922	9078	1	Full-time
Van Nuys	10616	3384	1	Full-time
Wilmington	3701	10499	1	Full-time
Malabar	4168	10382	1	Full-time
Cahuenga	8474	6926	1	Full-time
University	7335	20153	1	Full-time
West Hollywood	5130	12420	1	Full-time
Venice	4383	13460	1	Full-time
Vernon	8710	13410	1	Full-time
Benjamin Franklin	5855	18795	1	Full-time
Lincoln Heights	7072	9565	1	Full-time
Watts	2250	56057	1	Full-time
Hollywood	17644	7106	2	(1 Full-time) (1 Half-time)

Note A. Lawn cared for by the City Park Department.
Note B. Rented Building; no lawn to care for.
Note C. Lawn cared for by City Park Department; large sidewalk area to be swept by janitor.
Note D. Estimated area of lawn, 21,000 sq. ft. to be cared for by janitor.
Note E. Full-time except 6 hrs. per month spent at Ascot Library.

CLASSIFICATION OF DUTIES. In preparing the regulations for the direction of the operating force by the Librarian, the schedule of work therein to be done should be classified according to the frequency these duties must be performed. Certain tasks must be done every day—indeed some of them more than once each day—such as sweeping walks, steps and approaches, sweeping and dusting the building, cleaning finger marks, spots and other discolorations from bronze and glass in the front entrance and from the glass on the charging desk, hoisting and lowering the flag, lowering and raising window awnings, emptying waste paper baskets, filling containers for paper towels and toilet paper, weeding and sprinkling the lawn, and all other similar duties.

Some of the work need not be done oftener than once each week—such as mopping floors, cleaning linoleum, cork carpet, cork tile and wood block floors and floor coverings, touching up waxed surfaces worn or dulled by use, cleaning and dusting lighting fixtures and bulbs, collecting soiled towels and distributing clean towels for staff use, mowing the lawn, oiling such of the mechanical and electrical equipment as may need oiling as often as once a week, disinfecting the telephone mouthpiece, and other tasks of like nature.

Approximately once a month, or perhaps longer, is sufficiently frequent for still other classes of work, for example: clipping hedges, trimming, pruning, spraying and fertilizing trees and shrubs; wiping off all books, and tops of shelves and bookcases; washing all windows; dusting off all walls, high ledges, curtains and pictures; cleaning spots and finger marks from walls and furniture; cleaning and polishing all bronze, and all brass, nickel and chromium plated metal work; washing painted walls and woodwork; waxing linoleum, cork carpet, cork tile, hardwood, wood block and rubber tile floors and floor coverings and waxed wood surfaces; washing all glass lamp bulbs, globes and reflectors; clearing roof drains, gutters and downspouts of trash and leaves; making periodical inspections for indications of damage to the building by termites, and to the furniture by wood bettles; replenishing the oil supply in the self-oiling bearings of machinery equipped with the same; oiling door hinges; lubricating locks with powdered graphite; and so on.

Very frequently neighborhood clubs, parent-teacher associations and other organizations look to the library to furnish them with a meeting place, the club room or assembly room being used for this purpose. Practically always these meetings are at night. One member of the operating force should always be present, to assist in regulation of the heating or ventilation of the room, doing any special cleaning or decorating which may be necessary, arranging the chairs in accordance with the desires of the presiding officer of the organization, and closing and locking the windows and doors, extinguishing the lights, and shutting off the heat when the meeting is over. All these duties are extra, outside the scope of the usual work of the operating force, and overtime payment for these extra services should be required of these organizations by

the Librarian. The Librarian should also require that the organizations give notice of their proposed meetings sufficiently in advance to permit the preparation of a schedule of meetings, in order that there may be no conflict between any two or more organizations wanting to use the assembly room at the same time, and to make proper arrangement for the operating employee who is to perform the necessary overtime service.

DAILY TIME SCHEDULE AND REPORT. The Librarian should prepare a daily time schedule for each member of the operating force. These may be different for each individual employee, and each schedule may vary on different days of the week, depending upon the requirements of the daily service for each employee. As before stated, it is necessary for some of the members of the daily force to begin earlier in the day than others; and other employees are not needed until much later, in this manner rendering it necessary that the schedules overlap, if we are to have an operating employee on hand during all the working hours of each day.

For the convenience of the staff and operating force many libraries are equipped with a time clock, which keeps an exact record of the arrival and departure of each employee. In the absence of such time clock, the Librarian should require each employee to record, on a card especially designed for the purpose, the exact time of arrival in the morning, checking out for lunch and in again, and the time of leaving the building at the end of the day's work, also all overtime where extra duties have been performed. In the case of the card record human nature is prone to make out as favorable a report as possible, not always substantiated by the facts. Therefore the Librarian, or a trusted assistant, should check up on the arrival of the various employees at irregular and unexpected intervals, in order to make sure that the record as it appears on the card corresponds with the actual arrival and departure of the employee.

APPEARANCE AND CONDUCT OF OPERATING EMPLOYEES. The operation of any building is an eternal conflict with dirt, and from constant association with this dirt there is a considerable tendency for the operating employees to become careless, and exceedingly unclean and untidy in appearance. And where such employees come in contact with the public, the impression on the latter is distinctly unfavorable. The gardener working on the grounds; the engineer and the janitor passing about the building; the chauffeur driving around the city in an automobile marked as city property, all should be required to keep as clean as possible, consistent with the nature of their respective duties.

No impertinence, impudence or discourtesy of any kind, to a fellow-employee or to the public, should be tolerated for an instant. Discord among the employees should be thoroly investigated by the Librarian, and if continuous the employee responsible therefor should be summarily dismissed. Gossiping, using alcoholic liquor to excess, with resulting interference with duties

and lowering of efficiency, laziness and imposing upon the other members of the operating force, and habitual non-payment of just indebtedness should all be prohibited under pain of separation from the payroll.

PLANS, SPECIFICATIONS AND REGULATIONS. A set of architectural plans and specifications, with all revisions as of the completion of the building, should be carefully filed in a place accessible at all times to the operating force. Mechanical plans in particular should show the correct and accurate location and size of pipe of every kind, every fixture, every valve, clean-out cover, electrical circuit, panel, fuse, switch and every other feature of the electrical and mechanical equipment of the building. These should not be, as all too often they are, dumped in the store-room helter-skelter, all confused, to gather dust and grime, and when wanted the searcher for any particular plan must dig thru the mass until he finds the one wanted.

Plans should be filed flat in a drawer or case similar to a poster case; protected from dust and dirt. Specifications should be filed preferably in a filing case.

As an extremely important part of his duties each new employee of the operating force should study the plans, particularly the mechanical and electrical plans, and learn the location of all pipes, fixtures, valves and other necessary installations; and the Librarian should make sure within a reasonable time that this has been done. When an electrical fuse blows out, or a water pipe bursts, or anything else happens to the mechanical equipment of the building requiring prompt attention, it is indeed a poor time and a grave reflection on the efficiency of the management to have the operating employee on duty, presumably capable of quick and certain action, running aimlessly around hunting the location of the damaged fuse, pipe or other part, which he should have known before the damage occurred.

DISPLAY OF UNITED STATES FLAG. Being a public institution, devoted especially to the service of children and youth, the Library should always take care to do those things tending to the training of children and youth in patriotism and love of country. A symbol of such training is seen in the display of the flag. But if displayed at all it should be done in the proper manner with the field of stars in the upper corner nearest the staff. The author recalls an experience when a new building under his direction was first opened. The occasion was Independence Day, July Fourth. A member of the operating force was directed to hoist the flag. He did—upside down, and half-way to the top of the staff; a perfect symbol of distress as used by ships at sea. His halyard was continuous, and in raising the flag he pulled the halyard the wrong way, hoisting the flag bottom upward, and never looking up afterwards to see that it was in proper position.

A certain well-defined code for the display of the flag daily and on different holidays, the proper method or raising and lowering, and other important

information relating thereto is adopted by the United States War Department, Treasury Department and other governmental departments, and may be obtained from or thru any American Legion post. The regulations of this code are found in paragraph 201, Appendix F, of this volume.

GROUNDS AND APPROACHES. The appearance of the grounds, sidewalks, driveways and entrance steps may be taken as a true index of the condition of the interior of the building. Daily cleaning and washing, preferably in the early morning before the Library is opened to the public, is necessary.

Areaways and lawns form exceedingly convenient places for the disposal of waste paper, and passing persons so use them for this purpose. These lawns and areaways should be cleaned of all trash and paper waste at least once a day, and oftener if necessary.

In regions where irrigation is necessary the lawn should be sprinkled freely and frequently to keep it flourishing. The lawn should be mowed at frequent intervals, and all weeds removed as they appear. In colder regions mowing of the lawn should be discontinued in the fall, resulting in a thick mulch of uncut grass to protect the roots from freezing and to promote vigorous growth the following spring. Trees and shrubs should be trimmed and pruned in the late fall when the sap is not flowing. They should be sprayed upon the appearance of insect or funguous pests.

A deeply-cultivated border should be maintained about each tree, and all trees and shrubs kept from weeds and in a state of tilth. Lawns, shrubbery and trees should be fertilized annually, in the early fall.

SWEEPING AND DUSTING. The entire building except store rooms should be thoroly swept and dusted at least once every day. This may be done before the Library opens in the morning, or after closing for the day, as best suits the schedule prepared by the Librarian. Sweeping compound—damp sawdust—should be used, and not more than a double-handful sprinkled evenly across the floor at one end of the room and swept to the other end, should be used to pick up the dust more effectively from the floor and to keep it from rising into the air. The damp sawdust coming into contact with the dust adheres thereto, and carries the latter along with it leaving a much brighter cleaner floor than if no compound were used. The same compound can be used over and over again three or four times before throwing away. For all waxed floor surfaces, wood block and hardwood floors the compound may be a commercial product called "Cedar-sweep," a sawdust dampened slightly with an oily substance, ready prepared for use and very reasonable in cost. This compound, or any other oily sweeping compound, if used on marble floors will in time cause a sickly yellow oily stain, impossible to remove completely. If used on any floor of bituminous composition the oil, having a strong affinity for the bitumen, will be absorbed thereby, softening, roughening and deteroriating the floor where used. Water from water-dampened sawdust will be absorbed

by hardwood or wood block floors, causing them to swell, warp, buckle, twist and become exceedingly rough, and in time to splinter at the edges. The compound therefore should be selected for the particular character of the floor where it is to be used. Under no circumstances should redwood dust, dampened with water, be used for sweeping compound. Redwood contains a stain or dye, readily soluble in water, which is absorbed by other surfaces, oxidizes and turns to a deep purplish-black color, impossible to remove.

Dusting is one operation most likely to be scamped by the operating force, especially in those portions of the building out of direct sight. Picture moulding, high book cases, grilles, registers, radiators, lighting fixtures and glassware stair railings and all such features should receive adequate attention. Dusting should be done with a soft cloth especially treated for the purpose, and which can be bought at a reasonable cost. Feather dusters, so pretty to look at, are not the most efficient to be used, as they leave lines and streaks of dust where used. Dusting cloths can be made by the operating force, of large squares of cheesecloth dipped in hot soapsuds, dried out, then dipped in kerosene and dried without squeezing or wringing. In use these dusters quickly accumulate adhering dust which must be washed out frequently, or the dust-cloth will leave smeary, dusty smudges wherever used. A light sheet metal or cardboard shield should be used to protect the adjacent walls when dusting baseboards, picture moulds, chair rails and wainscoting. Occasionally the walls and ceilings should be dusted with a long-handled duster having a head of sheep's wool or other similar material.

CLEANING. Inkstains, finger marks and other spots should be cleaned daily from the glass on the charging desk, and the dirt working under the edges removed. Inkwells should be cleaned and refilled, wornout penpoints replaced, and soiled blotters replaced as necessary.

GLASS. Glass in the public entrances should be cleaned and polished daily, or oftener if required. All other glass in doors, windows and skylights should be cleaned at least once a month. For this purpose a gallon of warm water with a tablespoonful of household ammonia leaves a clean, sparkling surface with a minimum of labor. A tablespoonful of kerosene in one gallon of warm water produces the same effect. Soap, if used on window glass, will leave a thin, murky film on the glass exceedingly difficult to remove entirely except at the expense of long, hard polishing, unnecessary where ammonia or kerosene is used. The ammonia or kerosene—or soap—in the water for washing windows will soften, discolor and in time remove the paint from the adjoining woodwork; the latter therefore should be carefully protected from contact with the cleaning water when washing windows.

Electric lamp bulbs, shades, reflectors and globes of glassware should be dusted and wiped at least once a week. They should be removed from their fixtures not less often than once a month, washed with soap and warm water,

rinsed thoroly in clean warm water and wiped thoroly dry. In washing prismatic glass fixtures a stiff brush should be used to clean out the grooves.

FLOOR COVERINGS. Linoleum, cork carpet, cork tile and rubber tile floor coverings should be gone over daily with a dry mop. In rainy weather they should be wiped up with a damp cloth to remove mud or dirt tracked into the building. Three or four times a year floor coverings of these types should be waxed and polished. The old wax should be removed with a cloth wet with cleaning solvent and the surface washed with a solution of Ivory or other mild soap, a small portion of the surface at a time to prevent flooding the floor and soaking the seams. Scouring powders, abrasive soaps and those containing strong alkalis if used are certain to cause great damage to the surface of the floor covering. The soap solution should be rinsed off with clean water and the floor surface thoroly dried. Either paste or liquid wax may be used; if the former, a small quantity in the center of a square of cheesecloth folded several times, rubbed evenly over the floor will leave a light thin coat sufficient for the purpose. The thinner the better, otherwise the polished floor will be "tacky," or stick to the soles of shoes passing thereover. If liquid wax is used it should be applied very thinly with a piece of cloth saturated with the solution. After applying either paste or liquid wax it should be allowed to harden exposed to the air for about half an hour, after which the surface should be polished, either with an electric polishing machine or with a hand polisher, consisting of a heavily-weighted brush covered with a piece of wool carpet or wool blanket, fitted with a long wooden handle, and pushed back and forth over the surface until the requisite degree of polish has been attained.

There are many brands of paste wax and liquid wax manufactured and sold commercially. Practically all are good. Their principal ingredients are beeswax, carnauba wax, (an imported product from South America), turpentine and a solvent such as gasoline or similar substance. Where wax is used in large quantities for polishing floors or floor coverings in any building, it may be much less expensive for the management to manufacture its own polishing wax. Formula for its manufacture is found in Paragraph 711, Appendix F of this volume.

TILE, TERRAZZO AND CEMENT FLOORS. Dirt and fine particles of sand ground into tile, terrazzo and cement floors of corridors, lobbies and toilets should be thoroly removed, preferably with a scouring power containing about three-fourths fine sand, sprinkled evenly and lightly over the surface, using a scrubbing brush or mop and warm water. Every portion of the floor, under all furniture and in all corners should be cleaned thoroly, taking care to protect the wall from damage. After scrubbing and mopping up the dirty water and scouring sand, the floor should be rinsed with several applications of clean water, and dried with clean mops.

WOOD FLOORS. Polished hardwood and wood block floors require

daily wiping only with dustless mops. Washing when necessary should be done a small section at a time with a cloth dipped in a solution of 1½ tablespoonfuls of household ammonia in two gallons of warm water, rinsed at once with a cloth dipped in warm clear water, thoroly dried with a dry cloth or mop, and then waxed.

Plain painted or unpainted wood floors should be washed quickly, in small sections only, with warm water and scrub soap and thoroly dried to prevent absorption of water and consequent warping, buckling, unevenness, and splintering at the edges.

MARBLE. Polished marble should be wiped frequently with a soft dry cloth. When washing is necessary it should be done with warm water, changed frequently. If soap is required, Ivory or other mild, white soap may be used. Soften the water, dissolve the soap therein, dampen the marble with clean soft water, wash carefully with the soap solution and rinse thoroly with clean soft water.

Stains in marble, except those from rust or oil, can be removed with Javelle water, a solution of four pounds of sal soda or sodium carbonate and one pound of lime chloride in one quart of water. The solution may be obtained at any drugstore, or it can be made by the Library operating force. (See Appendix F, paragraph 710.) Old stains on marble are removed by repeated applications of Javelle water, or by pouring a small quantity over the stain and allowing to stand, then rubbing the surface with a cloth saturated with the solution. Stains on vertical surfaces of marble should be covered with a piece of blotting paper, saturated with Javelle water and allowed to stand.

To remove oil stains without absorption and spreading over a large area, and forming rings, the best method is to make a paste of pulverized fuller's earth and water, spread over the stain and allow to dry, then keep saturated with benzine or a high-quality of gasoline free from oil or kerosene. The fuller's earth absorbs the oil of the stain leaving the surface clean. Cotton or blotting paper may be used instead of the fuller's earth paste.

VARNISHED WOOD SURFACES. Varnished surfaces of furniture and interior trim may be cleaned by washing in a solution of one tablespoonful of ammonia in two gallons of water, rinsing thoroly in clean water and wiping dry, then applying furniture polish and rubbing until the requisite degree of polish is secured. The prevalent custom of wiping varnished surfaces with a damp cloth should be firmly discouraged by the Librarian. Accumulations of dirt and grease from the hands on desks, chair arms and other varnished surfaces should be frequently removed by rubbing with furniture polish, or by a dry cloth dampened in Javelle water, rinsing, wiping dry and rubbing with furniture polish. Attempts to remove ink and grease stains from varnished surfaces by washing in soap and water are worse than useless, and leave the furniture in worse condition than before.

Varnished window facings, picture moulds, chair rails and wall base may be kept in good condition by a frequent rubbing down with a dry cloth, going over occasionally with furniture polish and rubbing until dry and well polished

WAX-FINISHED WOODWORK. Stains on wax-finished woodwork should be washed off with a solution of a small amount of ammonia in warm water, then rinsed, wiped dry, re-waxed with a finishing wax of very thick consistency and polished. Furniture polish should never be used on waxed surfaces, as it dissolves and removes the wax, making a streaky job. Flat surfaces may be polished with a small piece of old carpet or old wool blanket. Inaccessible curves and grooves may be polished by rubbing with a soft camel's hair brush. Daily maintenance of waxed woodwork should consist of wiping down with a soft, dry, clean cloth, re-waxing occasionally as necessary to preserve its polished appearance.

METAL WORK. Interior and exterior bronze work and lighting fixtures of metal should be dusted off frequently with a soft dry cloth. Moisten the cloth occasionally with a solution of equal parts of crude oil, turpentine and oil of citronella, kept when not in use in airtight glass or metal containers. Exterior bronze work, lamp standards and brackets, not cleaned for some time, should be washed with a solution of a small quantity of ammonia in clean water lightly applied with a sponge or a soft cloth, then rinsed in clear water. The use of acid, or scrubbing with soap or scrubbing powders will remove the lacquer and should not be permitted.

Brass, nickel and chromium-plated metal railings, hinges, locks and plumbing fixtures should be wiped frequently with a soft dry cloth, and when dulled they should be polished with suitable metal polish purchasable at any hardware or grocery store. Brass work at the public entrances should be cleaned and polished when the building is closed so as not to inconvenience the public. Adjacent terra cotta, stone and wood to which the metal is fastened should be carefully protected by a thin metal or cardboard shield or template, cut out to fit around the metal being polished and laid over the terra cotta, stone or wood to be protected.

PLUMBING FIXTURES. All plumbing fixtures, bowls, lavatories, sinks, slop sinks, shower baths, tall partitions and wainscoting should be kept thoroly clean and sanitary. Accumulations of dirt should not be permitted behind closet bowls or in other concealed places. Closet bowls and urinals should be cleaned frequently with boiling hot water, and scrubbed with "Old Dutch" cleanser or "Bon Ami" powder, using a long-handled brush to reach the more inaccessible places. Toilet bowl stains may be removed with "Sani-Flush," about six or eight tablespoonfuls, placed in the bowl the last thing at night before closing the building, and flushing the first thing the next morning. Stains may also be removed with a solution of one part muriatic acid to six parts water, subsequently rinsing with clean water to prevent corrosion. Acids

and strong alkali solutions are exceedingly detrimental and corrosive to enameled iron fixtures, and the use of such solutions should never be permitted in connection therewith.

The lavish use of disinfectants to cover up dirty and unsanitary plumbing fixtures is questionable, and strongly to be condemned. If kept scrupulously clean with plenty of boiling water, soap and scouring powder there is little necessity for such disinfectants; should the Librarian consider, however, that the greater safety of the Library patrons will be promoted by the use of disinfectants, the public lavatories and toilets may be cleaned once or twice a week with a solution of one tablespoonful of carbolic acid or creolin in two gallons of hot water, then thoroly rinsed in clean hot water.

PAINTED WALLS. Painted walls and other painted woodwork should be washed as often as necessary with a solution of Ivory or other mild soap free from uncombined alkali to avoid dissolving the paint and streaking the surfaces, applying with coarse cloths and scrubbing vigorously until clean, changing the water as it becomes dirty. Rinse with clean water and wipe dry with a cloth or sponge.

TOWEL SERVICE. Paper towels in the public toilets and lavatories should be supplied for the patrons of the Library. For the use of the staff the local laundry or towel service will furnish small cotton towels, 17x32 inches, two each week for each member of the staff. The Engineer should be responsible for collecting, counting and checking the soiled towels sent to the laundry, and counting, storing and distributing clean towels weekly.

ROOF. The Engineer should be required to make frequent and thoro inspection of the roof, and keep gutters, drains and downspouts clear of leaves and trash to avoid stopping up, overflow and damage to the building. Metal roofs, gutters and downspouts should be kept well-painted, preferably with a paint of bituminous composition. Spots rusted thru should be cut out, replaced and painted over. Bare spots should be rubbed with emery or corborundum until clean and bright, then painted. Metal roofs should be repainted entirely at least once in every two years.

EXTERIOR PAINTING. Frame and wood buildings, and those with wood trim, should be painted at least every two years, using a paint of highest quality for exterior use.

LOCKS. To prevent locks from becoming filled with metal polish and consequent corrosion of the inner parts, insert the key in the lock while polishing. For lubricating locks only powdered graphite, blown thru a fine tube into the keyhole, should be used. Oil used for this purpose becomes sticky, gummy, and prevents the moveable parts from working properly.

KEYS. The Engineer should be responsible for keeping and issuing all keys to the building. He should keep an accurate record of each key for which he is responsible. Master keys should be held only by the Librarian, Assistant

Librarian, Engineer, Janitor, and such other employees especially designated by the Librarian All others should have issued to them keys only to such doors as they use in the performance of their daily duties. Master keys held by unauthorized employees should be promptly taken up Where keys to individual doors are lost, the cylinder of the lock should be taken off and changed, and new keys to fit the changed cylinder issued in place of the lost keys A deposit of at least the cost of making a new key, required from each employee to whom a key is issued, will tend to promote increased carefulness and watchfulness on the part of such employees to prevent loss of keys

OFFICE FURNITURE. Broken furniture, as soon as noticed, should be repaired at once—the proverbial "stitch in time" applying especially in this instance. One of the qualifications in hiring the engineer should be his ability to make minor repairs of wood and metal equipment. If too expensive or complicated to be made by the Library operating force, the work should be done by an outside cabinet maker, or the broken furniture sold for junk so as not to take up valuable space in the Library.

Serious damage is often done to floor surfaces and floor coverings by broken or worn casters on revolving chairs and other furniture. Before such damage occurs these broken or worn casters should be replaced by new ones. Bottoms of leg chairs, desks, filing cases and other similar furniture should be fitted with gliders of metal or "domes of silence," the bottom face resting upon the floor being of sufficient area to avoid settlement and making depressions in the floor covering.

UNUSED EQUIPMENT. All furniture not in constant use should be removed to storage rooms, looked over very carefully and any necessary repairs and painting or varnishing done, stored in orderly arrangement to prevent further breakage and damage, and covered with heavy paper or canvas to protect from dust.

Awnings should be taken down at the end of the summer season by the operating force, carefully examined and repaired where necessary, wrapped in canvas or heavy paper to protect from dust, and stored in a dry place. Before replacement the following spring they should be treated with a waterproof, mold-repellant preparation.

At the close of the warm season portable desk fans should be gone over carefully, cleaned, repaired if repairs are needed, and all bearings oiled. Fans should be wrapped in paper, properly tagged to show where they belong, and stored in a dry place.

At the approach of winter door and window screens should be removed, properly marked to indicate the respective opening of each, and stored in a place free from moisture and dampness.

SMALL TOOLS AND EQUIPMENT. Operating tools and equipment when not in use should be kept in properly-designed cabinets, orderly arranged

and convenient to the work when quickly needed. Each employee should be supplied with a cabinet equipped with a separate key for his individual tools. No tools should be left lying around on benches, or about the building, to become broken, lost or stolen. Lawn mower, cutting tools and saws should be kept in perfect working condition at all times. Garden hose, when not in use, should be thoroly drained and coiled or wound on a reel, and stored in a sheltered place, to prevent rotting of the cotton plies and deteroriation of the rubber. Worn or defective places in garden hose should be cut out, and the usable sections remaining connected together with "hose-menders."

ASHES AND RUBBISH. The Engineer should be required to see that ashes and all rubbish of every nature are removed promptly from the premises. This is usually done by monthly or annual contract with trash-haulers regularly in the business. The Engineer should make accurate record of the weight or cubic contents so removed each time, together with the date of such removal.

ELECTRICAL INSTALLATION. The Engineer is employed to assume primarily all responsibility for the efficient operation and economical upkeep of all electrical, mechanical and plumbing equipment; and secondarily to supervise and assist when necessary in the other operating activities such as janitorial service, gardening, motor vehicle operation and so on. It is his specific duty to watch and guard strictly against any waste in his department, whether unnecessary use of light, of fuel for heating, of gasoline and oil for motor vehicle operation, or extravagant and unnecessary purchases for the operating department. And his efficiency in his position is in direct proportion to his success in keeping down these various expenses, at the same time rendering adequate service.

Upon his arrival daily it should be his first duty to make a tour of inspection of the entire building, to see that no unnecessary lights have been left burning; and if found, to investigate and ascertain the person responsible, taking such action as may seem advisable if the culprit is one of the operating force, and reporting to the Librarian if one of the staff in another branch of the work. The Engineer should study the lighting system carefully, providing ample and sufficient light in all places where needed, but if light is being unnecessarily wasted at any place he should reduce the amount at that place by removing one or two bulbs, or by replacing with bulbs of lower wattage. He should be responsible for the purchase and issue of all electric bulbs thru requisition on the Librarian. When received, he should keep them under lock and key, personally issuing new bulbs only in exchange for broken, burned-out or defective ones. He should keep an accurate and up-to-date card-record of the purchase and issue of electric bulbs, showing date of purchase, number and wattage of each size, date, number and wattage of each size issued, and number and wattage of each size left on hand.

The Engineer should be responsible to see that each electrical panel in the building is provided with a printed or typewritten directory, indicating clearly the lights of the building controlled by each switch in the panel. He will make it his business to see that every employee of the Library is familiar with the operation of the various switches controlling these lights.

The Engineer will see that a proper supply of electric fuses for the various circuits is on hand and accessible at all times; also washers, plugs and other extra parts for the plumbing installation, and requisite tools for installing the latter.

PLUMBING INSTALLATION. The Engineer should see that the plumbing fixtures not in constant use are flushed regularly not less often than twice a week, replacing the seal in traps lost by evaporation, preventing the escape of sewer gases into the building, and washing out the mosquitoes breeding therein. He should inspect all cleanouts and check valves at intervals of not less than once in two months, to remove rags, paper and other trash caught therein, to clear the drains and prevent back-pressure and flooding of the building. He should inspect the pressure-reducing valve on the main water line at least every three months, replacing cut or worn valve seats and defective rubber cups, in order to prevent possible damage to fixtures and waste of water from excessive pressure.

HEATING AND AIR-CONDITIONING SYSTEM. In a single standard regulation or specification it is wholly impossible to describe accurately all the multitudinous systems of heating and air-conditioning systems, each with its method of operation vastly different from all others, which might be installed in the building. Each manufacturer of equipment of this nature supplies with every installation detailed, minute instructions for its operation which, if followed implicitly, will produce the safest and most efficient results. As before stated, it is not possible for the Engineer, and not likely any other operating employee, to be on duty during the full period of the long working day. In such cases it becomes necessary that one or more pages or assistants learn the method of stopping the plant and closing it down for the night. And the Librarian should make it an important and specific duty to see that such pages or assistants become wholly familiar with the manufacturer's printed instructions for starting, operating and stopping this equipment.

The installation is usually designed to be automatic in its operation. The heat in the building is regulated by thermostatic control. In this case the greatest comfort to the majority of patrons—(experience shows it to be impossible to keep the rooms warm enough and at the same time cool enough to satisfy all the patrons,)—as well as maximum economy in use of fuel for heating, is secured when the thermostat is set and maintained at a room temperature of 71 degrees Fahrenheit.

It is the responsibility of the Engineer to adjust all fuel feed apparatus,

burners and all air drafts in order that greatest economy and avoidance of waste in the consumption of fuel may be obtained. Radiating surfaces in the heating system should be kept absolutely clear of all dust, ashes and soot to prevent the insulating effect of these substances and to promote the greatest possible radiation.

MOTOR VEHICLE OPERATION. The Librarian should make and enforce such regulations as may be required for the operation and repair of motor vehicles, if these are used by the Library. Not one person in 10,000 realizes or appreciates the gravity, the actual danger, of injury to person and property from explosions as a result of smoking, lighting matches, or creating even a spark in any way, where the invisible vapor of gasoline hovers over the opening of a gasoline tank or a leaking pipe line. And in the case of motor cars, where gasoline is used, the Librarian should exert all necessary authority and arbitrarily DEMAND that no smoking, or lighting of matches or fires of any kind shall be done around the motor vehicles or anywhere in the vicinity of the garage, under penalty of drastic punishment if these demands are violated.

The Chauffeur, even tho his duties are not sufficient to keep him constantly employed as such and his job therefore is combined with one or more of the other positions in the operating force, must have had ample training and experience qualifying him to assume direct responsibility, under the general supervision of the Engineer, to operate the motor equipment efficiently and economically, and to make minor repairs to tires and to the vehicles themselves. The position will not usually warrant the employment of an expert automobile mechanic; and when any serious trouble develops, beyond the capacity of the Chauffeur, the difficulty can be remedied at a nearby commercial garage.

Requirements of automobile insurance companies demand that immediate report be made of any accident to any vehicle insured by them. In case of collisions and other accidents occurring to Library motor vehicles, the Librarian should require that the accident be reported at once, whether the driver was responsible or not, giving full and complete details of all circumstances.

Regular schedules for the operation of Library motor equipment should be arranged by the Librarian.

Gasoline and oil will be stored in tanks in the garage yard where possible. These supplies should be issued by the Engineer, who should keep accurate record of such issue, rendering monthly report to the Librarian, showing the amount of gasoline and oil on hand at the beginning of the month reported; the amount received, and the amount issued during the month; and the quantity remaining on hand at the end of that period. This report should not be a mere perfunctory paper report based solely upon the report for the preceding period, adding the invoices of gasoline and oil purchased during the month and subtracting the issues for the period, but these calculations should be care-

fully checked by actual measurement, showing the exact and accurate number of gallons remaining in the storage tanks at the end of the report period.

The Chauffeur should be required by regulations of the Librarian to maintain the proper level of oil in the crank case of each vehicle; to drain off old oil and replace with new after driving the vehicle not over one thousand miles; to keep air in tires at the pressure specified by the manufacturer; to repair punctures and blowouts in tires immediately upon return from a trip where they occurred, or before departing from the Library on the succeeding trip; to keep the proper level of electrolite in the batteries by the addition of distilled water when needed; to maintain the proper charge in the battery itself, as shown by the hydrometer, and when a battery is unduly weak, to report the same to the Engineer or to the Librarian, and secure authority to have the charge renewed or the battery replaced.

EQUIPMENT AND SUPPLIES. The Engineer should be responsible for requisition of all purchases intended for use by the operating department. For greater convenience and more accurate accounting, these purchases may be classified as follows: **Equipment,** or all articles of permanent character, used again and again, and those which do not lose their individual character by merging into other objects; such as tools of every description, lawn mowers, saws, hammers, and so on; and **Supplies,** or articles of impermanent, evanescent character such as string, pencils, paint, pens, paper and other similar articles. Stock cards should be kept, a separate card for each item, showing the date, amount and kind of each purchase; the date, quantity and to whom issued, and quantity remaining after each issue, in this manner maintaining an up-to-date inventory showing instantly the supply of each item on hand. Invoices of purchases received should be checked immediately by the Engineer and if found to correspond with the actual purchase received, should be O. K'ed and returned to the Librarian, in order that the dealer's discount allowed for payment of bills within a limited time may be deducted from the amount of the bill.

All operating equipment received should be receipted for by the Engineer on memorandum receipt to the Librarian. In like manner every article of equipment issued to other employees should be only on memorandum receipt to the Engineer, for his protection against loss. Every article of equipment lost or stolen should be paid for by that employee whose memorandum receipt is given to the Engineer, or to the Librarian. Broken or wornout equipment should be turned in to the Engineer, and when a sufficient quantity accumulates it should be destroyed or sold for junk. Credit for turned-in equipment should be given to the employee returning it; and when sold or destroyed, it should be dropped from the Engineer's memorandum receipt.

Supplies, accounted for on the stock cards, should be dropped without formality as soon as each issue is made.

A standard list of equipment necessary for the operation of an average library is shown in Paragraph 607, Appendix F of this volume. A list of supplies is shown in Paragraph 608, Appendix F.

PEST CONTROL.

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Chapter VI.

PEST CONTROL.

METHODS. When any invasion of pests occurs at an institution the average management of such institution at first feels more or less helpless and unable to cope with the unwelcome guests. The first impulse, usually followed, is to send for an expert in the control and extermination of the particular class of pest. He comes, sees and conquers—at a price most often which must be paid at the expense of some other item of the annual budget, pest control rarely being included as a necessary expenditure in the operation of the institution. The exterminator achieves his expertness only thru a long and close study of the habits, idiosyncrasies, peculiarities and instincts of the pest under consideration. His solution of the problem almost always involves simple, inexpensive and homely methods. And there is no special reason why the management of the institution should not also learn of these peculiarities of the more common pests, how to take advantage of them and conquer them at comparatively negligible cost, and save the expenditure otherwise incurred for its originally budgeted purpose. Whatsoever measures are taken must be done with energy and determination. Half-hearted efforts fail before well-started.

RATS AND MICE. It has been estimated that the loss and destruction occasioned by rats and mice in the United States alone amounts to more than $200,000,000 annually. Stated in another way, it takes the full-time efforts of 150,000 farmers, with modern equipment, every year to produce the foodstuffs required for maintenance of our rat population. But far greater menace is their sinister and almost limitless capacity for spreading disease — trichinosis, tuberculosis, typhus fever, bubonic plague, leprosy, cancer and many other diseases of man and animals. The bubonic plague, imported from Asiatic countries, is carried by a certain species of flea which is host to the disease germ. When a flea-infested rat dies from this disease, his flea colony promptly deserts the body and attacks the nearest animal or man—and when two or three days later the man dies, all his friends wonder where in the world he could have become infected, right at home!

The presence of rats and mice on any premises is a direct reflection on the efficiency of the management. Even tho unknowingly perhaps, breeding places and food supply have been furnished—for these little animals will not live where deprived of homes and breeding places, and of sustenance. Garbage, in uncovered containers or thrown carelessly on the ground; food supplies for pets and animals in containers accessible to rats and mice; loose-fitting doors and partitions in food cupboards and kitchens; open sinks and drains, all set forth a banquet for the visiting rat and mouse.

Sure elimination should begin with the design of the building. Spaces between wall studding of frame houses should be completely filled with rather soft Portland cement concrete to a depth of at least 10 or 12 inches, well tamped in place. Floors, whether of wood or of any other material, should fit tightly and solidly up against the walls, leaving not the slightest opening. Where vents are left in the foundation for the thoro ventilation of the space beneath a building, openings of sufficient size to admit a cat should be provided, which will promptly and surely rid the place of any rats beneath the structure. Walls, partitions, doors and windows should fit accurately into the building in their respective positions, leaving no openings thru which a mouse or rat might enter.

In operation, doors, screen doors, windows or window screens should be kept scrupulously closed; all trash removed from the premises; garbage cans consistently covered; drains screened; food supplies for man and animals kept in rat-proof containers.

To rid the premises of rats and mice already established thereon, traps and poison are used. In the author's experience traps are not one hundred percent effective. After being used a little while they become soiled with grease from baits and with blood from rats caught therein, almost impossible to clean; and the wary rats avoid them. Rats and mice are extremely fond of baker's chocolate, and appreciate very highly also peanut butter, mutton tallow, beef tallow, (fresh), cheese and hamburger. Barium carbonate, purchasable at all drugstores, is a rather mild, tasteless, slow-acting poison to rats and mice, causing them after eating to seek the open air and die. A tablespoonful of barium carbonate mixed thoroly into four tablespoonfuls of baker's chocolate slowly melted in the inner vessel of a double boiler, cooled and molded into balls the size of a marble or hazel nut, then placed on small squares of clean cardboard in out-of-the-way places where there are indications of mice or rats, will very effectively and promptly rid the place of these pests. Peanut butter, melted mutton or beef tallow, soft cheese or hamburger may be substituted in the same proportions for the baker's chocolate. The bait should be mixed and set out fresh every day, and only one kind used at a time. If one kind does not produce the expected results another mixture should be used. While having little or no effect upon children or larger animals, nevertheless the supply of prepared bait and that set out should be kept in places inaccessible to children, dogs, cats and fowls.

GOPHERS. It is intensely annoying to see a well-planned landscaping scheme all covered over with mounds of earth and sunken-in tunnels, and wilting trees, shrubbery and flowers dying from roots cut off below the ground surface, all from the activities of the gopher. Ordinary attempts to drown by running water thru a hose into their burrows are ineffctive, as the gophers take refuge in chambers above the level of their tunnels; and the

air in the chambers not being able to escape, holds back the water and prevents its entrance.

The surest and most effective way to get rid of gophers is to take advantage of their intense aversion to daylight. Between two fresh mounds of earth a two-foot square is marked out. The sod is cut, lifted out, and a hole one or two feet deep is dug, until the horizontal runway of the little animal is uncovered. A small steel trap is placed in the bottom of the freshly-excavated hole, at the center, fastened securely so the gopher may not make off with it, and covered with a very thin coat of fresh pulverized earth. The hole in the ground is then covered with a square of sheet metal or straw-board, or other substance, made light-tight around the edges, and having a two-inch hole in the center of the square directly above the trap. The gopher in passing this section of his runway sees the daylight falling thru the two-inch hole in the cover, sets immediately to work and tries to fill up the two-inch hole or blot it out, and in his efforts gets himself caught in the steel trap directly beneath.

A variation of this method is to place a steel trap, secured and covered with fresh pulverized earth as above described, in the excavation at each entrance to the tunnel and fasten a small bit of carrot, parsnip, sweet potato or even flower stem, carnation or other, firmly to the pan of each set trap. In this case the two-inch hole in the metal or straw-board is omitted, altho the cover itself is placed over the excavation and all light excluded.

Gophers may be poisoned by probing the ground above their tunnels with a crowbar or hardwood probe, thrust into the soft earth until a distant "give" is felt and a small opening from the surface of the ground is thus made. The earth is packed slightly by revolving the crowbar or hardwood probe. Small pieces of carrot, parsnip or sweet potato, sprinkled with strychnine and covered with sacharrine are carefully dropped into the tunnel thru the hole, taking care that the poisoned bait is not buried in the process. The probe hole is then covered with a board, a brick, stone or other object and made light-tight around the edges.

Gas may be used also to poison gophers. Where a fresh mound of earth is seen it should be leveled off, the end of the tunnel uncovered, and one end of a pipe or hose inserted in the tunnel and made gas-tight with earth, the other end of the pipe or hose being connected to the exhaust of an automobile. Carbon monoxide from the running motor of the automobile will painlessly and speedily kill the little animal. A ball of cotton waste the size of a baseball, saturated with carbon bi-sulphide, thrust down the tunnel and made gas-tight with earth, will produce the same result. The bi-sulphide is extremely inflammable, and care should be taken not to light matches or cigarettes in its vicinity. The saturated balls should not be lighted before dropping into the tunnel—the gas arising from the evaporation of the volatile liquid is sufficient to asphyxiate the gopher.

MOLES. Moles also cause considerable damage to lawns, especially by their burrowing beneath the surface in their search for earthworms, cutworms, beetles and other insects which form their food supply. Moles are easily caught in special mole-traps made of spring wire, purchasable at any hardware store. The mole's tunnel is uncovered by digging, the trap is set and placed therein, and a board placed over the hole dug to place the trap in the tunnel.

TERMITES. Within the past quarter-century the problem of termite-control has become increasingly grave. The growth of human population, the spread of civilization, the clearing and cultivating of forest lands, the burning of stumps, fallen trees and logs, have seriously upset the balance of nature and decreased the food supply and breeding places of these little insects until now more and more are they turning increased attention to the habitation of man, particularly those in which wood is used in any way as a building material.

Termites, popularly known as "white ants," are not related to the ant at all, but are of the same general family as the cockroach. They are insects, passing thru the egg, larval and adult stages. They live in communities, being divided into castes with special activities for each—Reproductive, Soldier and Worker, similar to bee colonies. They subsist on wood or other cellulose products, being particularly fond of books and paper; the worker caste—(in most species being the "Nymphs" or immature insects)—causing by far the greater portion of damage and destruction to buildings. The habitations of dry-wood and damp-wood termites are galleries in the infested wood itself; the subterranean species lives in nests and galleries in the ground, and build light-tight, air-proof and moisture-proof artificial tunnels of earth particles and partly digested wood fragments, cemented together with saliva and fecal deposits, over faces of concrete and brick walls connecting their subterranean galeries with the wood structure under attack. (See Fig. 7, Plate 22.) Subterranean termites are especially active in warm, dark locations under buildings near furnaces and chimney bases; constructing their own chimneys and pipes reaching from the ground to the wood floor joists above. (See Fig. 6, Plate 22.) If for any reason the interior of the artificial tunnel dries out the termites die; and destroying the tunnels and cutting off connection with the ground is one method of combating the subterranean termite.

Always working in the dark and in concealment, their ravages proceed unnoticed until great damage is done. The intelligence of the termite is phenomenal, as shown by two instances coming under the author's direct observation:

The basement floor of a certain library building was of concrete three inches thick. At one point, about twenty feet from the nearest wall, a small hole in the floor about as large as an 8-penny nail was discovered by the little creatures burrowing beneath the building from the outside. They promptly emerged thru this small hole, built their tunnels up behind some nearby

wood shelving and established a flourishing colony in some books and papers on the shelves—to the utter destruction thereof.

A piano stood for several months, about two inches from a wall in an assembly room on the second floor of a high school building in the Philippine Islands. The termites when discovered had worked their way up inside the wall, had constructed a bridge across the intervening space and had so riddled the piano case as to leave only the shell of varnish on each side of the galleries and tunnels wherein they had established themselves.

Altho a great number of species are known and others are constantly being discovered, for our purpose they may be divided into three general classes: (a) Dry-wood termites, (Kalotermes and Neotermes); (b) Subterranean termites, (Reticulitermes and Heterotermes); and (c) Damp-wood termites (Termopsis.) These general classes are shown, natural size, in Fig. 4, Plate 21. The various castes, greatly magnified, are shown in Fig. 1, Plate 19; (a) the reproductive caste, which develops wings and swarms at certain seasons of the year, mostly after the first heavy rain of the fall, about the middle of the day. In the air they pair off, male and female, and each pair seeks a favorable location for starting a colony. Having found a location to their mutual satisfaction, with a flip of their wings they shed the latter and start to burrow into the ground or into their choice of wood, according to their kind. (b) shows certain nymphs or undeveloped young, the most numerous of all the castes, which will develop into soldiers; while (c) shows nymphs, bearing wing pads, which will later develop into flying reproductives (d) Fig. 1, are the soldier-caste, with dark, heavily-armored heads and relatively enormous mandibles or pincers.

Plate 20, Fig. 2, shows the area of the United States from which destruction by subterranean termites, (Reticuliterms and Heterotermes), is reported. Fig. 3 shows the area affected by ravages of wood-dwelling termites, (Termopsis, Kalotermes and Neotermes.)

The presence of termites in a structure is indicated generally in one or more of four different ways: (1) failure of wood due to their attacks; (2) swarming of reproductive caste about mid-day after the first hard fall of rain, or in lesser numbers about mid-day after a rain in the spring; (3) characteristic fecal pellets of wood-working termites dropped from their workings; and (4) characteristic runways and tunnels built by subterranean termites from earth to wood and from wood to earth. (See Figs. 6 and 7, Plate 22.)

NEW CONSTRUCTION. In the construction of new buildings the following measures should be taken:

All waste wood, stumps, roots, scraps, blocks, refuse, shoring timbers, wood form lumber and grade stakes should be removed from the site at the earliest possible opportunity, or burned on the ground.

Adequate ventilation, at least two square feet of opening for each 25 lineal feet of exterior foundation wall should be provided. Ground surface beneath floor should be at least 24 inches below the bottom of the joists. Cross-ventilation beneath the building should be provided. No trees, shrubs or other obstructions should be planted in front of these ventilation openings.

All wood in contact with the ground or with concrete foundations, or concrete floor, should be "pressure-cell" treated—that is, piled upon small flat cars at a treating plant and run into long steel cylinders; sealed and put under vacuum pressure for 6 to 12 hours to withdraw as much as possible all sap and moisture; then the cylinder filled with creosote oil, a product from the distillation of coal tar, and maintained at a pressure of 6 pounds per square inch for a period of 48 hours; then the wood allowed to drain before removing from the cylinder. A ten percent solution of zinc chloride may be substituted instead of the creosote oil in case the wood is to be used in places always dry to prevent leaching out of the zinc chloride charge. Creosote oil does not leach, but it has a penetrating, unpleasant odor.

Hardwood flooring should be thoroly heated in kilns immediately prior to delivery on the job and laying. Building foundations should be of dense, well-tamped concrete, with the ground level on the outer wall at least 6 inches below the top of the wall, and as much lower as possible. Meeting or intersecting foundation walls should be strongly tied together with steel reinforcement. Stucco on an outside wall if finished to the ground level should be securely anchored to the foundation wall. Before applying the stucco the surface of the foundation wall should be free from soil and present a clean rough surface. Concrete or brick patios, porches or steps should be completely sealed from the building proper, by the use of a metal plate, 16-ounce hard copper or 26-gauge galvanized ingot iron, projecting well above the soil on the outside and beyond the top of the foundation as shown at (a), Fig. 9, Plate 23. Wood posts should never project below the level of the finish floor, but should rest upon metal plates set on small square foundations raised slightly above and projecting thru the floor, with a tight-fitting metal dowel thru the plate and down into the foundation. Pipes coming thru a foundation or concrete floor should have no openings, however minute, left around them. No construction joint should be permitted under any concealed space or under any wood unless the two members are securely tied together with steel reinforcement or the joint is sealed with a sheet of corrosion-resistant metal.

EXISTING BUILDINGS. For existing structures the treatment will depend upon the class of termites infesting, whether subterranean or wood-working. For either class poisoning with dry-powdered Paris green is most effective. Cleanliness is a passion with these insects. They are constantly grooming themselves and each other. Dry Paris green or other arsenical pow-

der adhering to the fine hairs of their bodies is licked off, either by themselves or by passing fellow-termites; those licking off the poison die, and all dead in a nest are eaten by the others, in this manner spreading the poison thruout the entire colony. An interesting example of this cleanly peculiarity of termites was noticed by an entomologist watching a group confined within a space of 20 square inches. A single termite was dusted with arsenical compound, and placed in the group; and within 30 hours 149 fellow termites had died from the effects of grooming the poison-dusted insect. (See Fig. 8, Plate 23.)

For dry-wood termites the most efficient method is by blowing powdered poison-dust into their tunnels and galleries, using Paris green, or white arsenic, (arsenical smelter dust), or finely ground sodium fluosilicate. In applying the dust a small hand duster with a container for the dust forming an extension of the blowing chamber, and with the nozzle in line with the plunger, such as is used in small gardens, is most effective. A rubber stopper, (see Fig. 8, Plate 23,) should be placed around the nozzlso when the latter is inserted in a quarter-inch hole a tight joint will be made. Quarter-inch holes at from 3 to 6-foot intervals should be bored from one-half to three-quarters through the longest dimension of the infested timber, cutting thru the termite galleries. A little "give" of the bit will tell the operator when a gallery is being cut. Usually many termite galleries are cut by any hole bored in an infested timber, especially when the hole is bored the longer dimension. The duster is then inserted in the various holes and given three or four strokes of the plunger, then the holes plugged with a wooden plug or cork. In interior work a hole as small as 1/16 of an inch may be bored provided a nozzle as small as that can be used. Some liquid poisons—cyanide, ortho-dichlorbenzene, carbon bi-sulphide, carbon tetrachloride and benzol—have been tried but none of them have been as effective as the powdered poisons named. Cyanide is extremely poisonous and dangerous to handle. Carbon bi-sulphide and benzol are highly inflammable, and the use of these two liquids is discouraged because of the poisonous nature of their vapors and the possibility of fires and explosions.

For subterranean termites the most satisfactory method of preventing damage is to remove all untreated wood from ground contact, and treating the ground. Posts, garden stakes, blocks, chips, trash, and all such cellulose-bearing substances should be removed. The author had immense success in treating this class of termites by breaking their tunnels wheresoever found, and filling the broken end with a generous plug of Paris green, sifted over with a metal "dredger" such as used in hotel kitchens for dredging meats, or by sifting thru a cheese-cloth bag. The termites would eat out the plug, groom themselves and each other free from adhering dust, and in this manner pass the poison along from one to another until the colony was exterminated. A word of warning here is due, however; if living conditions are favorable in any cer-

tain place, the mere killing of one colony will not prevent the settling of another pair of reproductives and rearing a new colony in the same place. This may be forestalled by saturating the ground with a 10-percent solution of sodium arsenite, or Paris green, or zinc chloride, 4 pounds dissolved in one gallon of water; or a 5-percent solution of borax may be used, dissolving 2 pounds in one gallon of water, and using a gallon for each square yard of ground so treated. After the ground treatment is finished it is advisable not to disturb the surface except in the case of sodium arsenite, which should be covered with soil as a protection against poisoning of men and animals. Ground treatment is effective only in places sheltered from the weather. In exposed places the poison leaches away rapidly.

Paris green and white arsenic are extremely poisonous to man. When used out-of-doors and sifted thru a dredger or cheese-cloth bag, a wet sponge should be worn over the mouth and nose to avoid inhaling and perhaps swallowing the dust. Large quantities of these poisons will also affect vegetation. After using, the hands and face should be washed thoroly, and all clothing changed. Sodium arsenite is dangerous to the skin and eyes, and special care should be taken in its use. The pail in which it is mixed should never be used for any other purpose. If spilled on the skin it should be washed off in a 25-percent solution of sodium thiosulphite, (photographers' hypo), then again with clean water. If it gets in the eyes, they should be washed out with a 5-percent solution of boracic acid.

Altho acting somewhat as a deterrent, paint is not wholly effective in preventing attacks of dry-wood termites on houses. Altho the author has not yet seen it tried, it is believed that a heavy coat of copper-bearing paint, such as is used on the bottom of ships to poison barnacles and keep them from adhering and forming colonies, would be equally successful if used for termite protection. In such cases the painted surfaces should be given a very heavy coat, and the paint well worked into cracks and spaces between window and door casing, and other openings.

In localities where termites are common a thoro inspection of the building, and especially the ground round-about and under the structure, should be made at least four times a year in order to prevent the little insects from gaining a foot-hold and doing untold damage.

COCKROACHES. These filthy Brobdingnagian first cousins of the termites, instead of living beneath or outside of the building, choose for their quarters the interior itself, particularly the kitchen cupboards, toilets, lavatories and other places where they may have access to the drain pipes. Carrying the slime of these pipes on their feet they crawl over food supplies in the cupboards, infecting them with typhoid and other filth-disease germs.

Banishment and poisoning of cockroaches is easily effected by mixing a

teaspoonful of dry, powdered breakfast cocoa with an equal quantity of powdered borax, dividing the mixture into small portions and spreading on small squares of clean cardboard about the building where the noisome bugs are seen.

WOOD BEETLES. These insects, commonly known as "Death Watch" or "Powder Post" beetles, are often mistaken for termites, to which, however, they are not related. Their presence is indicated by small conical piles of fine powder directly below the microscopic holes wherein they have entered the wood.

In a certain library the architect specified "Second-grade Philippine Mahogany" for the interior wood trim. The wood, infested with these beetles, was supposed to have been thoroly kiln-treated before delivery on the job and installation into the building; however, some of the insects outlived the heat-treatment and escaped into the building after it was put into use, promptly attacking the oak furniture in the reading rooms. They were easily killed by using carbon bi-sulphide in a hypodermic syringe, thrusting the needle of the syringe as far as it would go into the hole and discharging the full cylinder load of bi-sulphide behind the beetles.

ANTS. Ants of all kinds are especially active and pernicious in spreading all kinds of funguous diseases, from infected plants to well ones. Certain species of ants also carry aphids, (plant lice), from plant to plant, seeking fresh pastures for their aphid dependents somewhat as the human dairyman maintains his herd of cows, and for the same reason; in return for the care given them the aphids secrete a sweetish liquid much used by these ants for food.

To destroy the ants they must be sought at their nests. Near the latter should be buried a quarter-gill glass jar, the top flush with the ground, having a screw metal cover and grooves across the screw threads to admit the ants. The jars should be filled about one-fourth full of a liquid composed of one part honey, one part glucose, (corn syrup), one part Paris green and two parts warm water. A little wooden stick or shred of wood excelsior extending from the metal top to the liquid should be provided as a runway for the ants.

Where they are in a building they may be banished by sprinkling their runways with ant powder, many kinds of which are sold at grocery stores and all effective. Borax, or pyrethrum powder sprinkled over their runways are both very effective.

The western part of the United States is infested with a huge red ant which is extremely pestiferous. These ants build large nests of sticks, pebbles and earth. To exterminate, a hole should be dug in the center of the nest, to a depth of 12 or 15 inches; one or two heaping tablespoonfuls of potassium cyanide placed in the bottom, and the hole filled with earth, with a blanket of clay over the top if available. The whole should be thoroly wetted; and the wet potassium cyanide, generating cyanic acid gas, penetrates every part of the nest and kills all insects, embryos and eggs therein.

SILVER-TAIL MOTHS. Silver-tail moths, commonly known as "Silver-fish," attack cloth-bound books and eat the paste holding the cloth to the card-board of the backs. They are found on book shelves, on wall-paper, (where they eat the paste which holds the paper to the wall), and near sinks, lavatories and toilets. They are very easily controlled by sprinkling "Buhach Powder," or powdered pyrethrum, obtainable at all drugstores, over the shelves and other places where noticed in the building; and scattering small squares of clean cardboard, over which is placed a small quantity of library paste, in-to which has been mixed Paris green in proportions of one part Paris green to four parts paste. The cardboard squares should be put out in dark, vacant places beneath the building and in closets where they breed, and the silver-fish are attracted to the poisoned bait by the odor.

Instead of library paste, four parts of wheat flour, one part corn syrup and one part water may be boiled together until the flour is dextrinized, then one part of Paris green added and thoroly mixed in, may be used with equally deadly effect.

MOLD. In dark, damp, warm and ill-ventilated rooms and storage stacks mold forms on the backs of books and bound newspapers kept therein. In the design of the building provision should be made to admit light and thoro ventilation in such rooms. Air-conditioned ventilation too heavily charged with moisture should be by-passed around these quarters and only raw, dry air from the outside admitted, providing separate heating arrangements where necessary. To treat books already infested with mold they should be var-nished quite heavily with a preparation of one pint of grain alcohol, (ethyl alco-hol), in which is dissolved four 1:1000 tablets of corrosive sublimate, (bi-chlor-ide of mercury), and mixed with one pint of shellac. This preparation dries quite rapidly and leaves a film on the backs of books where used, destroying the spores coming in contact therewith and preventing the growth of mold and mildew.

If used of the strength indicated above the mixture is safe to all persons handling the books so treated. If a stronger mixture is used it is very likely to rot the backs of books where so applied, and to cause ulcers upon the hands of persons using them.

Corrosive sublimate is a deadly poison both internally and externally. The preparation should be used only with rubber gloves on the hands. After using the gloves should be thoroly washed, and the hands scrubbed with soap.

DRY ROT. This is funguous infestation attacking timbers in houses, and particularly floors and floor-joists over damp, ill-ventilated vacant spaces near the ground. At first it may be mistaken for termite attacks; but an examina-tion will soon determine whether the trouble is caused by dry rot or termites, altho termites are present in the majority of instances when dry rot exists.

Fig. 5, Plate 21, (a) shows a piece of wood affected with dry rot; (b,) a piece of termite-infested wood.

Adhering to the fine hairs of the bodies of termites in dry-rotted timber, spores are carried and spread the infection to sound timber. Treatment for dry rot is the same as that set forth previously for termites; cut out and burn all infected material at least two feet back from the infection, as the spores will reach at least that distance from any visible indication of infection. Replace with sound timber treated by the 6-pound pressure cell method previously described. Provide thoro and adequate ventilation and cross-ventilation beneath buildings where little or no ventilation is found.

SHRUB PESTS. Plantings of trees, shrubs and flowers are infested at different times during warm weather, with insects which weaken or actually destroy them altogether. These pests may be described generally as of two classes: sucking pests, which bore thru the bark and suck the juices, and chewing pests, which attack the bark and leaves. Aphids, already mentioned in the paragraph on ant control, are a good example of sucking pest; and snails give a vast amount of trouble as the chewing class. Treatment of either kind is very simple. Aphids may be kept down by thoro washing of the affected plants daily with a strong jet of water from a hose. During the growing season these plants may be sprayed occasionally, particularly after rains have washed off any former treatment, with one ounce of common laundry soap or Ivory soap dissolved in one gallon of warm water, and one teaspoonful of "Black-leaf 40," (a nicotine preparation made from tobacco), added to each gallon of soap mixture. This solution coats the aphids and other insect pests with a film of soap, which closes the air-pores in the sides of their bodies and smothers them to death, while the "Black-leaf 40," being extremely poisonous, is also drawn into their bodies thru breathing and poisons them. This mixture is effective for either chewing or sucking pests on trees and shrubs.

Snails are killed by scattering wheat bran, into which is mixed a small quantity of Paris green, (about a tablespoonful of Paris green to a pint of bran), thinly over the ground about the plants where their ravages are noticed. A commercial preparation called "Snarol," is also very efficacious, both as a poison and in drying up their body-tissues.

Mildew on plants is a funguous growth causing a spotted appearance of the leaves and stems, and a sickly, yellow appearance of the plant. This growth is treated by blowing a cloud of finely-powdered flowers of sulphur, dry, over the affected plant, preferably in the early morning when the powdered sulphur will adhere to the dew on the plant. A blower, similar to that shown in Fig. 8, Plate 23, may be used for distributing the powder.

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ACKNOWLEDGMENT:

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Figures and Cuts, Courtesy of Agricultural Experiment Station,
University of California.

FRONT (SOUTH) ELEVATION

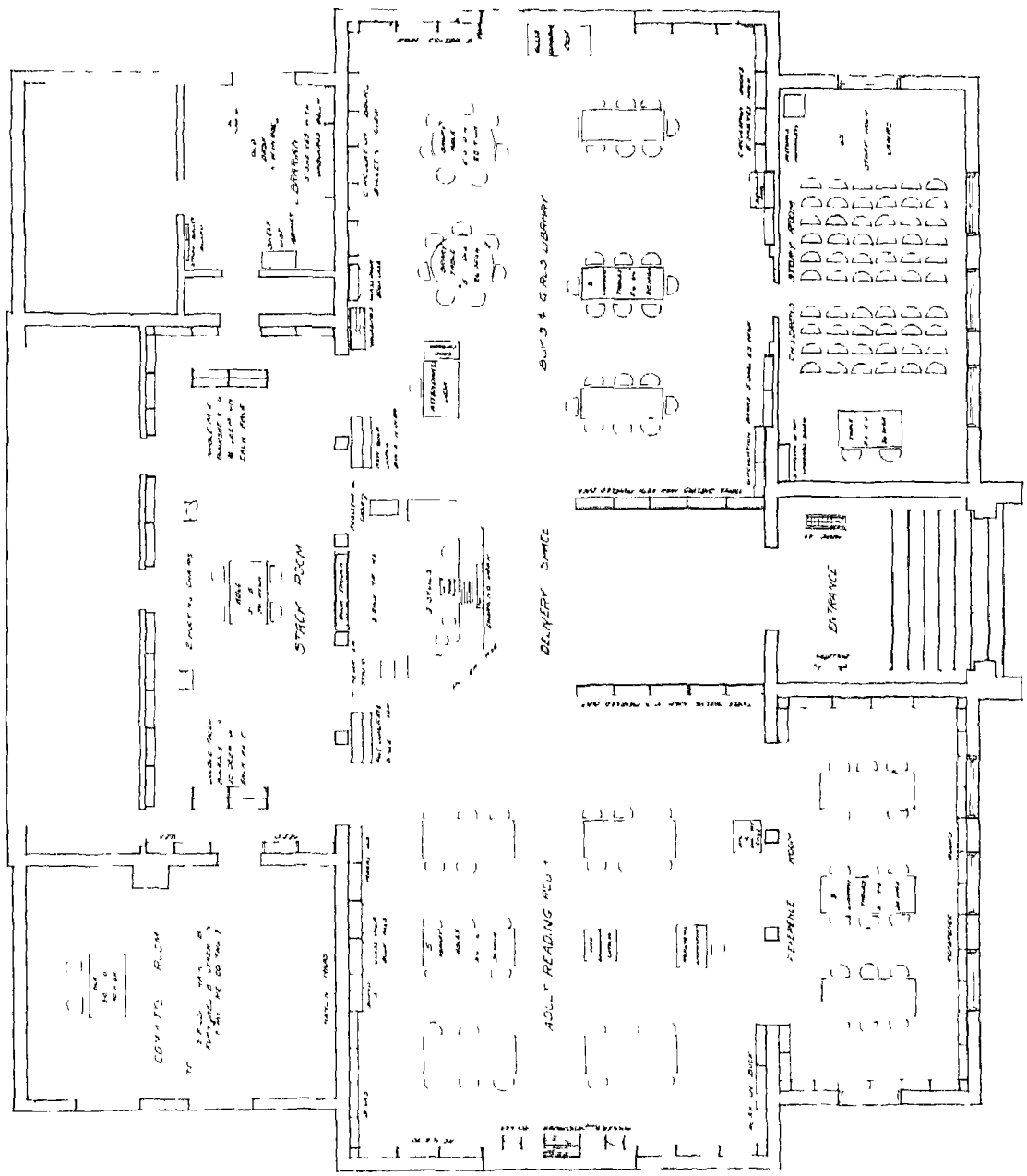
HOLLYWOOD
PLATE

FIRST FLOOR PLAN

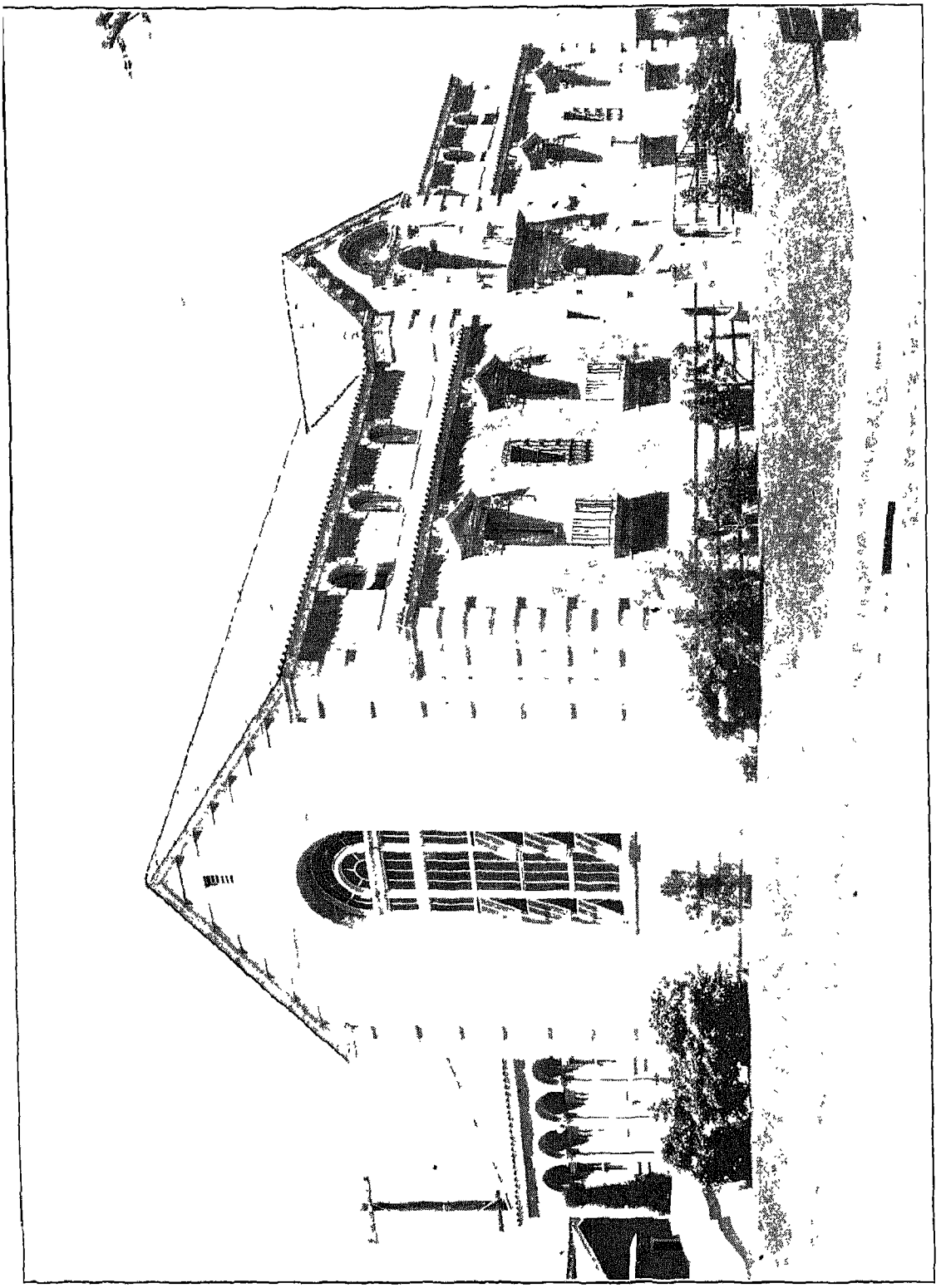
LIBRARY

FRONT (WEST) ELEVATION

UNIVERSITY
PLATE


CHILDREN'S LIBRARY
GALLERY
STAGE ROOM
ADULT READING ROOM
ENTRANCE
FLOOR PLAN

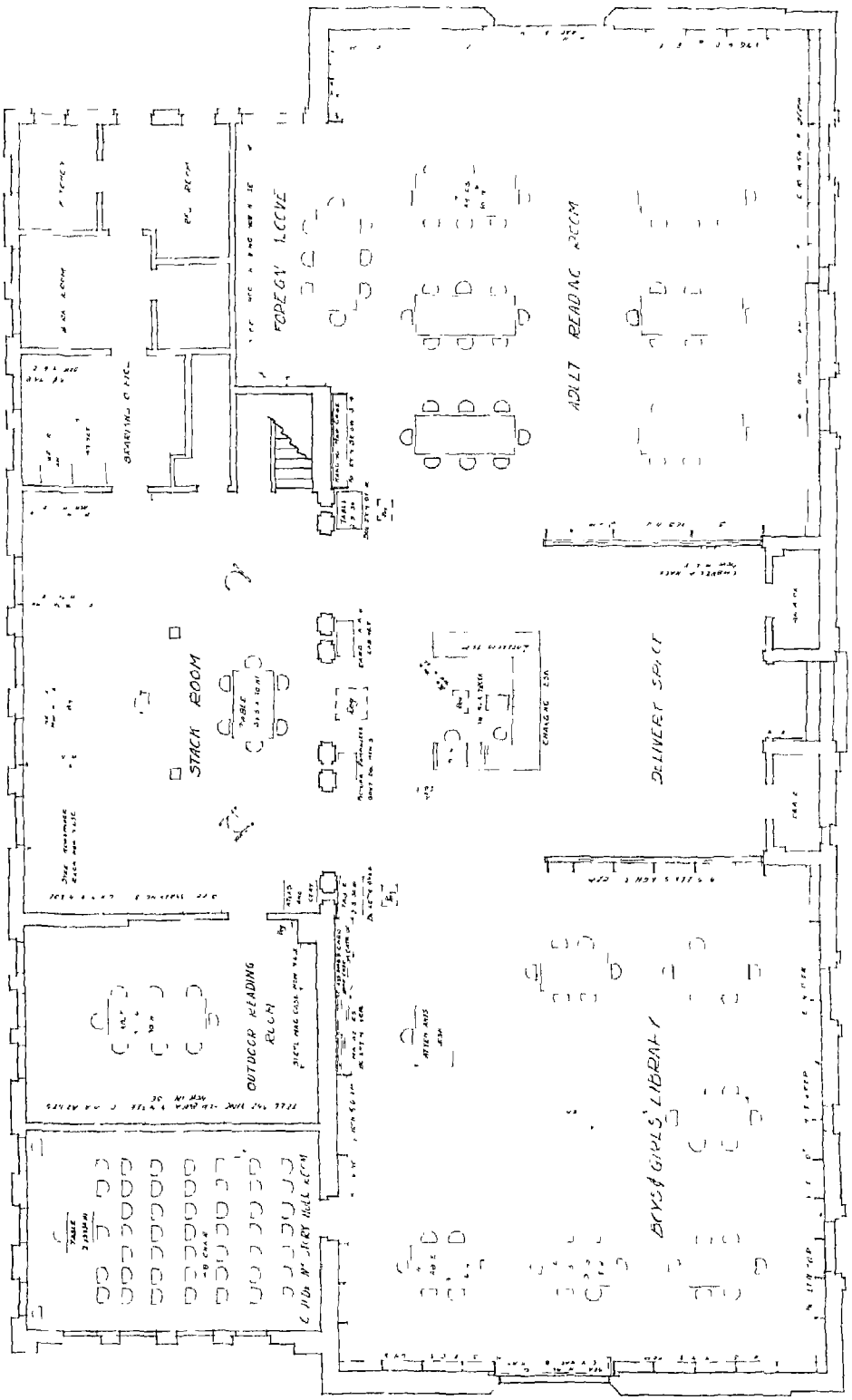
LIBRARY
2



FRONT (EAST) ELEVATION

Architects: Farrell and Mills
Steel Reinforced Concrete
Brick Stucco Clay Tile Roof

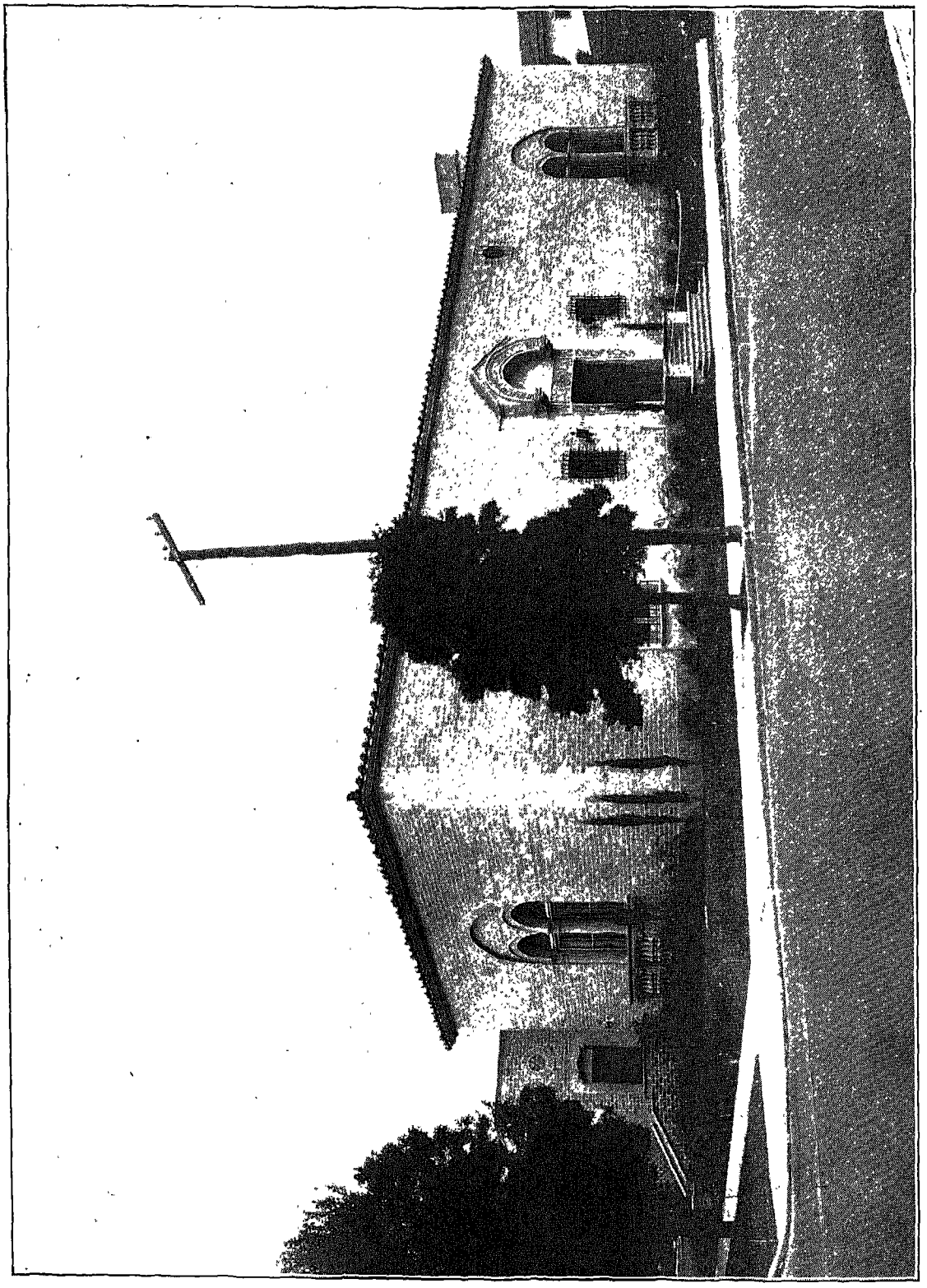
SAN PEDRO
PLATE



FLOOR PLAN

LIBRARY
3.

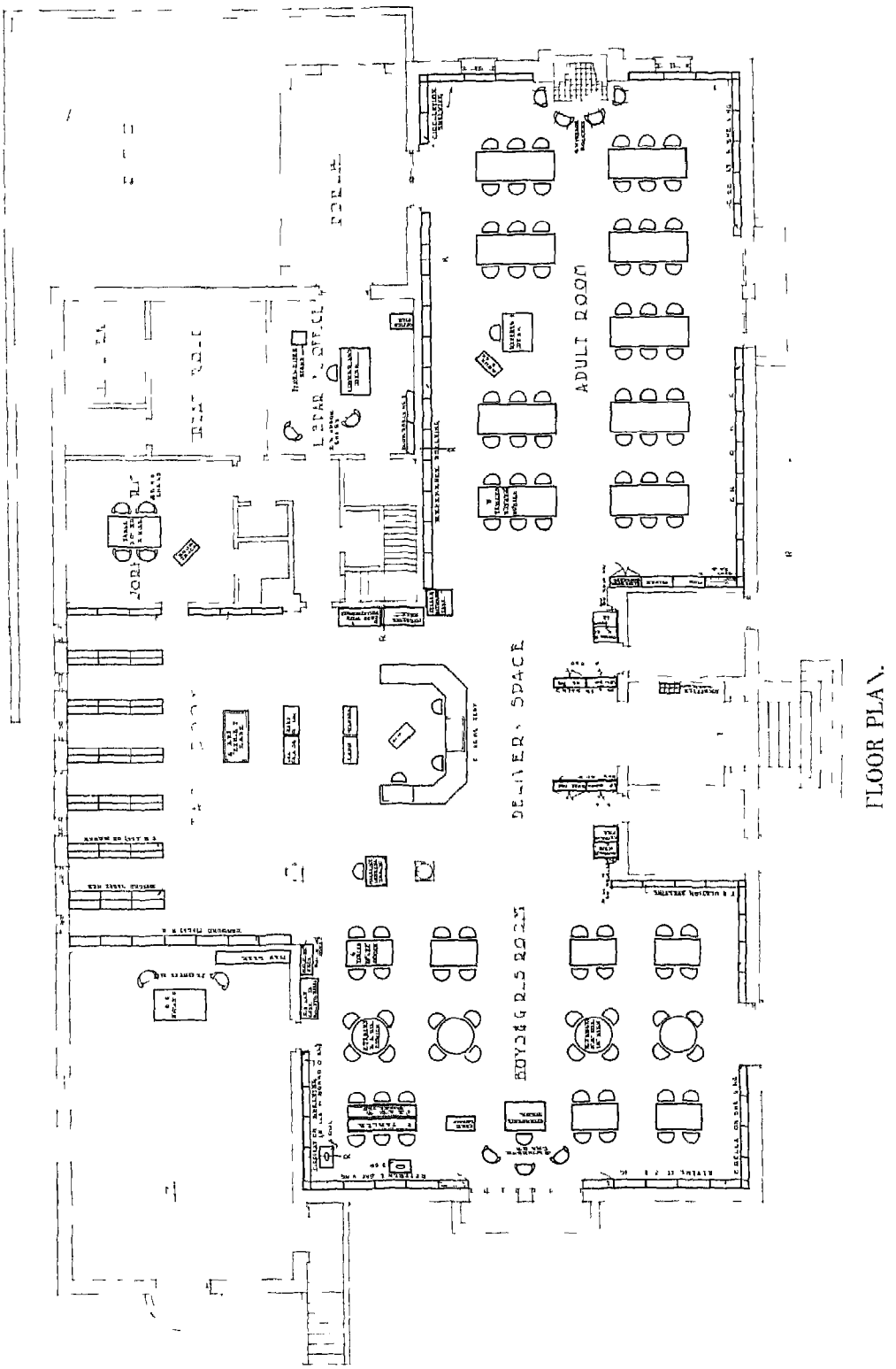
Cost —$6 .7 Building and Equipment
Floor Space—6 510 Square Feet
Capacity—28 584 Volumes



FRONT (NORTH) ELEVATION

Architect—Allen Ruoff.
Style—Italian Renaissance.
Hollow Concrete Tile, Clay-tile Roof.

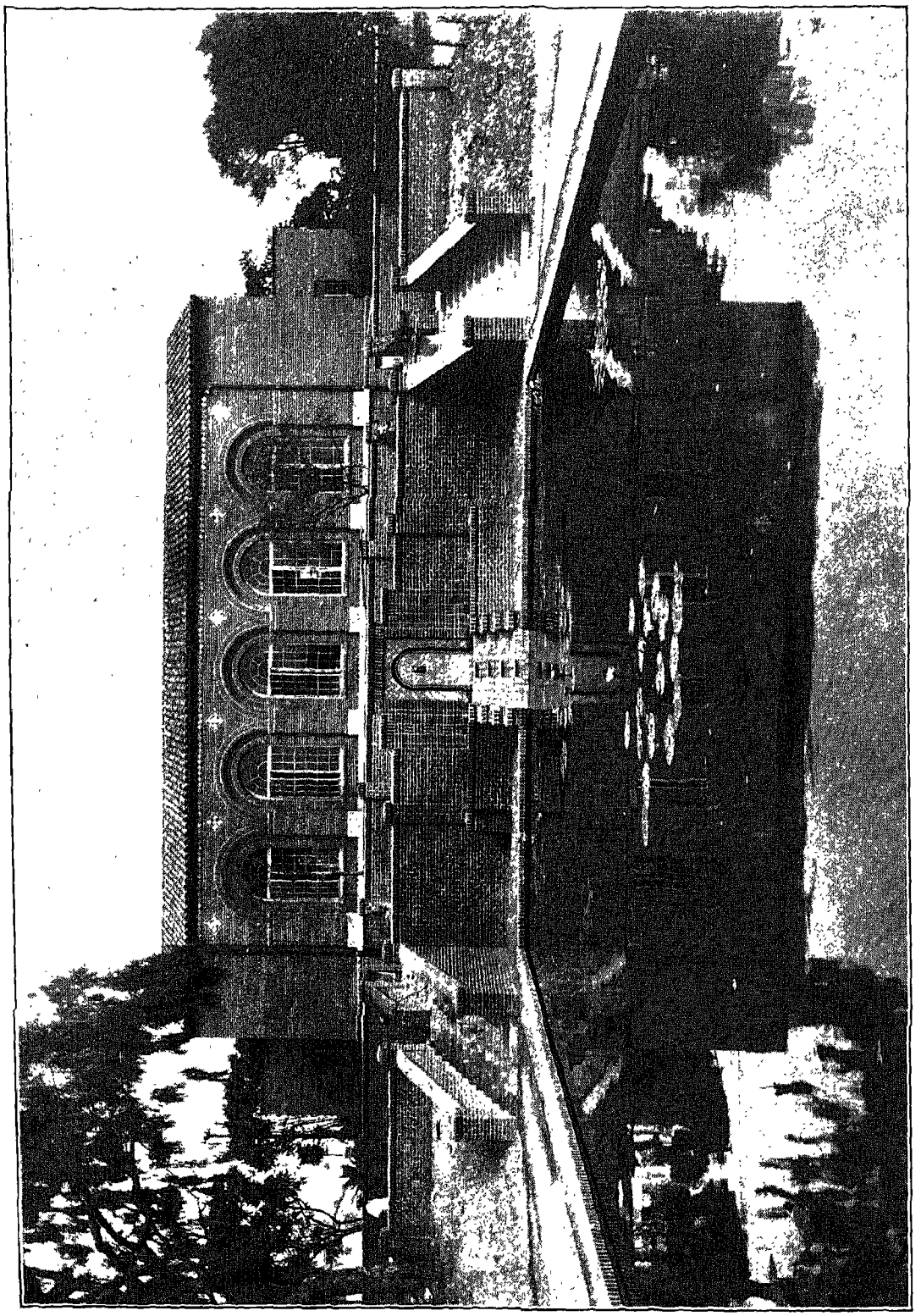
WILSHIRE
PLATE



FLOOR PLAN.

LIBRARY
4.

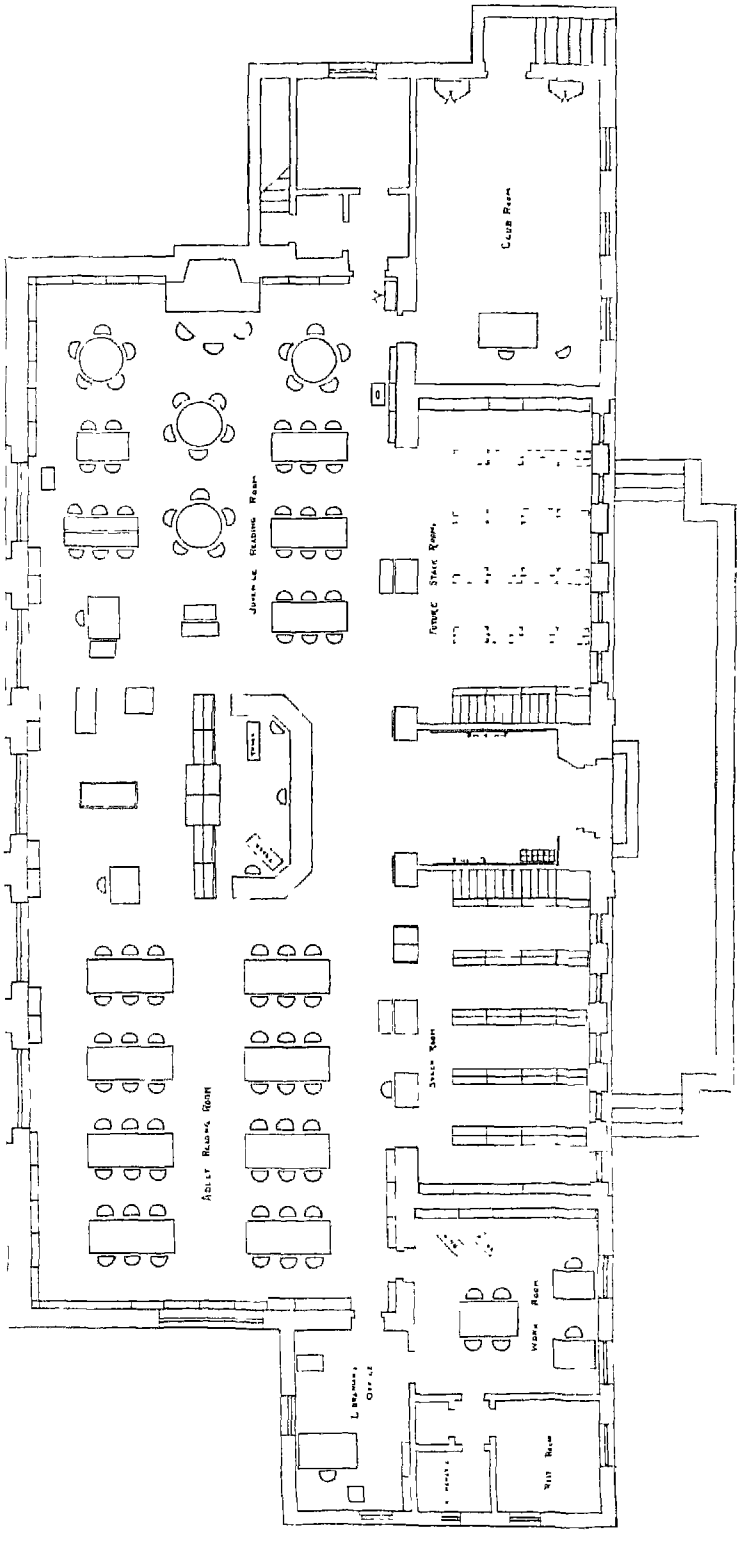
Cost—$50 105 Building and Equipment
Floor Space—4 258 Square Feet
Capacity—25 000 Volumes



REAR (SOUTH) ELEVATION, SHOWING *REFLECTING POOL.*

Architect—Austin Whittlesey.
Style—Spanish.
Brick, Clay-tile Roof.

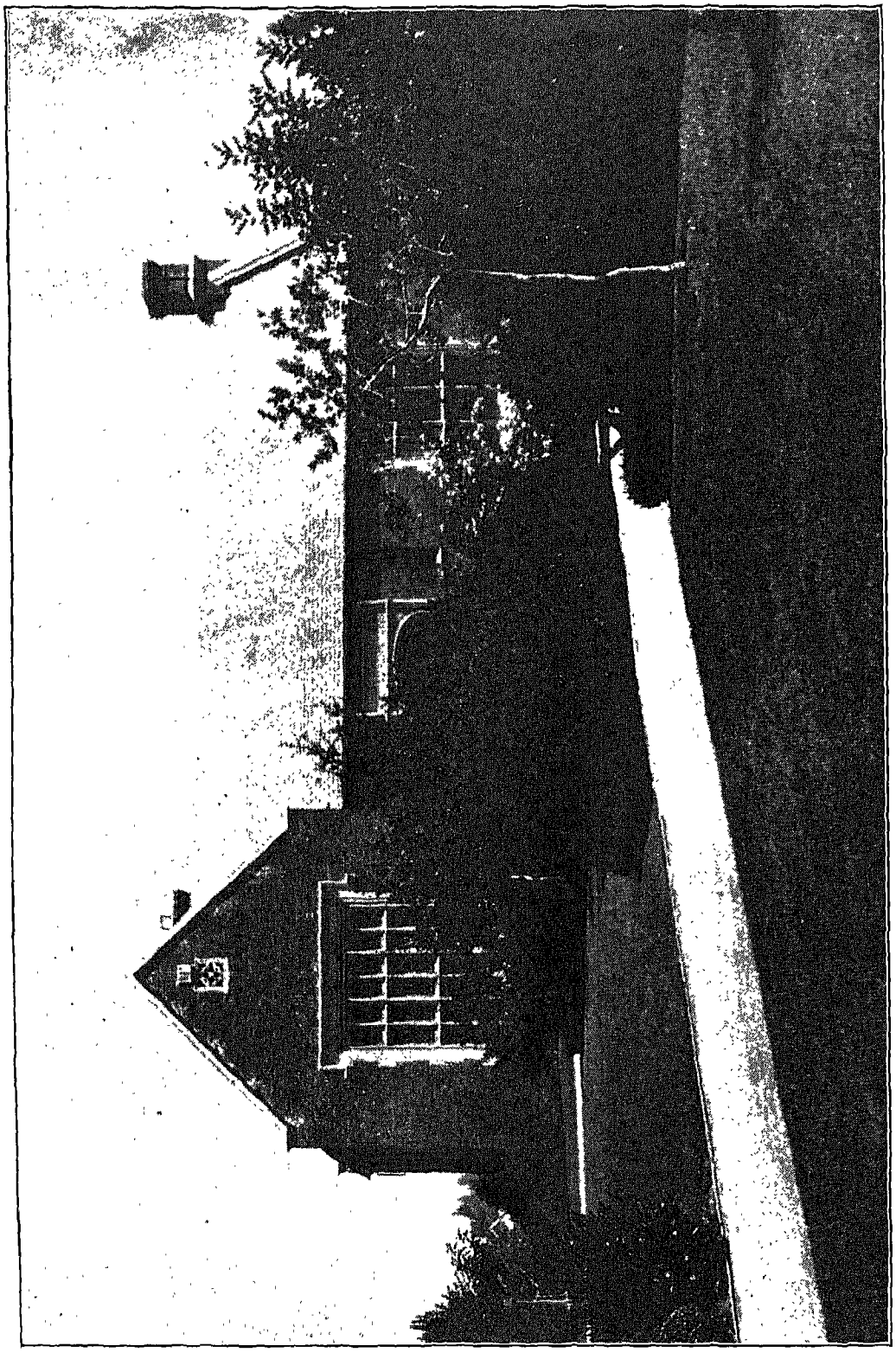
FELIPE DE NEVE
PLATE



FLOOR PLAN.

LIBRARY.
5.

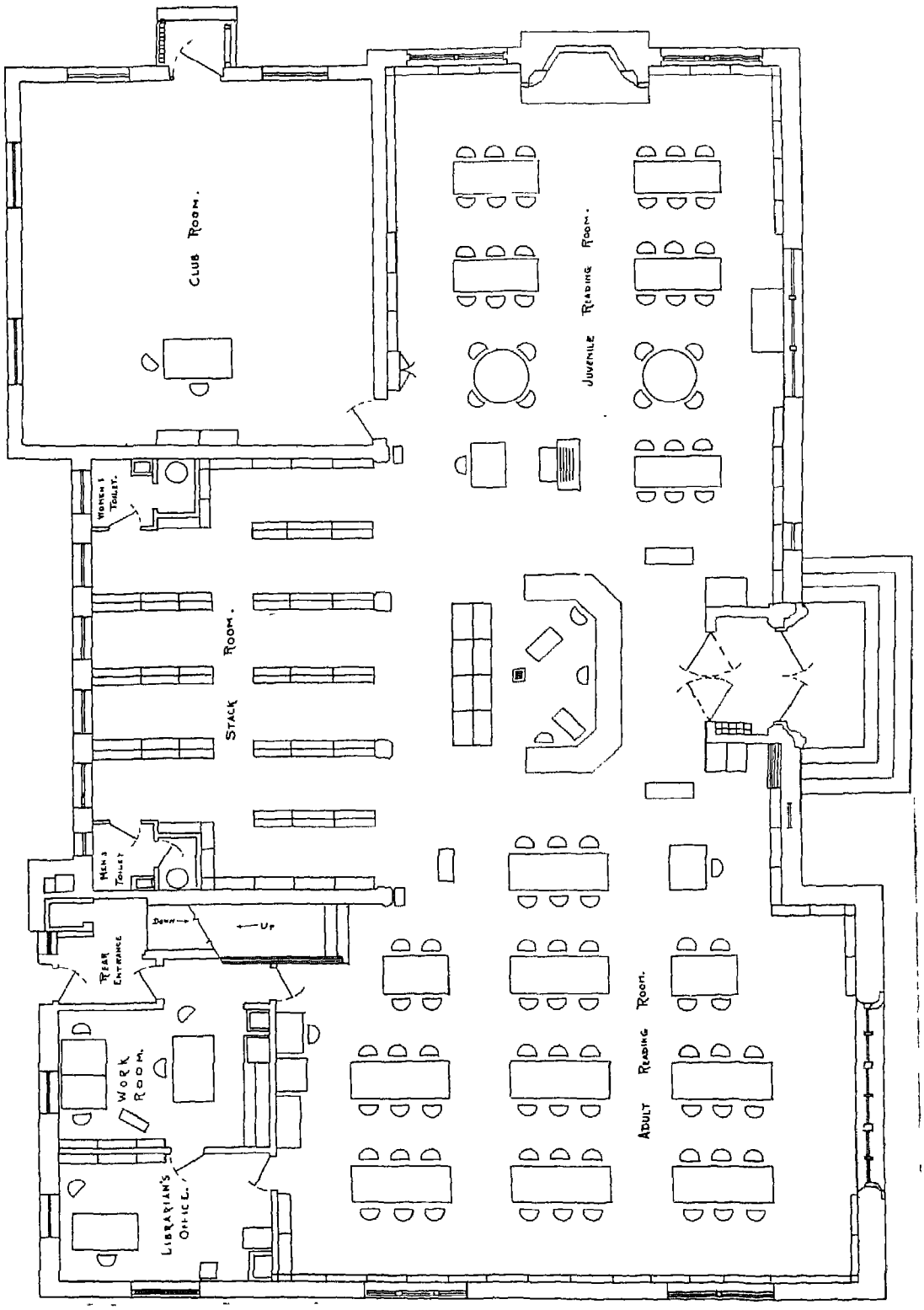
Cost $19,084 Building and Equipment.
Floor Space 7,094 Sq. ft. Feet
Capacity 30,825 Volumes



FRONT (SOUTH) ELEVATION.

Architects—Austin and Ashley.
Style—Early Tudor.
Brick, Asbestos-tile Roof.

MEMORIAL
PLATE



FIRST FLOOR PLAN.

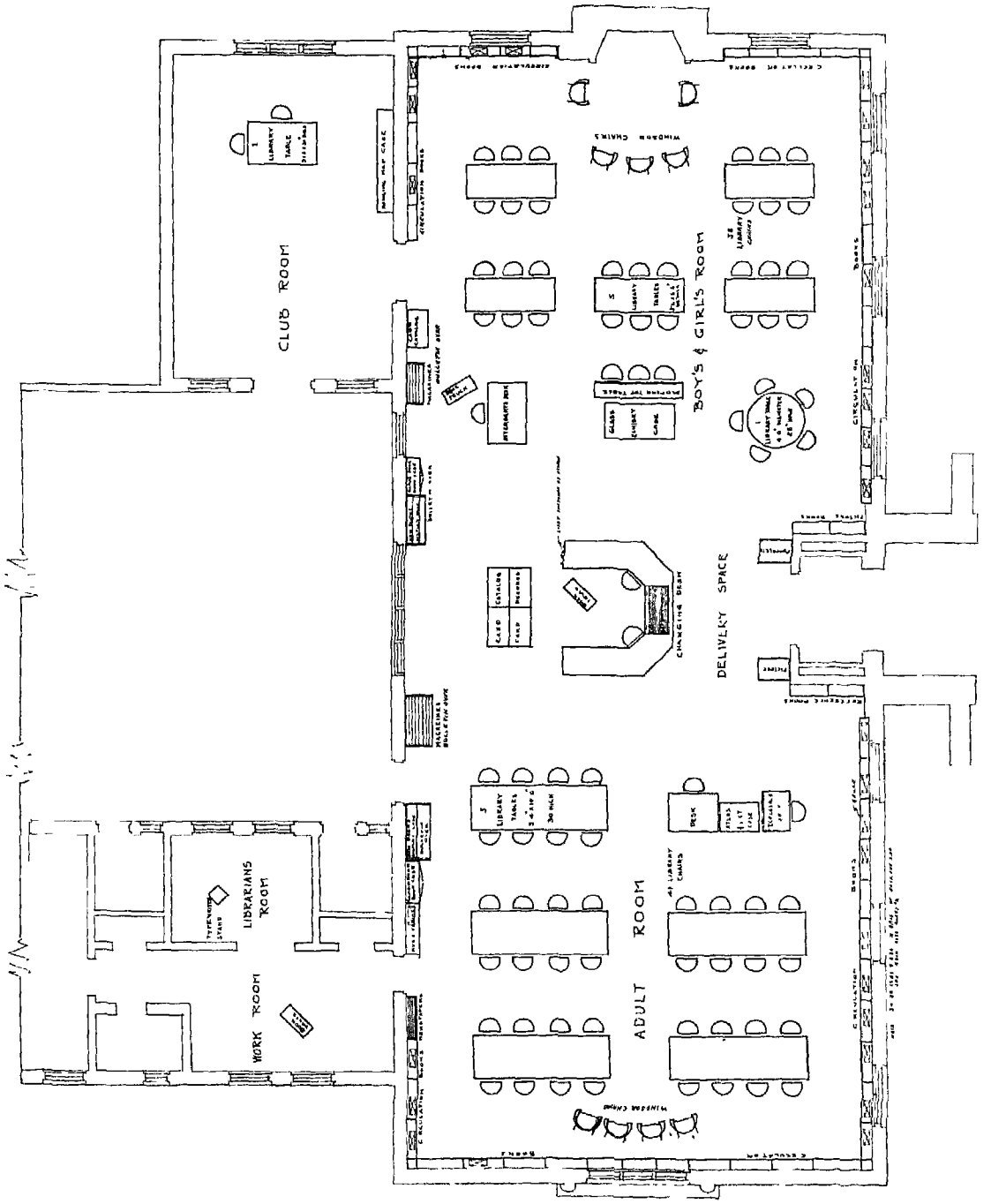
LIBRARY.
6.

Cost—$47 641, Building and Equipment
Floor Space—5,895 Square Feet
Capacity—28,125 Volumes

FRONT (NORTH) ELEVATION

Architect—Royal A. Dana
Style—California Renaissance
Hollow Concrete Block Clay tile Roof

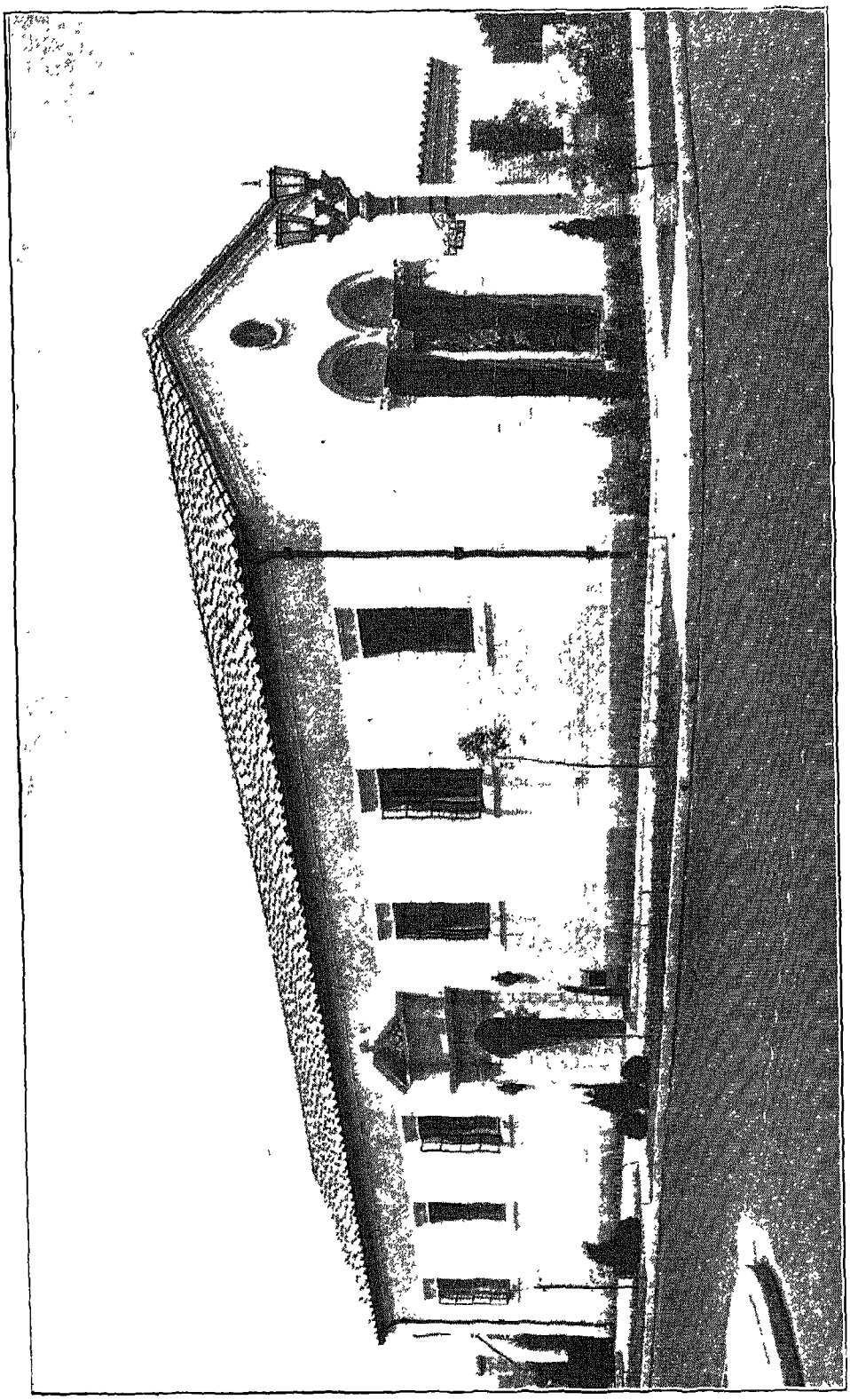
ANGLES MESA
PLATE



FLOOR PLAN.

LIBRARY.
7.

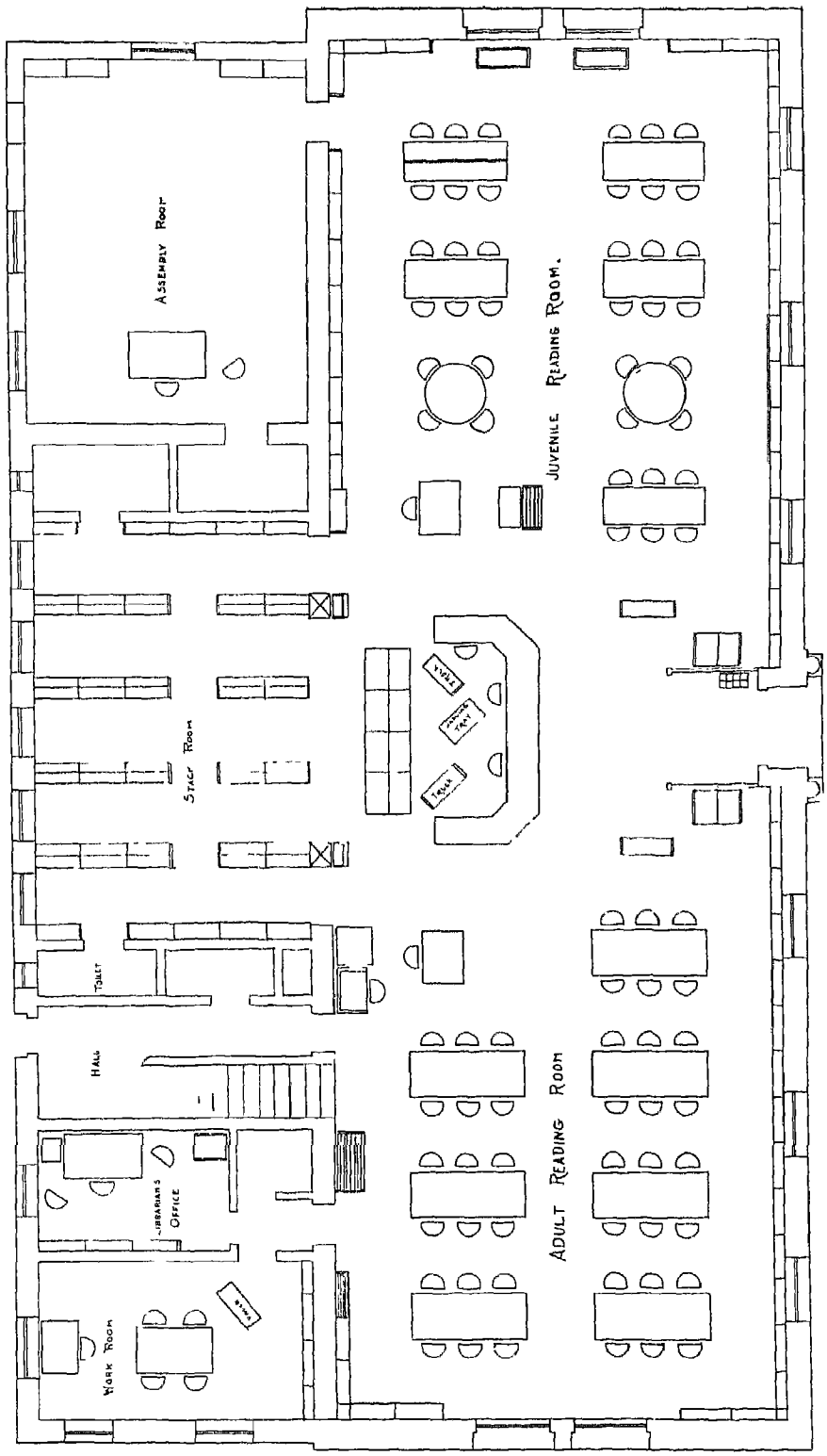
Cost—$10,450, Building and Equipment
Floor Space—4,750 Square Feet
Capacity—14,000 Volumes



FRONT (SOUTH) ELEVATION

Architect—Henry F. Withey
Style—Modified Italian
Brick Clay tile Roof

JOHN MUIR
PLATE



FIRST FLOOR PLAN.

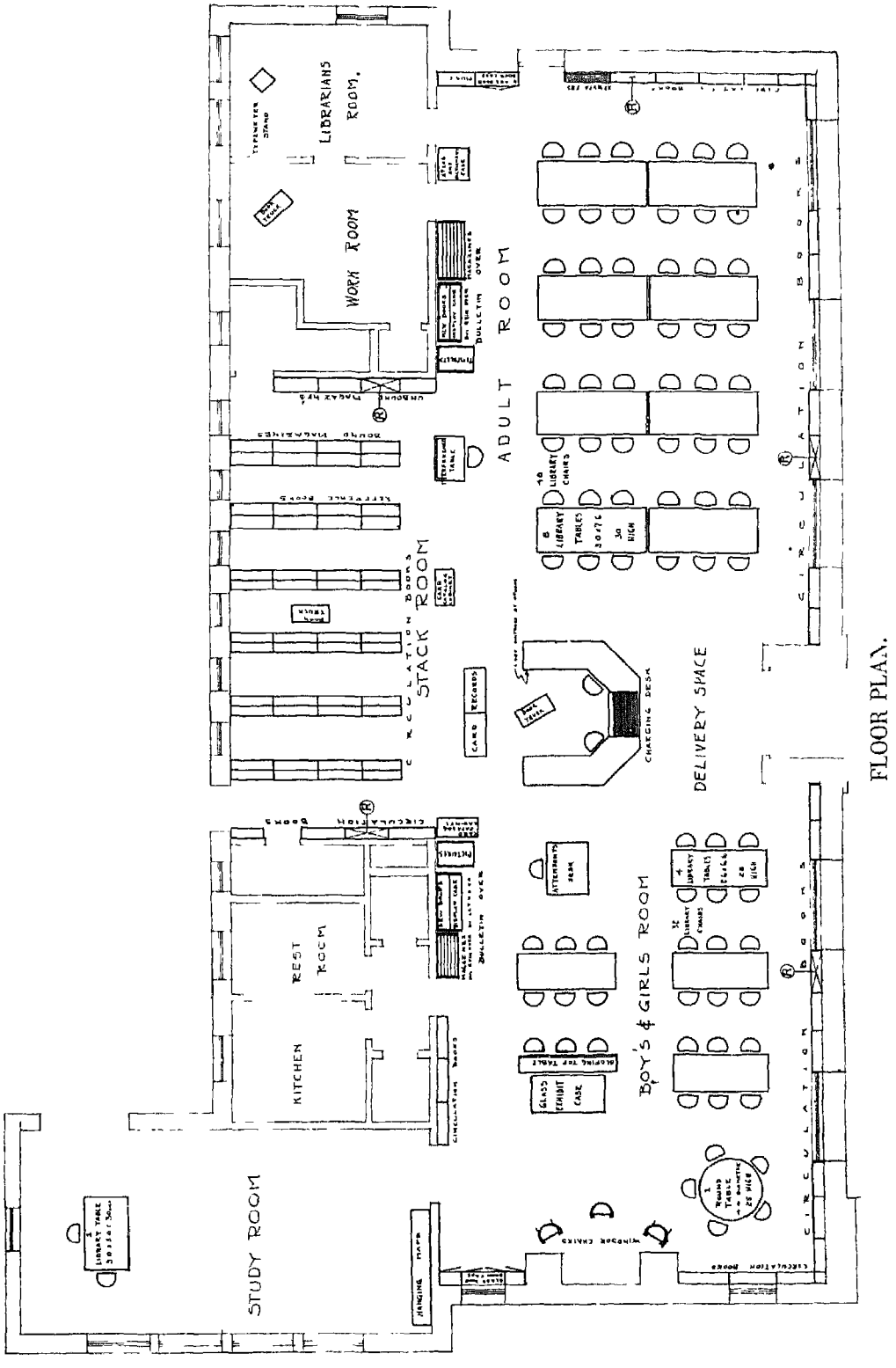
LIBRARY.
3.

Cost—$ 9,167 Building and Equipment
Floor Space—4,608 Square Feet
Capacity—25,875 Volumes

FRONT (WEST) ELEVATION.

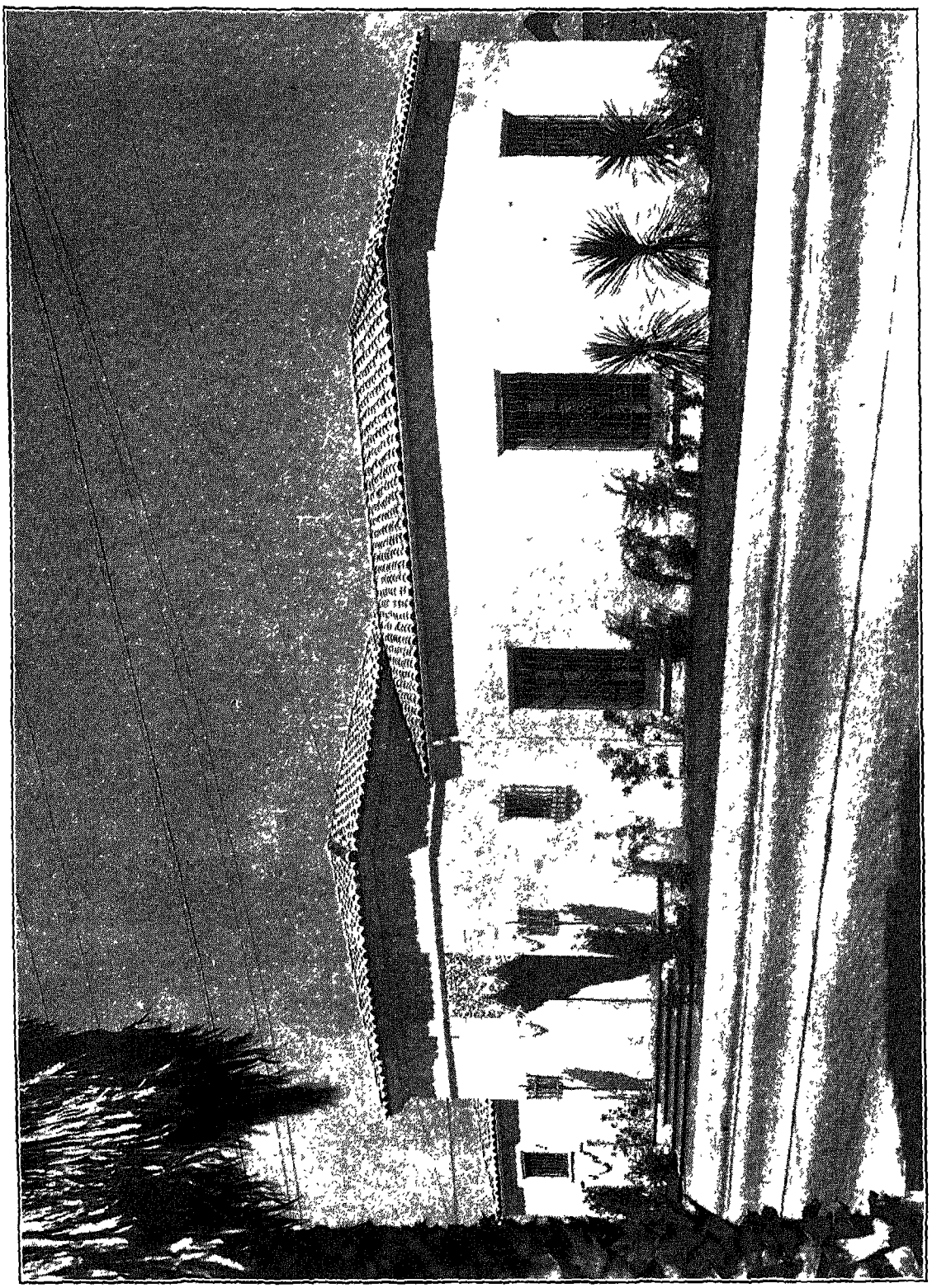
Architect—William Lee Woollett.
Style—Mexican.
Brick. Clay-tile Roof.

MALABAR
PLATE



LIBRARY.
9.

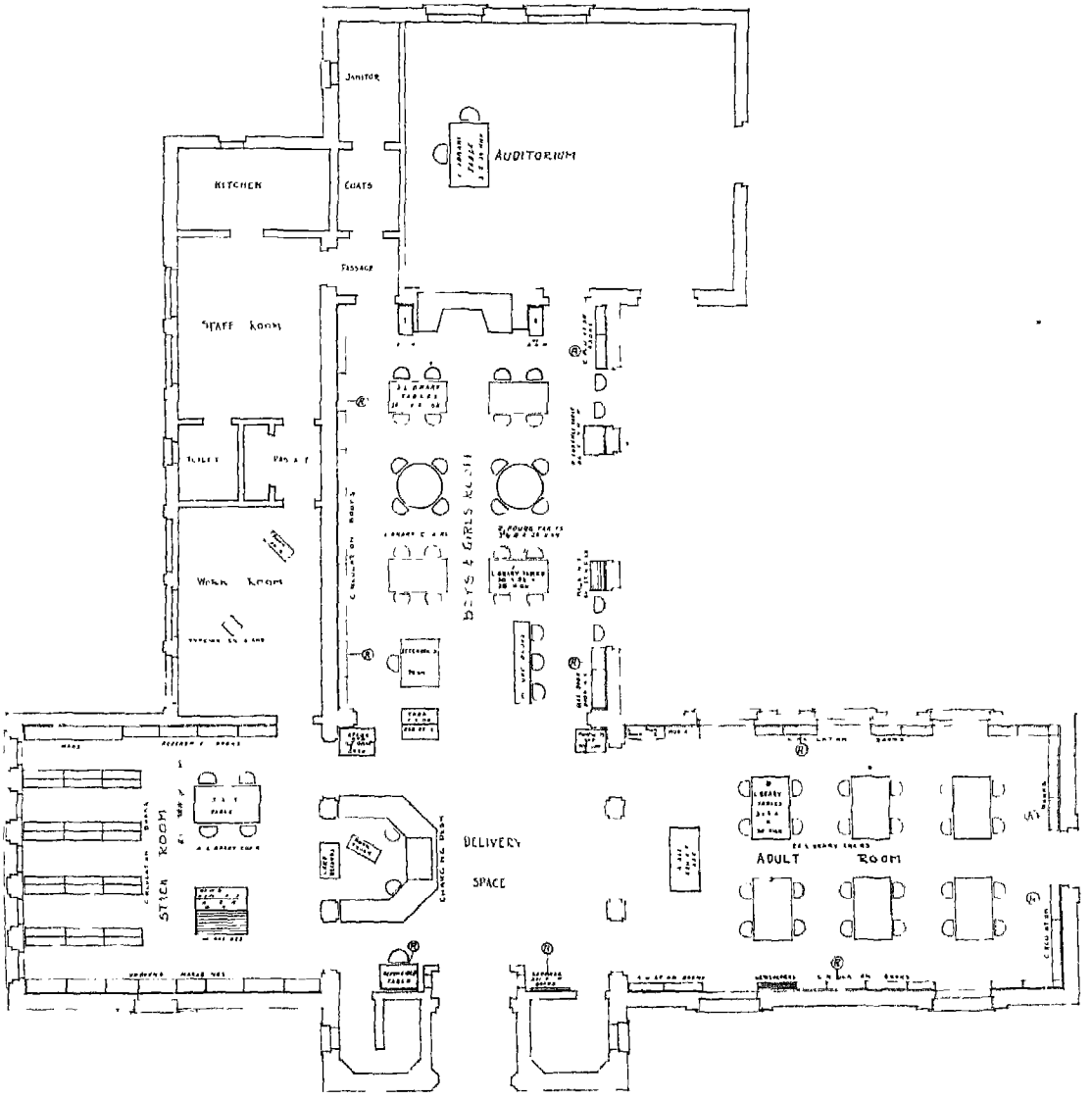
Cost—$18,721 Building and Equipment
Floor Space—4,165 Square Feet
Capacity 25,000 Volumes



FRONT (SOUTH) ELEVATION

Architects—Muston Van Pelt and Maybu y
Style—Spanish Colonial
Reinforced Concrete Clay tile Roof

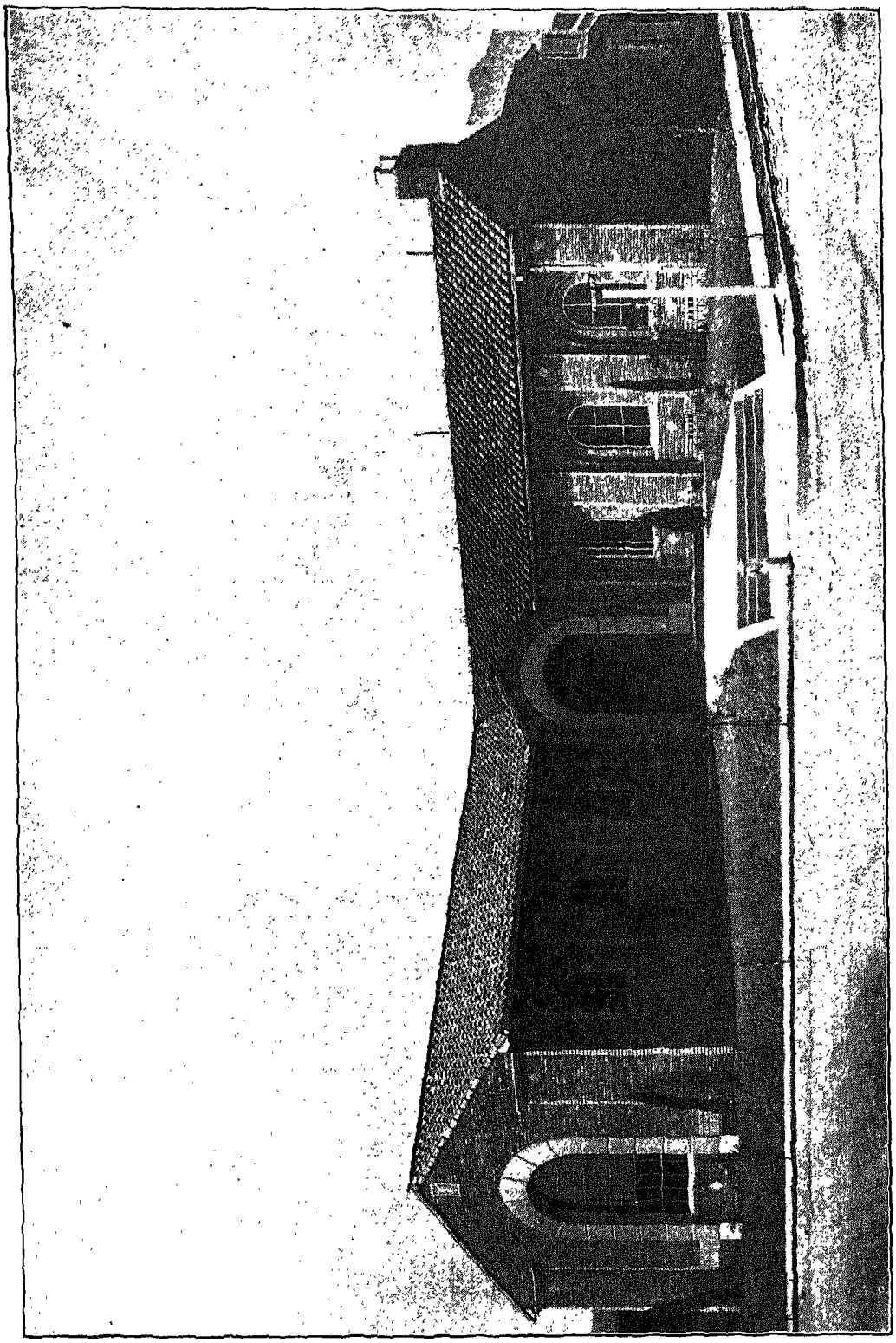
WILMINGTON
PLATE



FLOOR PLAN.

LIBRARY.
10.

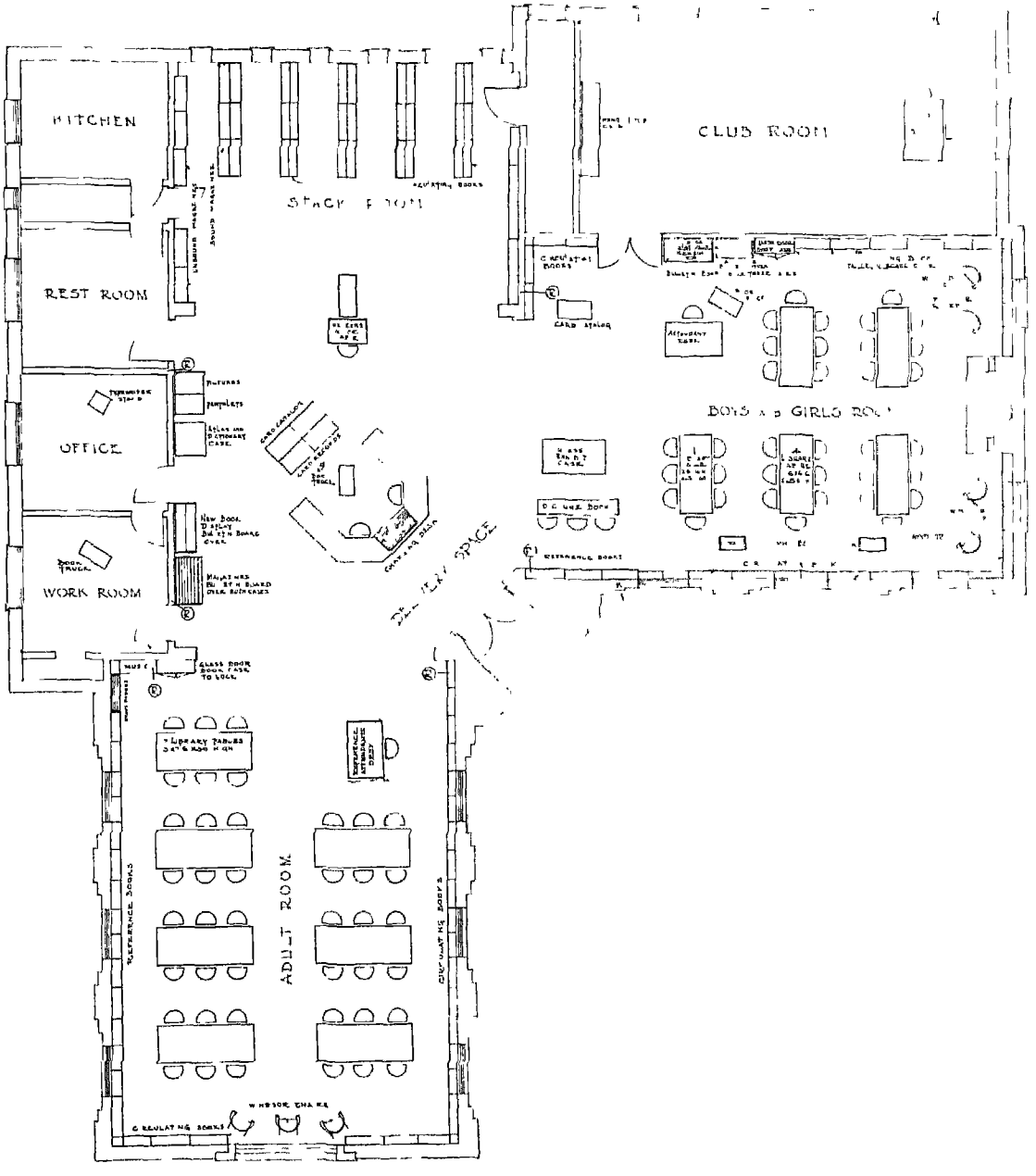
Cost—$18,157 Building and Equipment
Floor Space—3,701 Square Feet
Capacity—25,000 Volumes



FRONT (SOUTHEAST) ELEVATION.

Architect—George M. Lindsay.
Style—California.
Brick, Clay-tile Roof.

ROBERT LOUIS STEVENSON
PLATE



FLOOR PLAN.

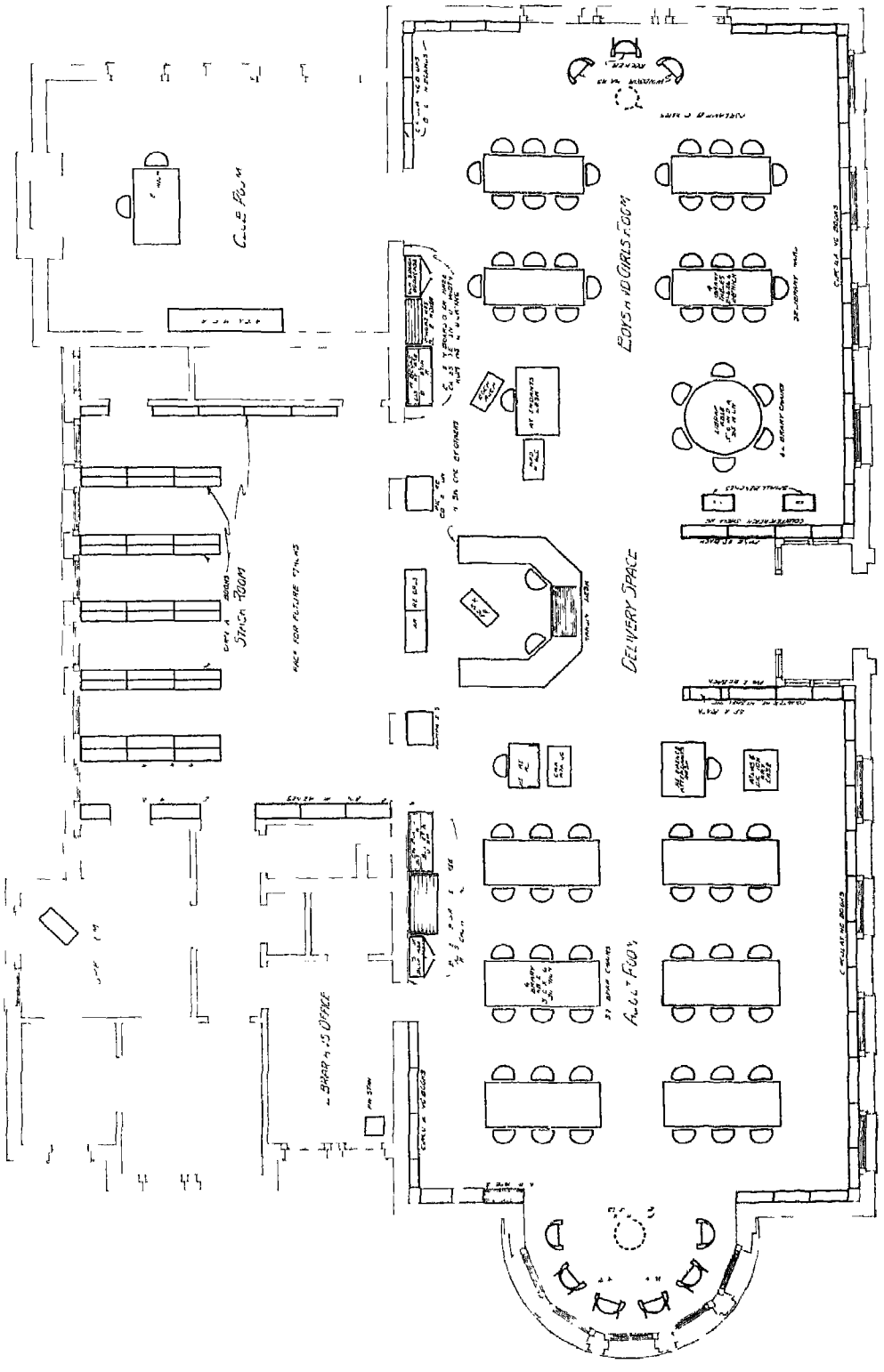
LIBRARY.
11.

Cost $7[illegible] Building and Equipment
Floor Space [illegible] Square Feet
Capacity [illegible],000 Volumes

FRONT (NORTH) ELEVATION

Architects—Allison and Allison
Style—Mediterranean
Brick Hollow Clay Tile and Stucco Clay tile Roof

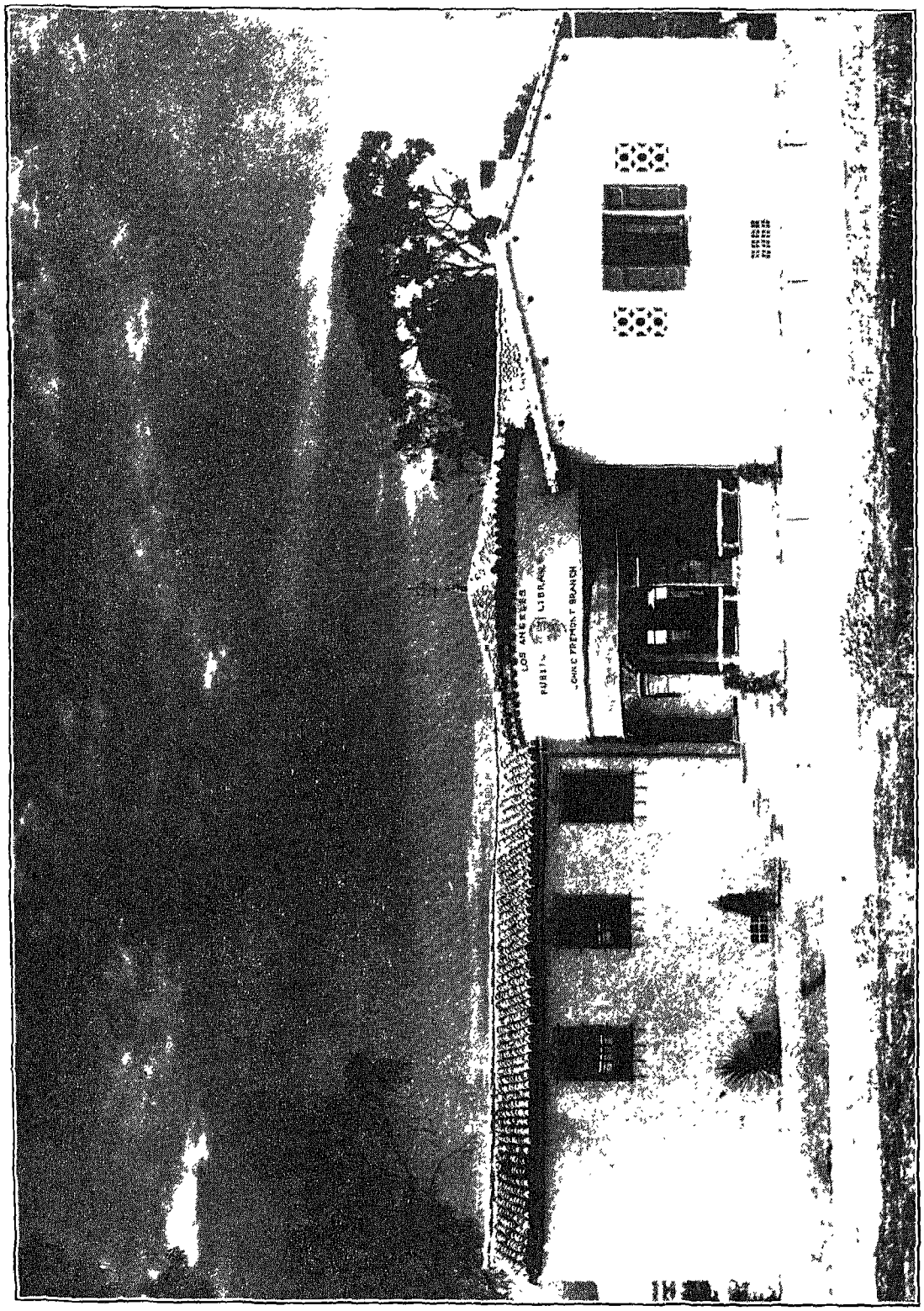
WASHINGTON IRVING
PLATE



FLOOR PLAN

LIBRARY
12

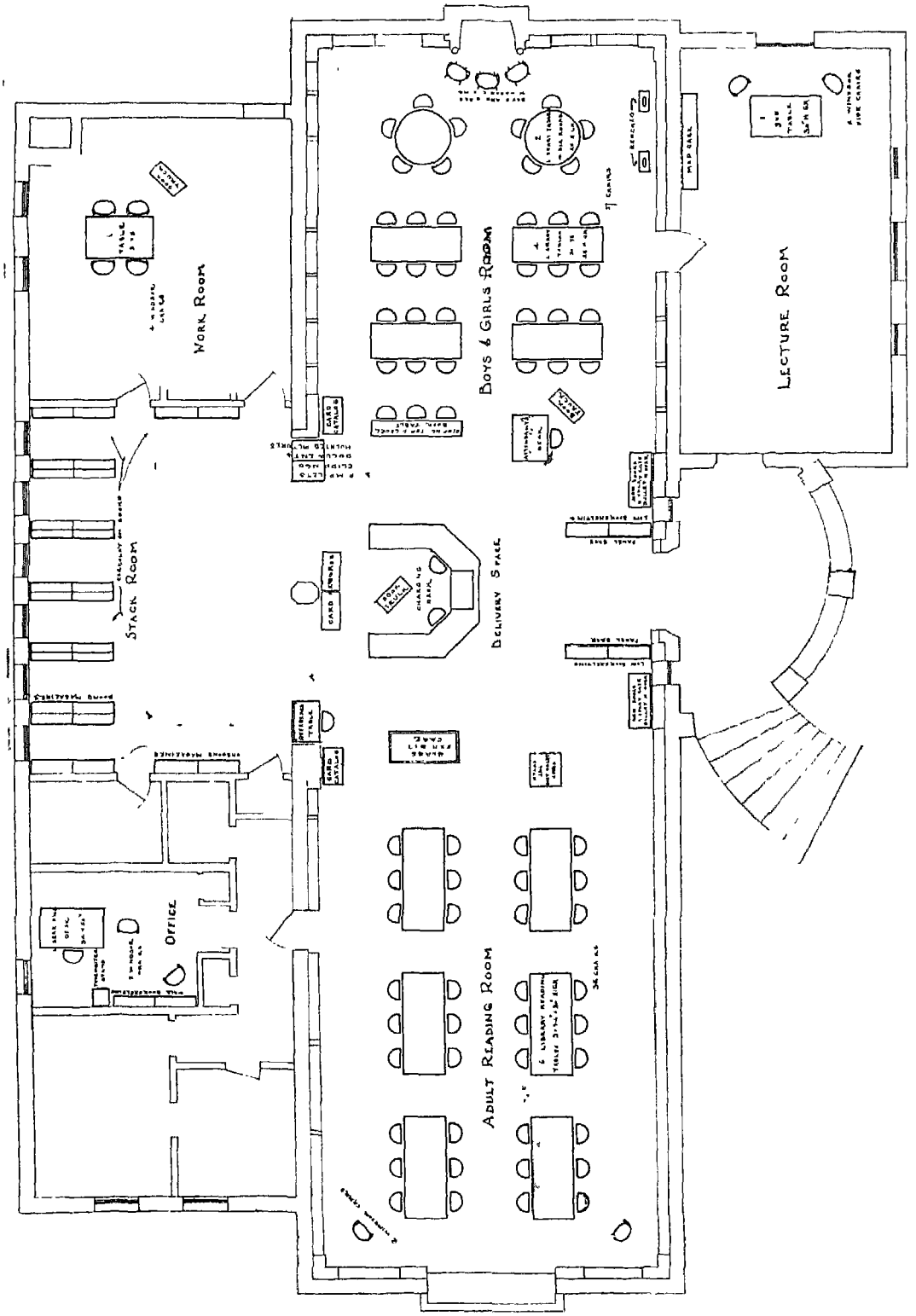
Cost — Building and Equipment
Floor Space — 1918 Square Feet
Capacity — 5,000 Volumes



FRONT (SOUTH) ELEVATION.

Architect—M. J. Baker
Style—Early Italian
Brick stucco, Clay tile Roof

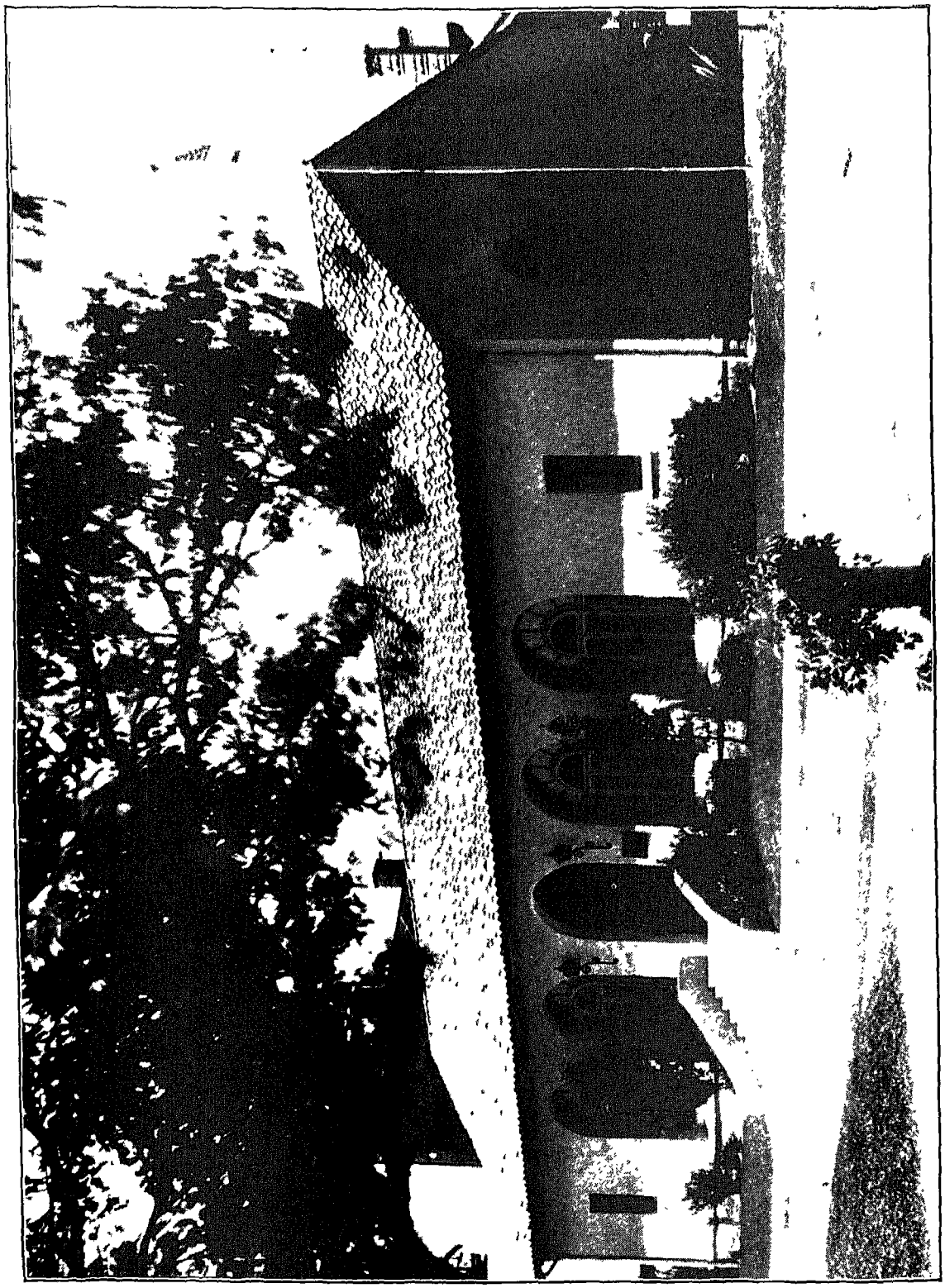
JOHN C. FREMONT
PLATE



FLOOR PLAN.

LIBRARY.
13.

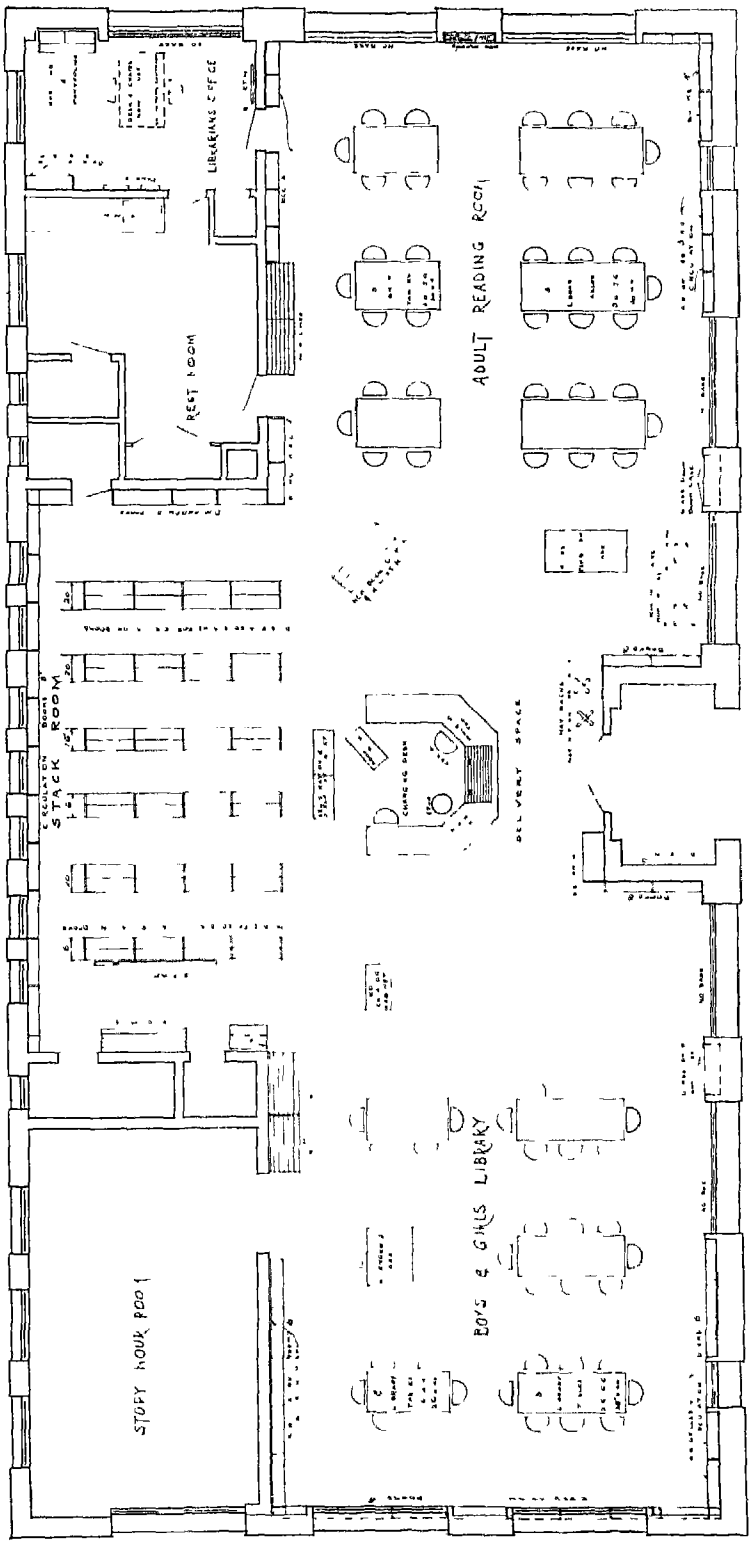
Cost—$35 502, Building and Equipment
Floor Space—4,276 Square Feet
Capacity—24,000 Volumes



FRONT (SOUTH) ELEVATION

Architect—Elmer Gray
Style—Spanish
Brick stucco, Clay tile Roof

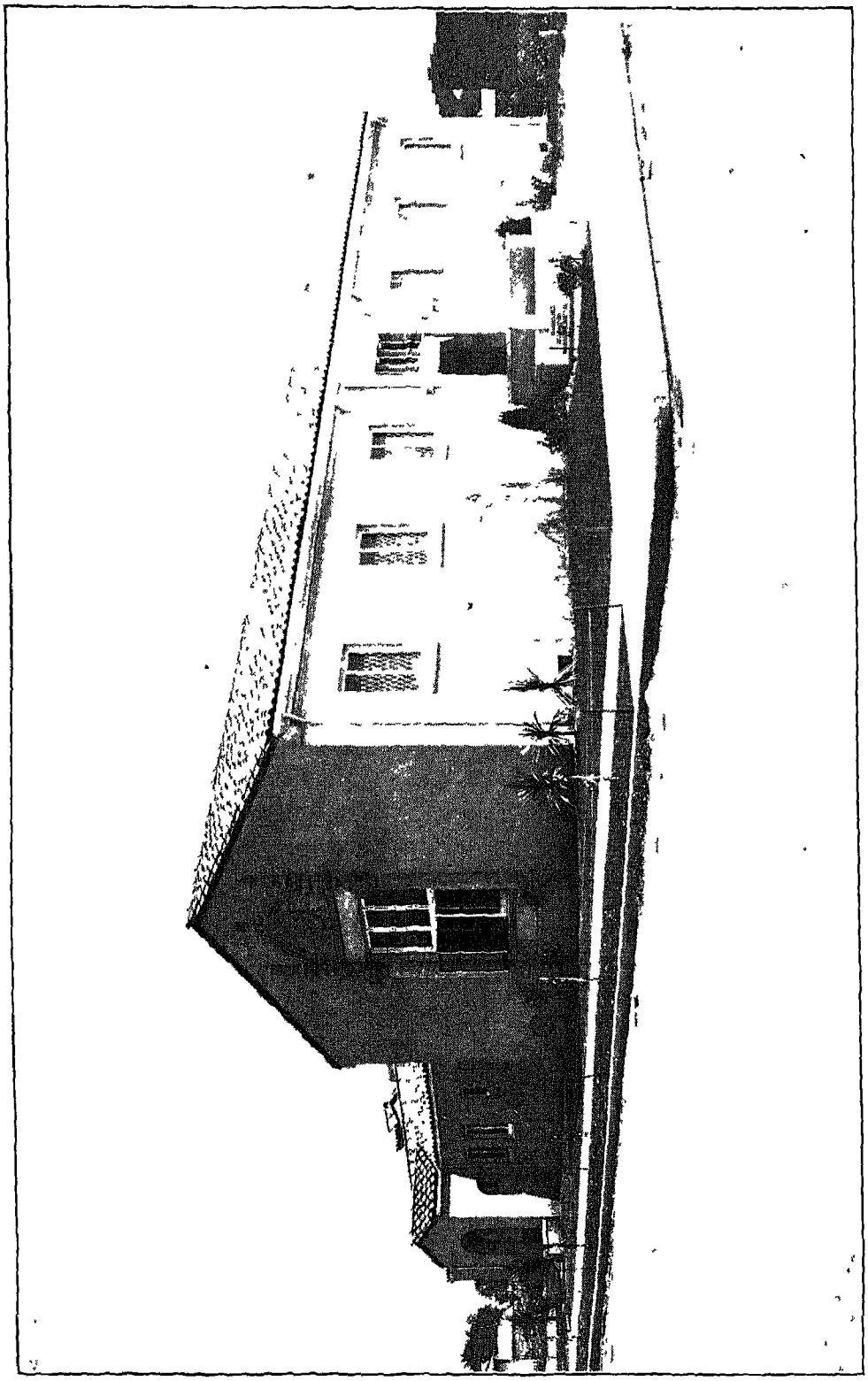
PIO PICO
PLATE



FLOOR PLAN.

LIBRARY.
11.

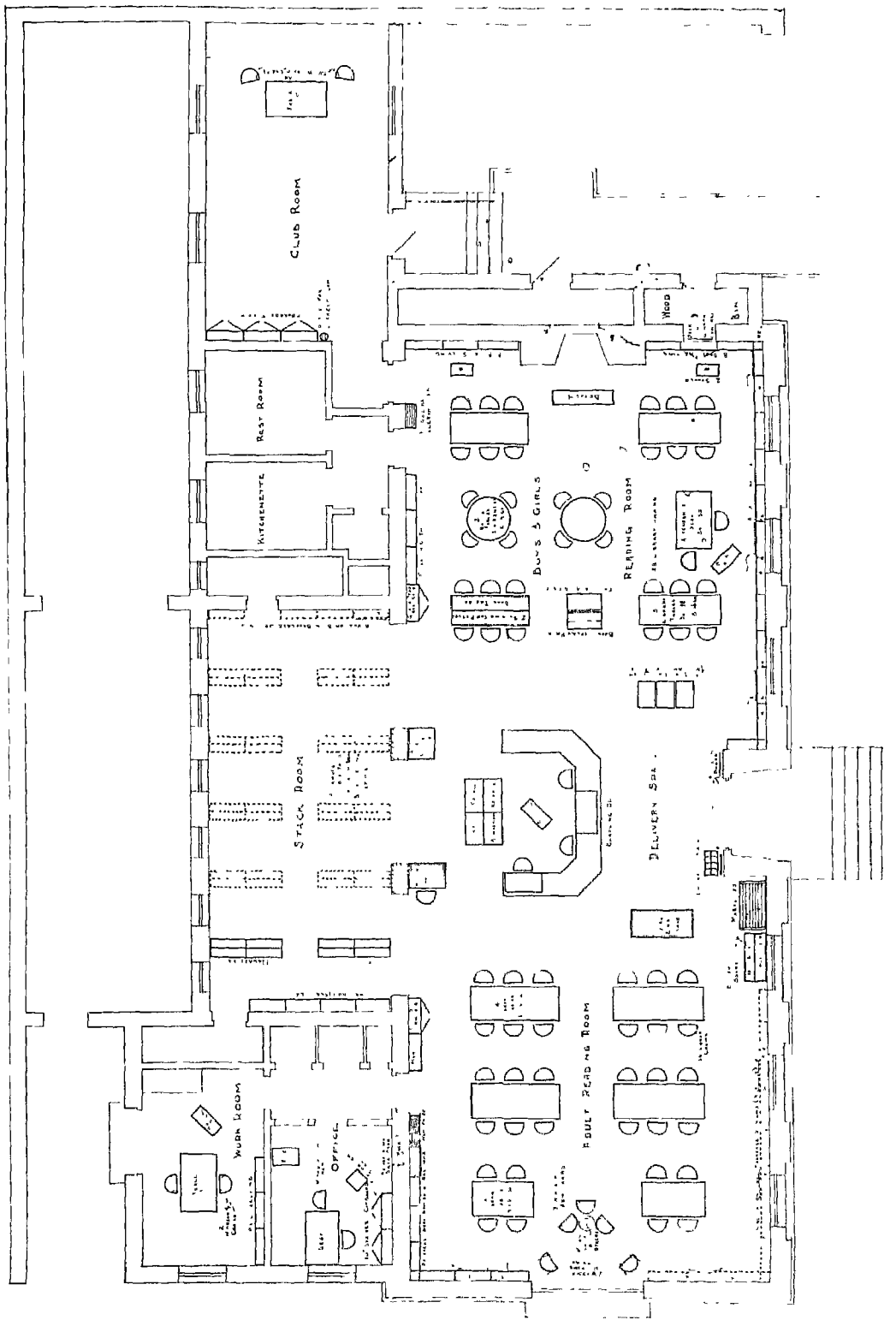
Cost—$15,170, Building and Equipment
Floor Space—4,275 Square Feet
Capacity—15,500 Volumes



FRONT (SOUTH) ELEVATION

Architects—Allison and Allison
Style—Spanish Mission
Reinforced Concrete Clay tile Roof

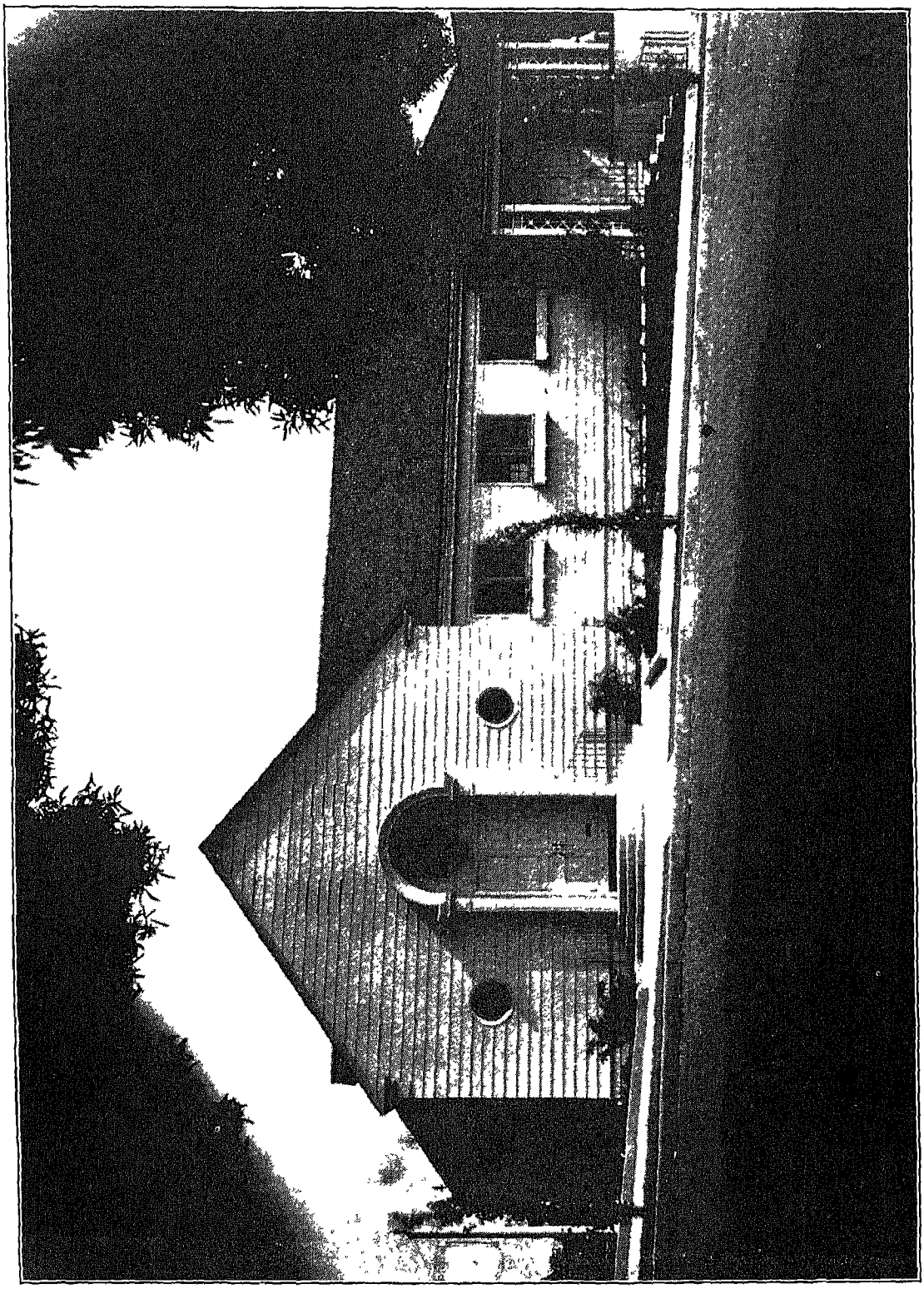
VAN NUYS
PLATE



FLOOR PLAN.

LIBRARY.
15.

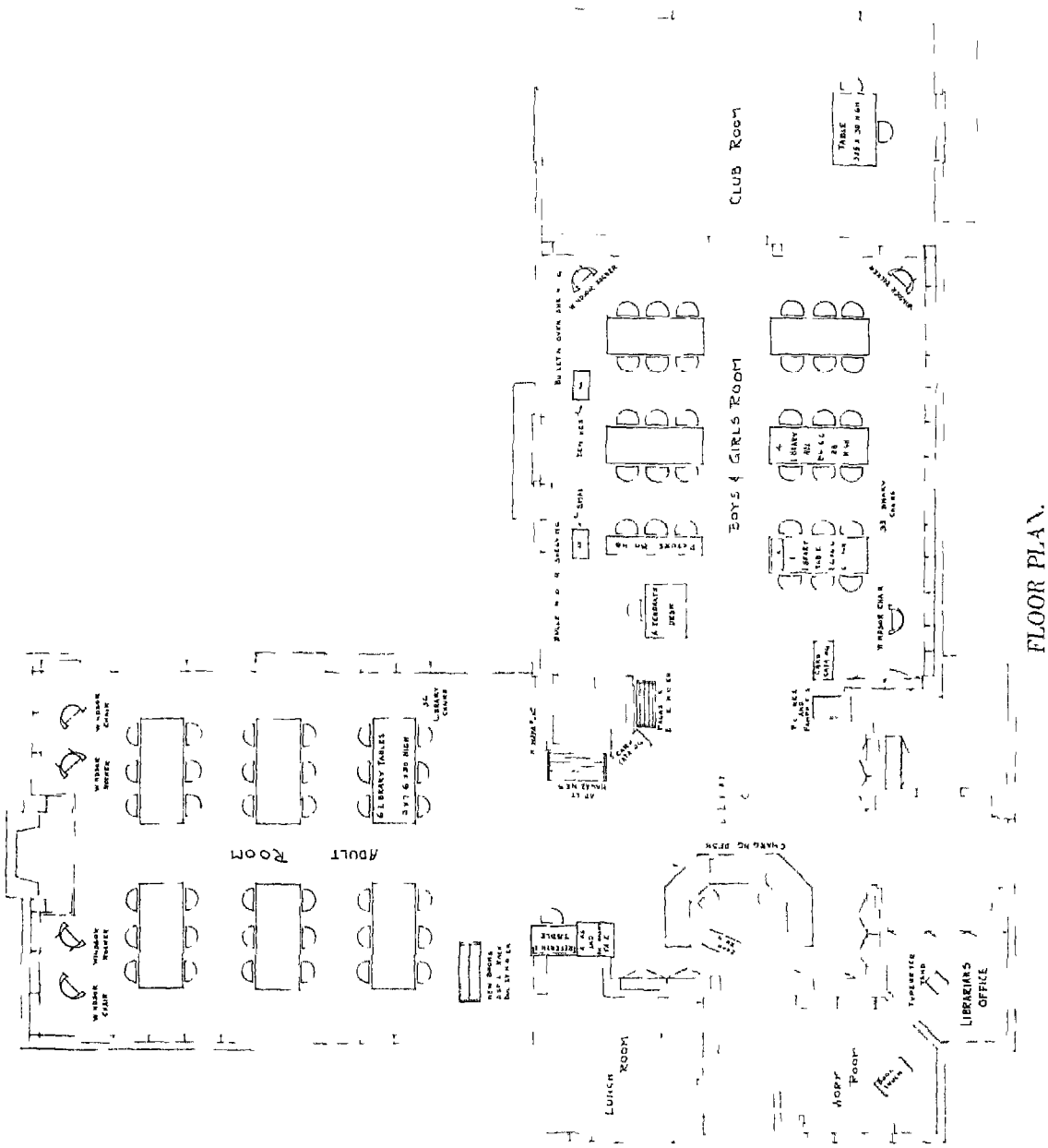
Cost--$15,066, Building and Equipment
Floor Space--1896 Square Feet
Capacity--10,416 Volumes



FRONT (NORTH) ELEVATION

Architect—Harry S. Bent
Style—New England Colonial
Wood-frame, Wood-shingle Roof

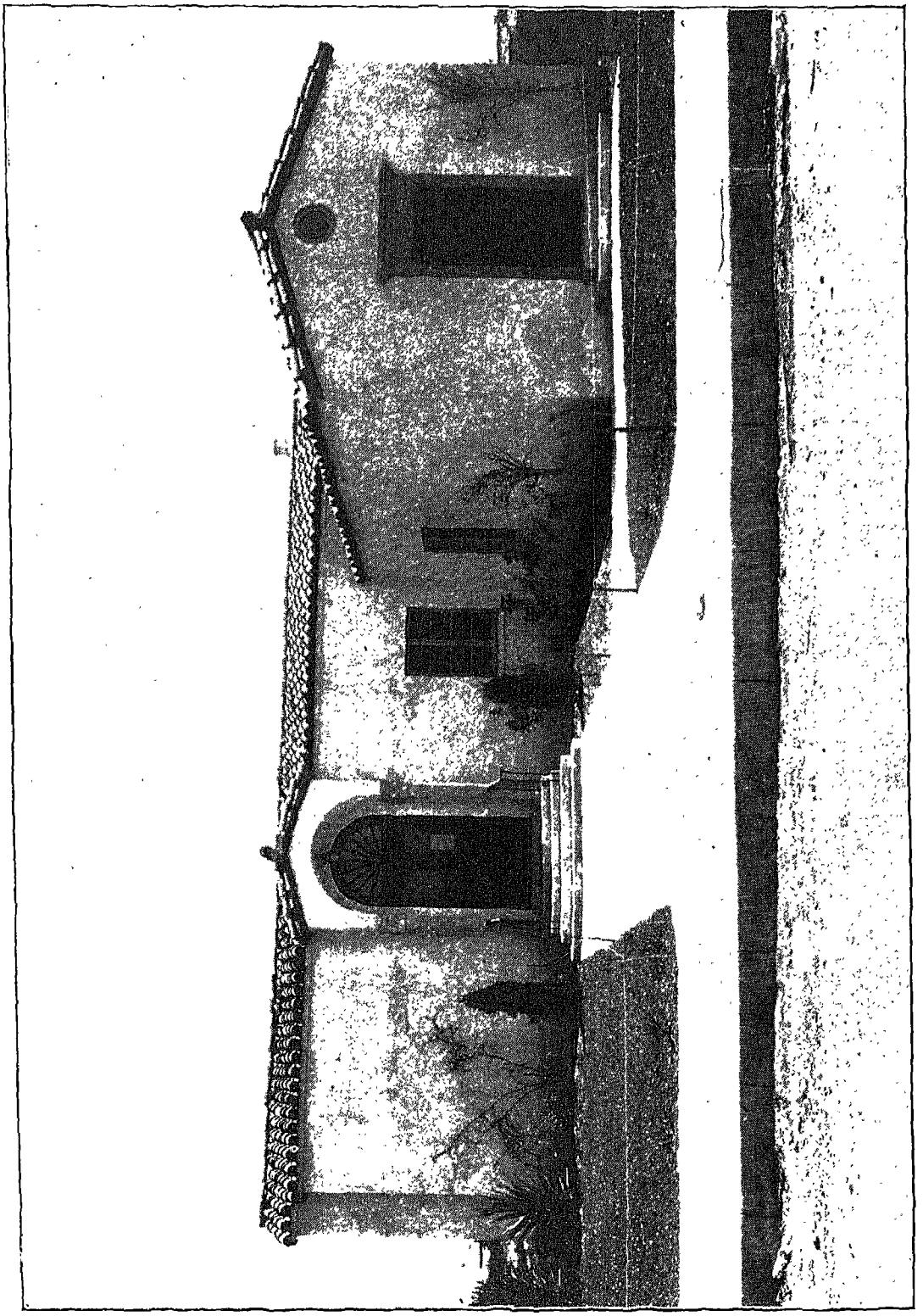
RICHARD HENRY DANA
PLATE



FLOOR PLAN.

LIBRARY.
16.

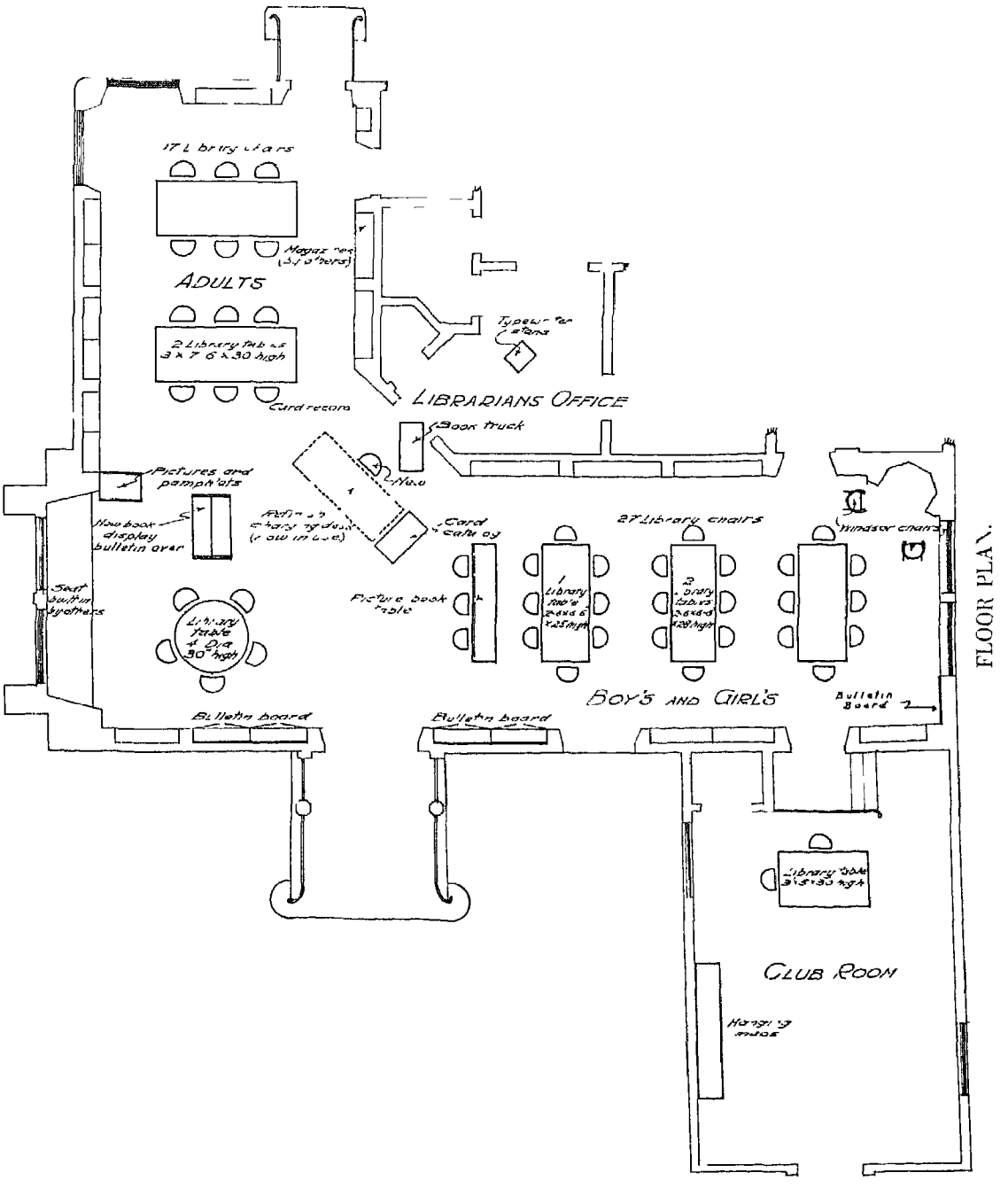
Cost—$ 7,737 Building and Equipment
Floor Space 1,080 Square Feet
Capacity—10,000 Volumes



FRONT (WEST) ELEVATION.

Architect—Armand Monaco.
Style—Italian, (Tuscan).
Frame-stucco, Clay-tile Roof.

CANOGA PARK
PLATE



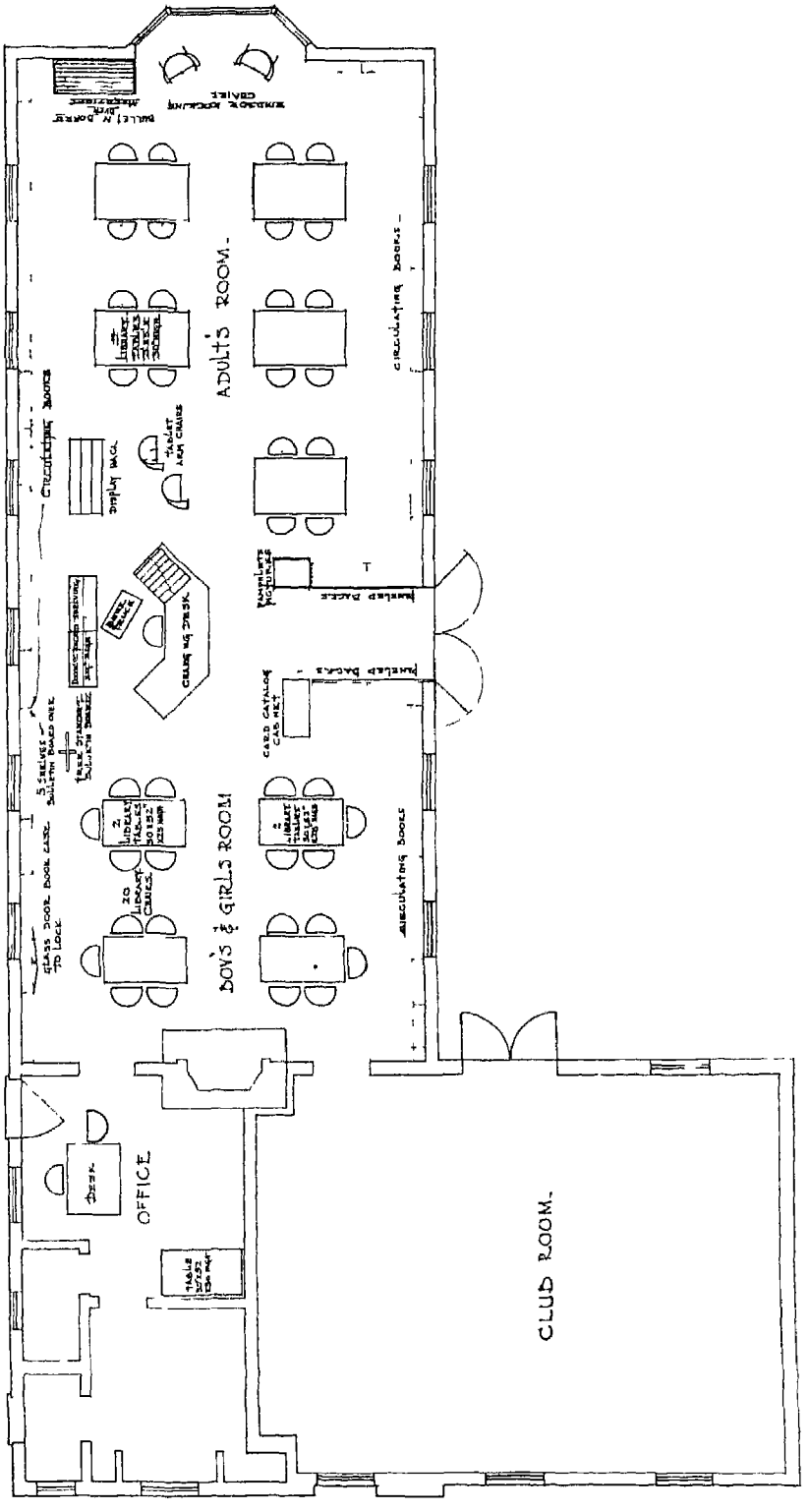
LIBRARY.
17.

Cost $1 150 Building and Equipment
Floor Space—1 710 Square Feet
Capacity —9 000 Volumes

FRONT (SOUTH) ELEVATION

Architects—Weston and Weston
Style—Mexican (Colonial)
Wood frame Wood shingle Roof

ALESSANDRO
PLATE



FLOOR PLAN

LIBRARY.
13

Cost—$11,75[illegible] Building and Equipment
Floor Space—2,057 Square Feet
Capacity—5,[illegible]00 Volumes

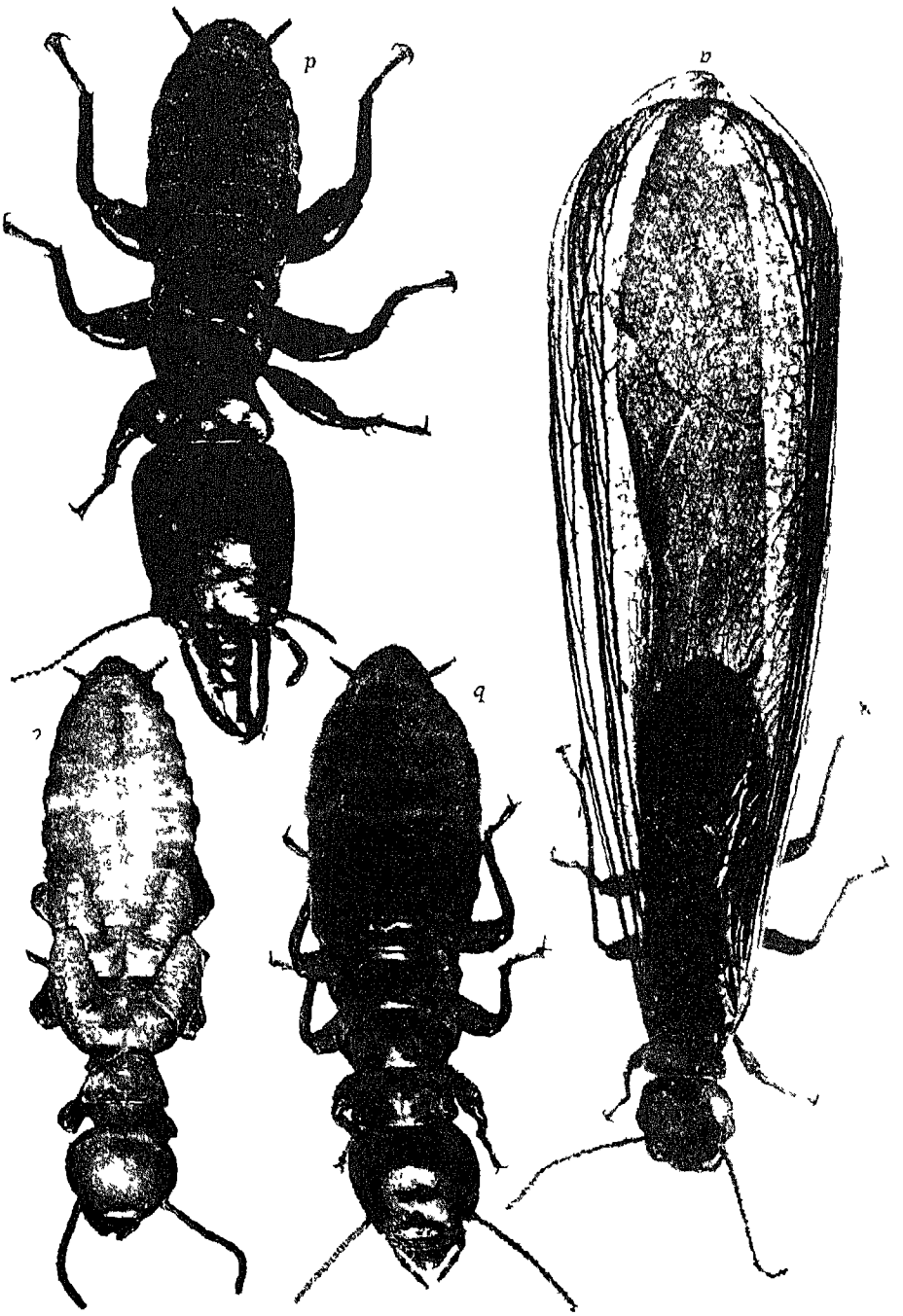


Fig. 1. TERMITE CASTES. (Termopsis greatly magnified.)
a. Winged reproductives. b. Nymphs immature soldiers. c. Nymphs immature reproductives with wing pads. d. Soldiers with large armored heads and enormous mandibles.

PLATE 19

Fig. 2.—Distribution of Subterranean Termites (Reticulitermes and Heterotermes) in the United States.

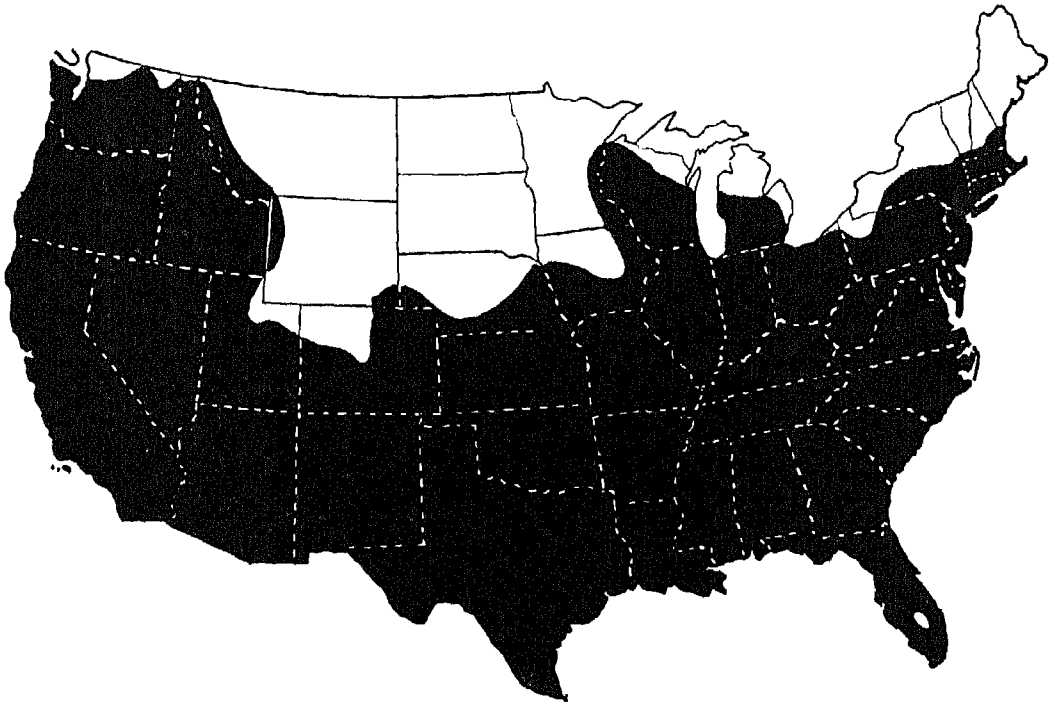


Fig. 3.—Distribution of Wood-dwelling Termites (Termopsis, Kalotermes and Neotermes) in the United States.

PLATE 20.

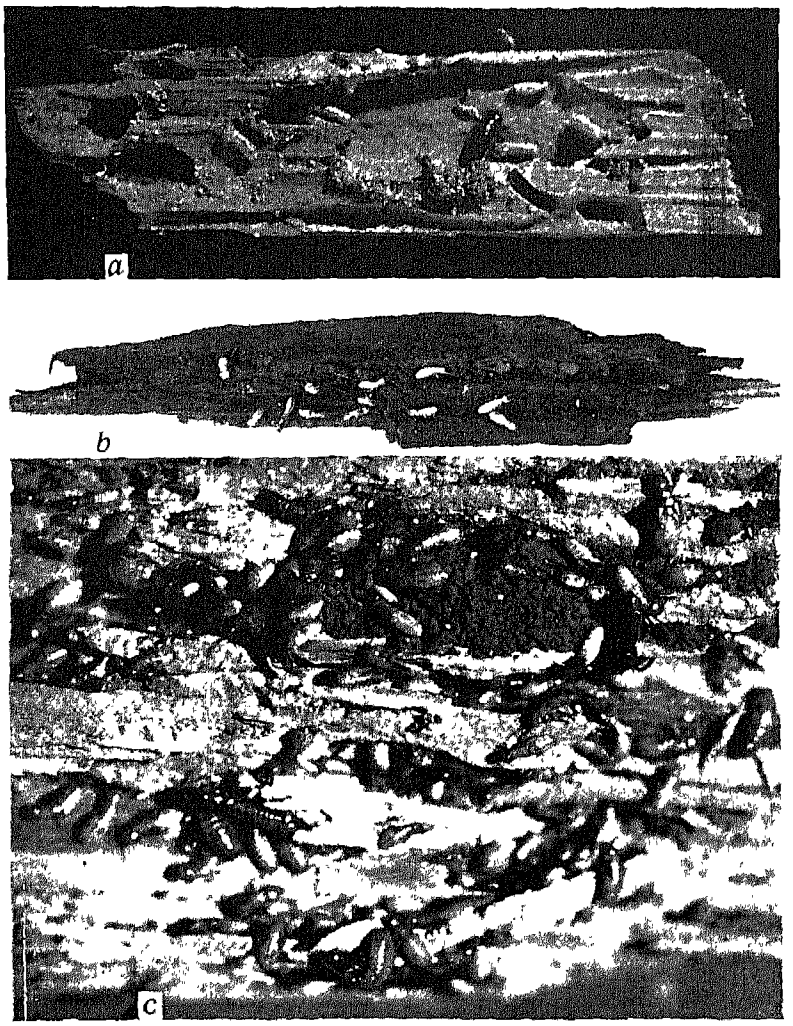


Fig 4 PACIFIC COAST TERMITES (Natural Size)

a Dry wood Termites (Kalotermes Minor) b Subterranean termites (Reticulitermes Hesperus) c Damp wood Termites (Termopsis Angusticollis)

Fig 5 DRY ROT VERSUS TERMITE RAVAGES

a Characteristic attack of funguous dry rot b Cavities in wood eaten out by termites

PLATE 21.

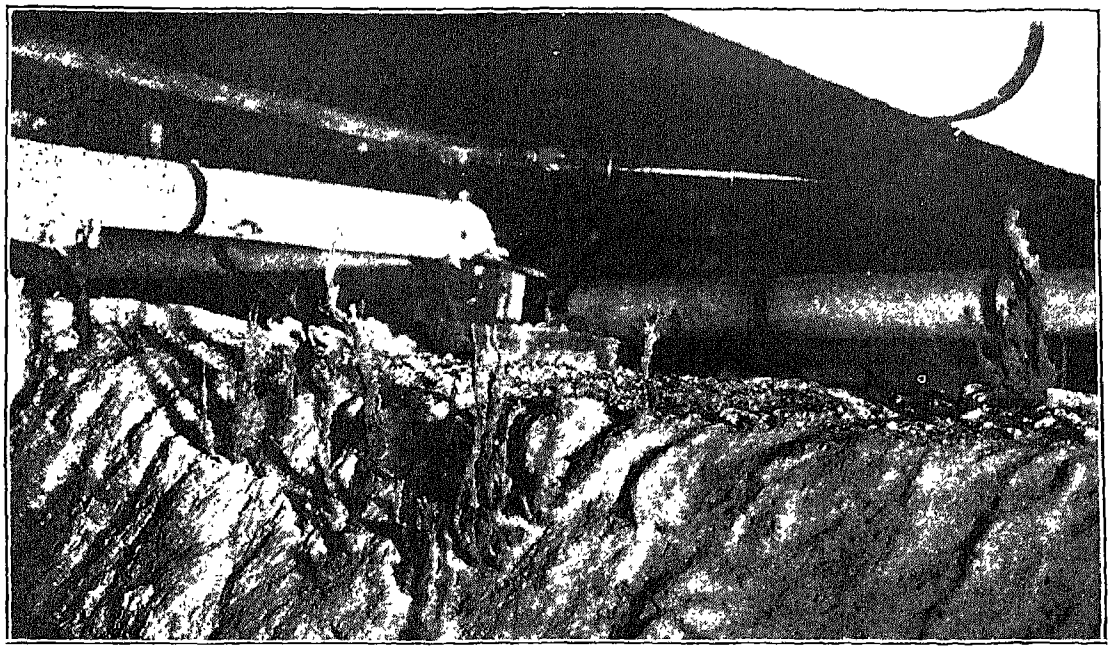


Fig. 6 SUBTERRANEAN TERMITE PIPES AND CHIMNEYS.

Showing Subterranean Termite tunnels, pipes and chimneys extending from the ground upward toward floors and floor joists above. These pipes and chimneys are found in warm locations near furnaces and flue-foundations beneath buildings.

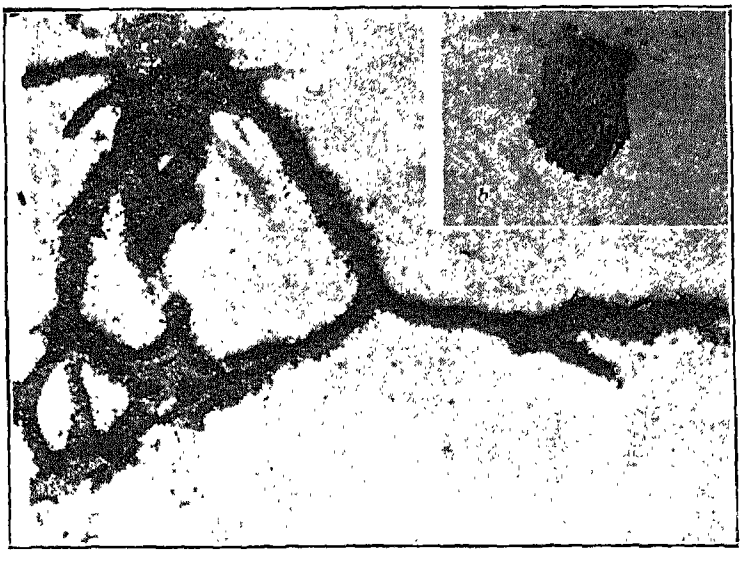


Fig. 7 SUBTERRANEAN TERMITE TUNNELS

a. Tunnel made in one night. b. Showing fragments of wood, earth, etc., from which tunnel is made

PLATE 22.

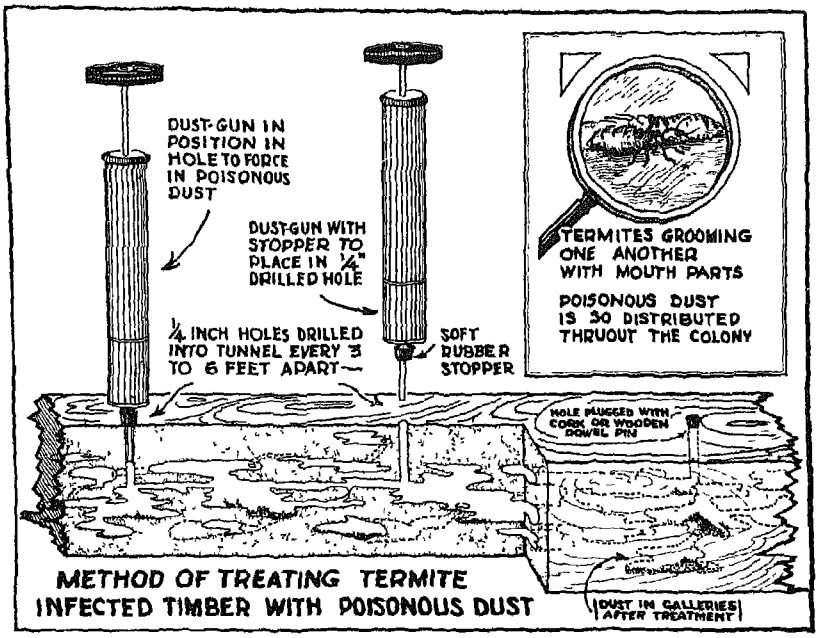


Fig 8 WOOD-DWELLING TERMITE TREATMENT

a, Shows the method of blowing poison dust into holes bored in the infested wood. b Shows termite habit of g ooming one another.

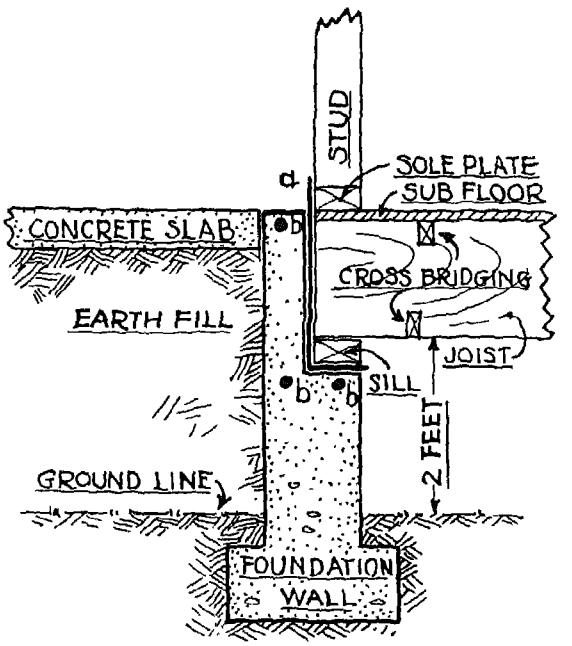


Fig. 9. CONCRETE FOUNDATION TREATMENT

Showing method of protecting wood floor system, resting on concrete foundation, by means of sheet metal shield

PLATE 23.

APPENDIX A.

FINANCING BY BOND ISSUES

(NOTE: This article is re-printed by special permission of its author, Miss Helen T. Kennedy, former second Assistant Librarian, Los Angeles Public Library.)

BOND CAMPAIGNS. Efforts to raise the special Library four-mill tax on each $100-valuation of city property to a higher seven-mill rate were successfully made, by printing a slip of paper about the size of a sheet from the annual report, and distributing this by thousands. This gave a study of the work accomplished by the Library on its limited income, and ended with a comparative table showing the various income, expenditures, book stock, number of borrowers, and circulation of books of eight to ten of the larger libraries in the country.

BOND CAMPAIGN OF 1921. The Board of Commissioners asked the City Council to put on a bond campaign of $3,750,000.00. This was cut by the City Council to $2,500,000.00 and placed on the calendar of June 7, 1921 at a special election. Two million was for the Main Library and $500,000.00 for branches. There was practically no opposition and the people registered a large vote, in fact, a record vote for a bond campaign.

Immediately the Library organized a campaign force, embracing every worker in the library system, from Directors to pages, and entered a period of four weeks devoted to intensive, continuous publicity designed to bring home to every resident of Los Angeles the reasons of practical economy and civic interest that made a central library building an imperative necessity. This campaign was carefully planned, elaborate and comprehensive. Committees of the staff were appointed to handle the various activities undertaken, which covered:

Newspaper advertising;
Publicity through the library, by means of exhibits, slips in books, special seals, and other devices;
Publicity through clubs, by addresses and printed material;
Motion picture advertising;
Publicity work with merchants and manufacturers, trade unions, and technological associations;
Publicity work with religious organizations;
Advertising in foreign sections of the city;
Miscellaneous advertising;
Theater program advertising;
A committee to secure speakers; and
A committee to interview the various candidates for local offices and enlist their support of the library measure.

At the outset, prospects were not encouraging. There were six bond issue propositions on the ballot, totaling twenty-four million dollars; business and industrial conditions rendered any larger increase of public expenditures more than doubtful, while the fact that a two-thirds vote is required to carry any bond issue made the outcome still more uncertain. There was no attempt to ignore or minimize these difficulties. The spirit of the library workers rose to meet and overcome them, strengthened by the growing realization that through its years of earnest, friendly service to the citizens the Library had built up a reserve force of public goodwill that now had opportunity for practical expression. As the days went on, it became evident that the library campaign was meeting with ever-increasing approval and support. Every newspaper in Los Angeles endorsed and opened it columns to the library cause. The motion picture companies gave valuable aid. They prepared an original "library film," staged in the overcrowded library quarters in the Metropolitan building, showing the congestion and discomfort to the public, the piled-up books, and the closely-packed readers. This was shown during the last week of the campaign in ten leading theaters throughout the city, and scores of others ran at every performance, a slide giving important facts concerning the library's need of a suitable building. On the Sunday before the election, clergymen in churches of every denomination preached on the value of the library to the public and urged support of the bond issue. The campaign, in all its elaboration, was carried through with unflagging enthusiasm and efficiency. Speeches were made by members of the library staff in every variety of meeting-place — clubs, churches, factories, stores, and institutions; the Directors not only carried the appeal to many leading organizations, but raised a substantial special campaign fund; and the Librarian made over forty address to different bodies from the City Club of Los Angeles to the men of the shipyards at San Pedro.

An immense amount of valuable publicity material was produced. Members of the staff contributed articles, long and short, which were sent to every newspaper, periodical, business, religious or institutional publication, not only in Los Angeles but through urban cities and towns; these were widely used, and helped create interest and sympathy among thousands of voters. An effective campaign poster was designed by a commercial artist who had used and profited by the Library's art department. Space on billboards was freely given by Foster and Kleiser, a leading billboard firm of the city. Mr. William Gale, well-known cartoonist of the Los Angeles Times, donated a clever cartoon

for a circular of which 200,000 were distributed by Boy Scouts and others to virtually every house in Los Angeles. Another effective circular was designed for the Library by Bullock's department store, and 50,000 of these were distributed through department store packages and in other ways. Automobile stickers, window-placards, every kind of up-to-date device for holding and informing the public mind, was availed of. Weekly, and at the last, daily, meetings were held of the various library committees, to impart fresh suggestions and to stimulate enthusiasm. And the final effort was made on the day of the election, when most of the 755 voting precincts were named by library workers, to give any information that might aid the library cause. Everywhere the public response was cordial and sympathetic. Encouragement and friendly appreciation for library services rendered cheered and strengthened the workers all through this crowded and exhausting campaign which, it must be remembered, was carried on in addition to the full every-day routine of library duty.

Of the six bond issues on the ballot all but two were defeated. The Library bonds carried by a vote of 63,852 to 25,234. The Harbor bonds were also successful, by a vote of 56,172 to 26,298. In this great affirmative vote for a central library Los Angeles for the first time pledged itself to the erection of a fine municipal building. There is a special opportunity and a special responsibility in this fact, for it means that the new library building in architectural beauty and dignity must set a standard to which other municipal structures may later conform.

BOND CAMPAIGN OF 1923. The Council approved a bond issue of $500,000.00 on the city election of June 5, 1923. The vote stood 62,123 to 14,388. This money was devoted to the purchase of additional frontage on the Flower Street side of the Library property, assuring a stately and spacious approach and greatly enhancing the beauty of the building.

BOND CAMPAIGN OF 1925. The bond issue approved by the City Council of $500,000.00 for the building of branch libraries placed before the people June 2, 1925, was carried to success by a vote greater than the two-thirds majority required. In the campaign in support of the bonds, the Board of Library Directors gave freely of time and effort, participating in the zeal and energy of the whole library personnel. Mr. Frank H. Pettingell's wide financial interests were utilized to bring substantial contributions to the library campaign fund, and special mention should be made of the services of Mrs. Smith, as able chairman of the staff committee in charge of co-operation with clubs, and of Mrs. Zahn, who gave of her wide experience to the staff committee assigned to work with civic, social and fraternal organizations. The success of this bond issue made possible the execution of a carefully worked out program that established small, attractive and adequate branch libraries in many sections of the city eager for book service and heretofore insufficiently supplied.

With the close of the year the library functioned under the provisions of the city charter and entered into a revenue more commensurate with its needs and opportunities. It was a matter of much satisfaction to the Board of Library Directors to be thus enabled to give deserved recognition to the admirable service of the library personnel by the adoption of a new salary schedule, which granted increases to heads of departments and branch principals and set the salaries of trained workers in the various grades on a plane that must raise standards of efficiency thruout the library system.

APPENDIX B.

INSTRUCTIONS TO ARCHITECTS.

Index.

Paragraph	Subject	Paragraph	Subject
1.	General.	14.	Fireplace.
2.	Duties of the Architect.	15.	Hollow Metal Doors.
3.	Plot Survey and Soil Tests.	16.	Incinerator.
4.	Outline.	17.	Concealed Safe.
5.	Design.	18.	Sink, Drain-board and Hot Plate Shelf.
6.	Full-size Details — Finish and Color Scheme.	19.	Base.
		20.	Gutters and Downspouts.
7.	Alternates.	21.	Finish Hardware.
8.	General Permit.	22.	Electrical Design.
9.	Precautions Against Settling.	23.	Plumbing Design.
10.	Precautions Against Earthquakes.	24.	Air Conditioning.
11.	Concrete Design.	25.	Lighting Fixtures.
12.	Street Side-walk.	26.	Payment.
13.	Carpentry Design.		

1. **GENERAL.** These instructions are for the guidance of Architects only in the designing and the preparation of plans and specifications for any public library building.

2. **DUTIES OF THE ARCHITECT.** It shall be the duty of the Architect, under these specifications:

a. In conjunction with the Librarian and the Library Board, to prepare an "Outline" as set out in detail in Appendix C herewith accompanying.

b. To prepare and submit for the approval of the Board, and for the approval of the Art Commission, preliminary sketches showing the Architect's conception of the proposed building.

c. To prepare general and detail plans of the building sufficiently full and complete to indicate clearly to the contractor all necessary work to be done, in accordance with such plans; also in accordance with the specifications prepared by the Architect as provided in these instructions. Twelve complete sets of the general plans are to be furnished the Library Board under this contract for the information of intending bidders.

d. Prepare full-size details sufficient to indicate clearly to the contractor the special processes necessary for the completion of the building in accordance with the intention of the Architect; to designate the character of the finish, and in general, the color scheme to be used in the decoration. Finish and color scheme are to be approved by the Librarian.

e. Secure the General Permit from the Building and Safety Commission of the City of..... .... for the construction of the building. The expense of the General Permit will be a proper charge against the Library.

f. Advise with the Librarian and the Library Board on certain features connected with separate contracts such as floor covering, design of lighting fixtures, etc., in order to secure the most harmonious and effective result possible.

g. Act as authorized supervising representative of the Library Board during the construction of the building.

3. **PLOT SURVEY AND SOIL TEST.** Preliminary to the commencement of his designs the Architect will secure a map prepared by the City Engineer showing the plot survey; and a soil test by a reputable chemist of the city showing the character of the soil, to a depth of at least twenty-five (25) feet, upon which the building is to be erected. The plot survey will include all curb and sidewalk details, distances, etc., property line, and one-foot elevation contours showing the topography of the entire plot of ground. The cost of such map and soil test shall be a proper charge against the Library.

4. **OUTLINE.** Before any work shall have been commenced on the design of any public library building, the outline shown in Appendix C hereof is to be filled out by the Librarian, and the Architect. A copy of this outline will go to each, the Board, the Librarian, and Architect, three copies in all.

5. **DESIGN.** In designing the building-heating plant, plumbing fixtures, metal doors, steel window sash, etc., etc., in all cases wheresoever possible to secure the results desired, the Architect will use articles or products manufactured locally or in the regional vicinity.

It is desired particularly in cases of heating plant, etc., that only standard equipment be used in all cases whatsoever, and no unusual or freak products of any manufacturer; this in order to conduce to ease and efficiency of maintenance after the building is completed and the equipment is placed in operation.

Articles or products specified by manufacturers' name or brand are established as the standard for that product or class. The Contractor may propose in writing to substitute any article or material

as an "approved equal" of the established standard. Before any substitute article or material so proposed is used or incorporated in the work, the Contractor shall secure the affirmative written approval of the Architect.

6. **FULL-SIZE DETAILS—FINISH AND COLOR SCHEME.** The Architect will furnish, at the time the architectural plans and structural drawings are submitted, all full-size details necessary for the complete instruction of the contractor, and the plans will not be considered complete until such full-size details have been furnished. The Architect will also approve in writing all shop drawings submitted by the contractor acceptable to the Architect, without unnecessary delay.

The Architect will, in conjunction with the Librarian, determine the interior and the exterior finish of the entire building and the color scheme to be adopted in the treatment of the same.

7. **ALTERNATES.** Provision will be made for such alternate forms of construction as the Architect may deem desirable. Alternates will be set forth in the particular section to which they properly appertain; a tabulation of all alternates will appear in Paragraph 818, "Alternates" of Section 8 of the specifications—"Information for Bidders." A tabulation of the alternates will also appear in Section 2, the blank bid form upon which to submit the bidder's proposal.

8. **GENERAL PERMIT.** Upon the completion of the general plans and such detail plans as may be necessary, the Architect will secure from the Building and Safety Commission of the City of ..... the General Permit for the construction of the building. The cost of obtaining such permit will be a proper charge against the Library.

9. **PRECAUTIONS AGAINST SETTLING.** In order to guard in every possible respect against settling of all buildings constructed under these specifications, all foundations will be so designed, of concrete, as to have continuous and connected deformed steel rod reinforcement clear around the perimeter of the building. In the case of the small frame, or frame stucco buildings on sand, loam, yellow or red clay soil, this reinforcement may be fairly light, such as four ⅝-inch square deformed steel reinforced bars; in the case of the heavier buildings, such as brick, hollow cement tile, reinforced concrete or other masonry buildings, and on light, soft, unstable soil, this reinforcement will consist of not less than 0.5 percent of the area of cross-section of the footings.

10. **PRECAUTIONS AGAINST EARTHQUAKES.** In cases where buildings are designed to be constructed of brick, hollow concrete tile, or other masonry of any kind, it is desired that a reinforced concrete cap be constructed in such manner as to extend continuously around the top of the walls of the building, a precaution against damage by possible earthquakes. This reinforced concrete cap to be horizontal without any vertical bend whatsoever, the reinforcement to consist of not less that four 1-inch square deformed steel bars with sufficient lap to furnish the full amount of strength at the lap as occurs at any other point in the bar itself. The cap itself will be so designed as to furnish the requisite amount of strength to to harmonize with the remainder of the design of the building. Mortar for such walls shall be 1 part Portland cement, 1 part lime putty, 6 parts clean, sharp, well-graded sand.

11. **CONCRETE DESIGN.**

a. **Steps.** In case of concrete steps and of concrete work of any kind approaching and abutting upon any building a special precaution will be taken in the design thereof to prevent the settling and cracking away of the steps from the building. Reinforcement extending from within the walls of the building will be made continuous around such concrete steps or other concrete structures. Treads of concrete steps should always be roughened, either ribbed with parallel longitudinal grooves or with a rough wooden float, or by sprinkling uniformly with No. 20 emery, at the rate of one pound for every four square feet of area, and lightly trowelling while plastic.

In case of frame stucco buildings, the expanded metal reinforcement or wire mesh used for reinforcing the stucco on the outside of the building will be extended so as to be partly incorporated with the top step or with the top portion of the concrete structure. This manner of reinforcement will be clearly shown by a detail in the plans themselves, as well as specified in specifications. All concrete steps will be carefully designed that all treads of uniform width and all risers of uniform heights are clearly shown by a detail on the plans. All treads shall be designed with wash, to drain.

b. **Basement Windows.** In the design of basements (usually with reinforced concrete walls) it is desired that no windows be inserted in these walls, the bottom of which shall be lower than the elevation of the ground level immediately outside of these windows. This in order to prevent seepage and leakage of water from rainfall and from irrigation. Unavoidable windows shall be designed with areaways, which shall be membrane-waterproofed, and thoroly drained into storm sewer for street gutters.

12. **STREET SIDEWALKS, ETC.** The design of this Library and its grounds will include the design and construction under the contract of any necessary sidewalk, curbing, etc., outside of the property line within the street line.

13. **CARPENTRY DESIGN.**

a. **Furred Walls.** It is desired where possible that furred recesses be provided in the building for the installation of wall shelving.

b. **Design of Windows.** No round or rounded top windows shall be used in this Library building, being too difficult to curtain. All casement and architectural projected windows shall open outward. Wooden window frames and door frame joints shall be doweled.

c. **Screens.** All exterior doors and windows shall be screened.

d. **Ceiling Vents.** Ceiling vents, if provided, shall be designed with metal shutters to control the current of air rising thru these vents.

14. **FIREPLACE.** No limitations of any kind are placed upon the Architect for the design of the fireplace for the Children's Room. Any design, including a terra cotta picture or other ornamentation above the same, however, shall be approved by the Librarian before the same is incorporated in the plans and in the specifications.

Special emphasis shall be placed upon the fact that the hearth of the fireplace shall be sufficiently higher than the finish surface of the adjacent floor, to permit the hearth of the fireplace to be of the same elevation as the surface of the adjacent floor covering after the latter has been laid.

15. **HOLLOW METAL DOORS.** Where the amount of the appropriation will permit, the Architect will design all exterior doors, particularly those facing east, south, or west, to be of hollow metal, aluminum or steel.

16. **INCINERATOR.** Provision will be made for a built-in incinerator to be incorporated with and a part of the flue of the fireplace. Access should be had to the incinerator from both within and without the building, and from all floors.

17. **CONCEALED SAFE.** At some convenient point within the office of the branch library a concealed safe shall be designed. The net dimensions of this safe should be 4¼x13¾x20 inches.

18. **SINK, DRAIN-BOARD AND HOT-PLATE SHELF.** The sink, drain-board and hot-plate shelf in the kitchenette will be designed of Oregon pine covered with tile, hexagonal or square, of color approved by the Librarian. This design will include not only the drain-board and shelf proper but the wall immediately in the rear of both of these to a height of not less than fifteen (15) inches. Provide sink with built-in soap dish.

Provide gas plate shelf at least 2 ft. 6 in. square with ventilator above.

19. **BASE.** Base of the same material as the floor or floor covering will be provided in all cases for public rooms and for staff quarters, the exception being possibly where unit wood block or tile flooring is laid. A base of either tile, terra cotta or marble, will be used, for tile, and wood base for unit wood block. Where linoleum or cork carpet base is employed it will be of the same material as that used for floor covering and will be applied by the linoleum contractor on the walls of all rooms where such base occurs, and also on the base of such furniture as requires a base of this nature. The base will be capped by a small, neat, wooden cap mould furnished, applied and finished by the general contractor for the building wheresoever linoleum or cork carpet base occurs, whether on the interior walls of the building or on the furniture.

20. **GUTTERS AND DOWNSPOUTS.** The gutters and downspouts shall be of adequate capacity. Gutters shall be semi-circular in form not less than 5 inches in diameter with a cross-sectional area not less than 10 square inches.

Downspouts shall be of sufficient capacity to carry the run-off accumulating in the gutters of the building. Gutters shall be adequately detailed in order that the contractor may have a thoro knowledge of what is required in the way of constructing the same.

Gutters and adjacent roof shall be so designed that no tile roofing projects over gutters without a provision for space at least every four feet to clean out and repair the gutters.

21. **FINISH HARDWARE.** All public doors, screen doors, toilet doors, etc., shall be provided with door stops of approved standard make and pattern.

All outside doors will be provided with foot-release checks.

All windows hinged so as to swing outward, will be provided with appropriate window stops in order that they may be fastened in any position.

The above hardware mentioned in this paragraph will be adequately specified by the Architect in the specifications.

22. **ELECTRICAL DESIGN.**

a. **Fan Motors.** Motors designed for operating fans of air-conditioning systems and other electrically-driven equipment of any kind will be specifically designed for the purpose and so set out in the specifications, giving the proper voltage and cycle for the local community electric service company.

b. **Meter Installation.** Provision shall be made in the finish of the building for installing an electric meter where it can be read from outdoors. A high glass-faced cupboard in the rear of the building is recommended for this installation.

c. **Main Switch Panel.** The main switch panel for the entire building shall be located in a place inaccessible to the general public, convenient to the charging desk but not in the desk, and where it will not occupy wall space in the reading room which should be used for shelving. The main switch shall not be less than 20 ampere capacity. Each room shall be controlled from a single switch (except perhaps the reading room) but not more than four lights shall be controlled from any one switch.

The main switch panel shall be so designed as to provide space for the installation of a transformer to operate the electric control of the air-conditioning system.

d. **Buzzer.** Provide a buzzer system from charging desk to work-room, and to Librarian's

office, and where a basement is included in the plan of the building provide also a buzzer to the basement for the janitor, unless otherwise instructed at the time the "Outline," Appendix C, is prepared.

e. **Floor Plugs.** Design floor plugs for vacuum cleaners, flood lamps, and electric clocks thruout the building wherever necessary or desirable. Provide floor plug immediately in rear of charging desk.

f. **Stack Light Outlets.** Stack light outlets will be so designed that lights will occur in the center of each aisle-way every two rows of stacks. In stack rooms with ceiling nine feet high or less, the outlets will be placed in the ceiling of the stack room; in stack rooms with ceiling more than nine feet high, the stack lighting system will be designed of a series of arches connected from stack to stack, made of square copper conduit material with the light suspended from the arch over the middle of the aisle between stacks.

23. **PLUMBING DESIGN.**

a. **Fixture Cut-off.** Each plumbing fixture in the building shall have a separate cut-off.

b. **Drinking Fountain.** Where so instructed at the time the "Outline" is drawn up, provide an electrically-cooled drinking fountain at some convenient point. In the design of this fountain do not use white porcelain or chinaware, but instead use a mottled green or other pleasing color effect.

c. **Built-in Toilet Paper Holder.** Provide all toilets—staff and public—with built-in toilet paper holders of appropriate design. Install in the wall before the plastering is done.

d. **Gas Meter.** So locate the gas meter as to be easily accessible and easily to be read from the outside of the building, preferably in glass-faced recess at rear.

e. **Enamel-Iron Fixtures.** Where enameled-iron fixtures are used, the enamel will be specified as "acid-resisting."

24. **AIR-CONDITIONING.** The Architect will design such air-conditioning plant as to him seems best; subject only to the requirement which recommends a standard product of local or regional manufacture, and also to provisions which place restrictions upon the individual or company installing this equipment requiring that such person or firm be a manufacturer financially adequate and having at least two years' experience in installing a plant of the same type as that proposed prior to the commencement of work on this building. Control switches shall be so located in the room as to be inaccessible to mischievous boys, yet accessible for adjustment by the Librarian.

The plans will show a separate heating outlet directly in the rear of the charging desk, for the convenience and comfort of the Librarian and attendants when working at charging desk.

25. **LIGHTING FIXTURES.** The lighting fixtures in all cases will form a separate contract for which proposals will be secured and contract let by the Library. As a part of his duties, set out in paragraph 2—(f) above, however, it is the duty of the Architect to consult with the Board in order that a type of lighting fixture proper to the design of the building may be selected.

26. **PAYMENT.** The compensation, agreed upon between the Board of Library Commissioners and the Architect will be payable as follows:

a. **Preliminary:** Upon completion, submission, acceptance and approval of Preliminary Sketches by the Art Commission—one percent of the estimated cost of the building;

b. **Design:** Upon completion, approval and acceptance of Plans, Specifications, Full-size Details and all necessary Designing Work; securing the General Permit; Advertising and Letting to Contract—three and one-fourth percent of the estimated cost of the building;

c. **Supervision:** Upon completion, approval and acceptance of the building—six percent of the actual, final contract price, including all adjustments, additions and deductions, minus previous payments made under (a) and (b) preceding.

APPENDIX C.

OUTLINE.

..... PUBLIC LIBRARY.

A. APPROXIMATE APPROPRIATION. $.....

B. I. LOCATION OF LOT. (Street and Number.)

II. SHELVING THRUOUT THE BUILDING.

a. MINIMUM book capacity as agreed upon in conference.
b. Provide for a doubling of Library's existing supply.
c. In estimating book capacity count 8 books to the running foot.
d. Book shelving sections to be uniformly 3 feet in length.
e. Height of cases to be 6 ft. 10 in. in adult reading room and stacks. (Base and top, 4 in. each, 7 shelves and base.)
f. Shelves to be 8 in. wide except reference shelving, which is 10 in. wide and bound magazines, music and picture books—12 in. wide.

III. ROOMS.

1. **Adult Reading Room**.....ft. x .....ft.
   a. Seating capacity.....persons (3 feet allowed for each chair).
   b. Five-foot aisles between tables.
   c. Shelving 10 in. wide to be provided for reference books; 12 in. wide for bound and unbound magazines and a special section for music.
   d. Save wall space for book shelving to be bought in a separate contract.
2. **Children's Room**.....ft. x .....ft.
   a. Located to get benefit of afternoon sun.
   b. Seating capacity.....persons (never less than 40). (3 feet allowed for each chair.)
   c. Five-foot aisles between tables.
   d. Shelving to be 5 ft. high—shelves 3 ft. long by 8 inches wide.
   e. Except for special sections for picture book and reference books where shelves are 12 inches wide.
   f. All shelving to be supplied under separate contract.
   g. Plan for book shelving heights in window design and plastering.
3. **Assembly Room**.....ft. x .....ft.
   a. Should adjoin Children's Room.
   b. Seating capacity.....persons (never less than 50), 6 sq. ft. per person.
   c. Should not use best light and outlook at expense of Adult and Children's Room.
4. **Circulation Space**.....ft. x .....ft.
   a. Should be situated directly opposite entrance with supervision of Adult and Juvenile reading rooms. To contain charging desk and space in rear of desk for stacks, if possible.
   b. Provide ten-foot open space in front of charging desk.
5. **Stacks.**
   a. Provide ceiling 15 ft for steel stacks and 6 ft. for wooden stacks to allow an extra tier of stacks for growth.
   b. Provide windows reaching to floor at end of each aisle. (Double faced wooden stack is 1½ ft. wide and aisle 4 ft. wide.
   c. Make windows high enough for second tier of stacks.
6. **Work Room** ft.x ft.
   a. To be situated near charging desk.
   b. Provide outside light for mender's table and desks.
   c. Provide cloak closet, or locker for each member of staff.
   d. Provide large cupboard with 12-in. shelves and a window for unbound magazine storage.
   e. Provide built-in cupboard for library supplies with shelves 12 in. wide.
   f. Provide book shelving for bindery books.
   g. Provide built-in poster case.
7. **Librarian's Office**.....ft. x .....ft.
   a. Provide low book shelving as desired.
   b. Provide built-in safe.
   c. Provide telephone extension from charging desk.
8. **Rest Room**.....ft. x .....ft.
   a. Provide space for couch.
   b. Provide space for table and several chairs.
9. **Kitchenette** .....ft. x .....ft.
   a. Provide cooler in coolest corner of kitchenette.

b. Provide built-in china cupboard
c. Provide built-in table, with seats or breakfast nook, when practicable.

10. **Staff Toilet and Lavatory.**
    a. Provide with built-in toilet paper holder and mirror.
    b Provide inset cupboard with glass shelves for powder, soap, etc, and mirror in door of same.

11. **Janitor's Closet.**
    a. Provide slop sink.
    b. Provide shelving for supplies.
    c. Provide space for 10-ft. ladder.
    d Provide good ventilation because of musty mops, etc.
    e. Provide a space for storing garden tools with an outside entrance, and in a building with a fireplace, a space to store at least a ¼ cord of wood, or one ton of coal.

12. **Public Toilets.**
    a Should be located unobtrusively, as far apart as the building will permit but not removed from supervision.
    b. Provide built-in mirror, and toilet paperh older.
    c Provide plate on door of each public toilet saying "Men" or "Women"
    d. Provide "Russwin" locks, or approved equal, with one cylinder only.

IV. MINOR DETAILS.

1. *Signs.*

Provide a sign, large letters (in terra cotta, tufa, woodstone or bronze) on the face of the building above the main entrance—

.. ....(Name of City) ... .PUBLIC LIBRARY.

Also a lighted wrought iron lawn sign giving hours when library is open.

2. **Interior Finish.**

Architect shall submit for approval of Librarian—

a. Finish of woodwork.
b. Finish of walls and ceilings (walls back of shelving to match woodwork.)
c. Design of fireplace or decorated ceilings.
d. Any special decorations such as tile insets, fountain, garden seats.

APPENDIX D.

STANDARD SPECIFICATIONS.
FOR
PUBLIC LIBRARY BUILDINGS

GENERAL INDEX.

Section	Subject
1.	Advertisement.
2.	Proposal.
3.	Questionnaire for Bidders
4.	Collusion Affidavit.
5.	Bidders' Bond.
6.	Material and Labor Bond.
7.	Workmanship Bond.
8.	Information for Bidders.
9.	General Conditions.
10.	Temporary Structures, Equipment and Service.
11.	Samples.
12.	Grading and Excavating.
15.	Waterproofing and Dampproofing.
14.	Concrete and Cement Work.
13.	Sub-drainage.
16.	Masonry Work.
17.	Stone Work.
18.	Architectural Terra Cotta.
19.	Structural Metal Work.
20.	Miscellaneous Metal Work.
21.	Sheet Metal Work.
22.	Carpenter and Mill Work.
23.	Lathing and Plastering.
24.	Marble Work.
25.	Tile Work.
26.	Terrazzo.
27.	Wood Shingle Roof.
28.	Composition Roof.
29.	Tile Roof.
30.	Unit Wood Block Floor.
31.	Painting and Finishing.
32.	Glass and Glazing.
33.	Finish Hardware.
34.	Plumbing.
35.	Heating and Air-Conditioning.
36.	Electrical Work.
37.	Lighting Fixtures.
38.	Cork Carpet and Linoleum.
39.	Underground Sprinkling System.
40.	Landscaping.
41.	Agreement.

SECTION 1.

ADVERTISEMENT.

SEALED PROPOSALS, addressed to the Secretary, Library Board,..... (Name of City)....., ...(State)....., plainly marked—"Proposals for Construction of Library Building,"—will be received until..... ...(Hour)....., ...M.,..... (Day of Week)....., ... (Date)....., and publicly opened at that place and time, for furnishing all labor and materials and performing all work necessary for the construction of a Public Library Building, complete,..... ....(Concise description of size, material, roof, etc., here).....0.....

Plans, specifications and all necessary information may be secured from the above-named office upon deposit in the amount of $15.00, cash or check, payable to the order of the President, Library Board,.....(City)....., ...(State)....., which will be refunded upon the prompt return of the plans and specifications in good condition.

.....
Secretary.

.....(City)....., ...(State).....,
.....(Date)....., 19.....

SECTION 2.

PROPOSAL.

.....
(City) (State)
....., 19....

The Honorable, The Library Board,

.....
(City) (State)

Gentlemen:—

In compliance with your Advertisement dated....., 19 , the undersigned hereby proposes to furnish all necessary materials and labor and to perform all work required for the construction of a Public Library Building, complete, ...

.....

in strict accordance with all drawings, specifications, General Conditions of the Agreement, and all other necessary documents herein included, referred to and hereby made a part of this proposal, for the total sum of..... Dollars, ($.....)

The undersigned agrees, upon receipt of written notice of the acceptance of this proposal within ten days after the date of opening of the proposals as set forth in the aforesaid Advertisement, to execute the required form of Agreement, Section 41 hereof, in accordance with the terms hereof as accepted, and to furnish Material and Labor Bond and Workmanship Bond, Sections 6 and 7 respectively hereof, with good, sufficient and acceptable surety or sureties for the faithful performance of the Agreement, within ten days after the prescribed forms are presented for signature, and to complete the work within..... calendar days after receipt of written notice to proceed.

ALTERNATE A: For substituting genuine wrought iron pipe and extra heavy brass and copper pipe, iron pipe sizes, and cast brass fittings, ... { Add $..... Deduct $.....

.....

.....

.....

.....
(Business Address.)

INSTRUCTIONS:

1. Read carefully "Information for Bidders," Section 8, and "General Conditions," Section 9, before preparing proposal.
2. If bidder is a corporation, write state of incorporation under signature.
3. If bidder is a partnership, give full names of all partners.
4. This proposal will not be considered unless it is accompanied by Bidder's less than ten per cent (10%) of the total amount of the above proposal.
5. All signatures in proposal, bidder's bond, etc., must agree exactly in every respect.

SECTION 3.

QUESTIONNAIRE FOR BIDDERS.

301. **Please answer** in complete detail all questions contained in the Questionnaire. No Questionnaire can be considered complete unless each and every question has been fully answered.

302. **The financial statement,** paragraph 214-353 inclusive, should show the exact condition of the business as of date noted in caption. List all accounts payable as they will be investigated.

303. **Please request all banks** in which you have funds deposited, and to which you refer in your Questionnaire, to furnish you with a statement verifying your figures. Let this statement come forward with your Questionnaire. The amounts shown for each item must be actual, as obtained from bank statements, etc., and not approximate amounts.

304. **Under paragraph 346,** "Equipment at Book Value," the age should be shown as the number of years you have owned the article and in case it was purchased second-hand, it should be so indicated in the column for "Description." Where replacements have been made in a piece of equipment, the replacements would reduce the depreciation reserve; the purchase price less depreciation should give the book value; and unless both the age and purchase price of each item of your equipment is listed, we have no means whatever of checking the book value against A.G.C. rating. In case you increase the value of an article by the addition of an attachment, for instance, the increase in value of the article should be added to the purchase price.

305. **List all equipment** which you own, as this will have a bearing on your fitness to bid on this construction and will limit the amount of work which you could undertake at any one time.

306. **For your information and guidance,** in computing book value of equipment in accordance with A. G. C. rating, you may obtain a copy of "Equipment Ownership Expense" for the sum of one dollar by addressing the Associated General Contractors of America, Inc., Munsey Building, Washington, D. C. This pamphlet contains valuable information on rental charges and may prove useful in many ways.

307. **The statement may be signed** in the space provided in paragraph 375-377 of the form, and the proper affidavit executed verifying the statement.

308. **The signatory of this financial statement** and Questionnaire guarantees, as evidenced by the sworn affidavit required herein, the truth and accuracy of all statements and of all answers to interrogatories hereinafter made.

In compiling "Bidder's Financial Statement" the amounts shown as "Total Assets" and "Total Liabilities" must be identical.

GENERAL INFORMATION.

309. Have you filed a performance record with the Bureau of Contract Information, Inc., at Washington, D. C.? ..... (Yes or No.)

310. Give names and addresses of all surety companies which have written surety bonds for you, covering construction contracts during the last three years .....

311. Do you now hold a valid license to operate in this state as required by law?.....

.....License number.....

License for what class of work?.....Date obtained.....

312. Name of county or counties in which license is registered.....

313. In what other states are you licensed to do contract work?.....

BIDDER'S FINANCIAL STATEMENT.

Condition at close of business....., 19.....

ASSETS.

		Dollars	cts.
314.	**Cash** (a) On hand $.....		
	(b) In bank $.....		
	(c) Elsewhere $.....		
315.	**Notes receivable:** (a) Due within 90 days		
	(b) Due after 90 days		
	(c) Past due		
316.	**Accounts receivable for completed contracts,** exclusive of claims not approved for payment		

317. **Sums earned on uncompleted contracts** as shown by Engineer's or Architect's estimate:
(a) Amount receivable after deducting retainage
(b) Retainage to date, due upon completion of contracts
318. **Accounts receivable** from sources other than construction contracts

319. **Deposits for bids** or other guarantees:
(a) Recoverable within 90 days
(b) Recoverable after 90 days
320. **Interest accrued** on loans, securities, etc
321. **Real estate** (a) Used for business purposes
(b) Not used for business purposes
322. **Stocks and bonds:** (a) Listed—present market value
(b) Unlisted—present market value
323. **Materials** in stock not included in Par. 342
(a) For uncompleted contracts (present value)
(b) Other materials (present value)
324. **Equipment,** book value
325. **Furniture** and fixtures, book value
326. **Other assets**
Total Assets

327. **Notes payable:** (a) To banks regular
(b) To banks for certified checks
(c) To others for equipment obligations
(d) To others exclusive of equipment obligations
328. **Accounts payable:** (a) Not past due
(b) Past due
329. **Real estate encumbrances**
330. **Other liabilities.**
331. **Reserves**
332. **Capital stock paid up:** (a) Common
(b) Common
(c) Preferred
(d) Preferred
333. **Surplus** (net worth)
Total Liabilities

CONTINGENT LIABILITIES.

		Dollars	cts.
334.	**Liability on notes receivable,** discounted or sold		
335.	**Liability on accounts receivable,** pledged, assigned or sold		
336.	**Liability as bondsman**		
337.	**Liability as guarantor** on contracts or on accounts of others		
338.	**Other contingent liabilities**		
	Total Contingent Liabilities		

DETAILS RELATIVE TO ASSETS.

339. (a) On hand
(b) Deposited in banks named below
(c) Elsewhere—(state where)

Name of Bank	Location	Deposit in Name of	Amount

*340. **Notes receivable:** (a) Due within 90 days $
(b) Due after 90 days $
(c) Past due $

Receivable From	Name and Address	For What	Date of Maturity	How Secured	Amount

Have any of the above been discounted or sold? If so, state amount, to whom, and reason

*341. **Accounts receivable from completed contracts** exclusive of claims not approved for payment

Name and Address of Owner	Nature of Contract	Amount of Contract	Amount Receivable

Have any of the above been assigned, sold or pledged?..... If so, state amount, to whom, and reason.....

*342. **Sums earned on uncompleted contracts,** as shown by engineer's or architect's estimates: (a) Amount receivable after deducting retainage.....$.....
(b) Retainage to date upon completion of contract .....$.....

Designation of Contract and Name and Address of Owner	Amount of Contract	Amount Received	Retainage When Due Amt.	Amt. Exclusive of Retainage

Have any of the above been sold, assigned or pledged?..... If so, state amount, to whom, and reason.....

*343. **Accounts receivable** not from construction contracts.....$.....

Receivable From	Name and Address	For What	When Due	Amount

What amount, if any, is past due?.....$.....

* List separately each item amounting to 10 percent or more of the total and combine the remainder.

344. **Deposits with bids or otherwise** as guarantees.....$.....

Deposited with:	Name and Address	For What	When Recoverable	Amount

345. **Interest accrued on loans, securities, etc.**.....$.....

Description of Property	Improvements		Total Book Value
	Nature of Improvements	Book Value	
(a)			
(b)			
(c)			
(d)			
(e)			
(f)			
(g)			

346. **Equipment** at book value.....$.....
(Note: In listing equipment depreciate value in accordance with A. G. C. Schedule. List only equipment to which you can show sole ownership, the depreciation of which must be computed in accordance with A. G. C. Schedule.)

Quantity	Description and Cacapity of Items	Age of Items	Purchase Price	Depreciation Charged off	Book Value

Are there any liens against the above?.....If so, state total amount $.....

If two or more items are lumped above, give the sum of their ages.

347. **Furniture and fixtures at book value** ..... $.....

348. **Other assets** ..... $.....

Description	Amount
Total Assets	$

DETAILS RELATIVE TO LIABILITIES.

349. **Notes payable:** (a) To banks, regular ..... $.....
(b) To banks for certified checks ..... $.....
(c) To others for equipment obligations ..... $.....
(d) To others exclusive of equipment obligations ..... $.....

To Whom	Name and Address	What Security	When Due	Amount

350. **Real estate encumbrances** (See Par. 345, Assets) ..... $.....

351. **Other Liabilities** .....

Description	Amount
	$

352. **Reserves** ..... $.....

Interest	Insurance	Bldgs. & Fixt.	Plant Depr.	Taxes	Bad Debts
$	$	$	$	$	$

353. **Surplus** ..... $.....

TOTAL LIABILITIES ..... $.....

BIDDER'S EQUIPMENT QUESTIONNAIRE.

354. **Give names and addresses of all banks** with whom you have done business during the last three years, exclusive of those shown in Financial Statement in paragraph 339.....

Name of Bank	Location	Name and address of officers with whom you transacted business

355. **Give names and addresses of material or equipment houses** with whom you have established a line of credit.

Name of Firm or Company	Address

356. **Give names and addresses of producers** from whom you have purchased principal materials during the last three years.

Name of Furnisher or Producer — Address

357. **Give names and addresses of equipment dealers** from whom you have purchased equipment during the last three years.

Name of Firm or Partnership — Address

BIDDER'S EXPERIENCE QUESTIONNAIRE

358. **Organization:**

If a corporation, answer this:
Capital paid in cash $.....
When incorporated.....
In what State.....
President's name.....
Vice President's name.....
Secretary's name.....
Treasurer's name.....

If a co-partnership, answer this:
Date of organization.....
State whether partnership is general, limited or association .....
Name and address of partner:..... Age.....

359. **How many years** has your organizationbeen in business as a general contractor under your present business name?.....

360. **How many years' experience** in construction work has your organization had:
(a) As a General Contractor?.....
(b) As a Sub-Contractor?.....

361. **What projects** has your organization completed in this state and elsewhere?.....

Contract Amount	Class of Work	When Completed	Where Located City	County	State	Name and address of Official to whom you refer

362. **Have you ever failed** to complete any work awarded to you?.....If so, where and why?

363. **Has any officer or partner** of your organization ever been an officer or partner of some other organization that failed to complete a construction contract?.....If so, state name of individual, other organization and reason therefor.....

364. **Has any officer or partner** of your organization ever failed to complete a construction contract handled in his own name?..... If so, state name of individual, name of owner, and reason therefor. .....

365. **In what other lines of business** are you financially interested? .....

366. **For what corporation or individual** have you performed work, and to whom do you refer?

367. **List cities** for which you have performed work.

Name of City	State	Description of Work	Amount of Contract	Name and address of supervising official in charge

368. **List the counties** for which you have performed work.

Name of County	State	Description of Work	Amount of Contract	Name and address of supervising official in charge

369. **For what State Bureaus or Department** have you performed work, and to whom do you refer?

370. **Have you ever performed any work** for the U. S. Government?..... If so, when and to whom do you refer?

371. **What is the construction experience** of the principal individuals of your organization?

Individual's Name	Present position of office	Years of construction experience	Magnitude and type of work	In what capacity

AFFIDAVIT FOR INDIVIDUAL

372.

STATE OF.....
COUNTY OF..... } SS

....., being duly sworn deposes and says that the foregoing financial statements, taken from his books, is a true and accurate statement of his financial condition as of the date thereof, and that the answers to the interrogatories contained therein are true; that the statements and answers to the interrogatories of the foregoing plan and equipment questionnaire are correct and true as of the date of this affidavit; and, that the statements and answers to the interrogatories of the foregoing experience questionnaire are correct and true as of the date of this affidavit.

.....
(Applicant must also sign here)

Sworn to before me this.....day of....., 19.....

.....
Notary Public, in and for the County of....., State of.....

AFFIDAVIT FOR CO-PARTNERSHIP

373.

STATE OF.....
COUNTY OF..... } SS

....., being duly sworn, deposes and says that he is a member of the firm of.....: that the foregoing financial statement taken from the books of said firm, is a true and accurate statement of the financial condition of said firm as of the date hereof, and that the answers to the interrogatories contained therein are true; that the statements and answers to the interrogatories of the foregoing plan and equipment questionnaire are correct and true as of the date of this affidavit; and, that the statements and answers to the interrogatories of the foregoing experience questionnaire are correct and true as of the date of this affidavit.

.....
(Member of Firm must also sign here)

Sworn to before me this.....day of....., 19.....

.....
Notary Public, in and for the County of....., State of.....

AFFIDAVIT FOR CORPORATION

374.

STATE OF.....
COUNTY OF..... } SS

....., being duly sworn, deposes and says that he is ..... of the .....,
the corporation described in and which executed the foregoing statement; that he is familiar with the books of the said corporation showing its financial condition; that the foregoing financial statement, taken from the books of said corporation, is a true and accurate statement of the financial condition of said corporation as of the date thereof, and that the answers to the interrogatories of the foregoing plan and equipment questionnaire are correct and true as of the date of this affidavit; and, that the statements and answers to the interrogatories of the foregoing experience questionnaire are correct and true as of the date of this affidavit.

.....
(Officer must also sign here)

Sworn to before me this.....day of.....19.....

.....
Notary Public in and for the County of....., State of.....

SECTION 4.

COLLUSION AFFIDAVIT.

401. AFFIDAVIT TO ACCOMPANY INDIVIDUAL OR FIRM BIDS.

STATE OF.....
} SS
COUNTY OF.....

.....and ....., being duly sworn, depose.....and say.....; that.....he.....the person.....whose name.....signed to the foregoing proposal, Section 2 hereof; that said proposal is genuine and that the same is not sham or collusive; that it is not made in the interest or in behalf of any person not therein named; that.....he.....ha.....not, directly or indirectly, induced or solicited any other person, firm or corporation to refrain from bidding; and that.....he.....ha..... not in any manner sought by collusion, to secure for.....mscl.....an advantage over any other bidder.

Subscribed and sworn to before me this .....
day of.....19.....

.....
Notary Public in and for the County of....., State of.....

NOTE: All members of a firm, or company, must execute the above affidavit.

---

402. AFFIDAVIT TO ACCOMPANY CORPORATION BIDS.

COUNTY OF.....
} SS
STATE OF.....

..... the .....
(Name of Officers) (Title)

of the corporation whose name is signed and whose seal is attached to the hereto annexed proposal, having first been duly sworn, deposes and says: That the said proposal is genuine and that the same is not sham or collusive; that it is not made in the interest or in behalf of any person not therein named; that the said bidder has not, directly or indirectly, induced or solicited any other person, firm or corporation to refrain from bidding; and that it has not in any manner sought, by collusion, to secure for itself any advantage over any other bidder.

.....
(President, Secretary or other managing Officer)

of the .....
(Corporation)

Subscribed and sworn to before me this .....day of....., 19.....

.....
Notary Public in and for the County of....., State of.....

NOTE: The above affidavit must be made by the President, Secretary, or other managing Officer of the corporation submitting the bid.

SECTION 5.
BIDDER'S BOND.

KNOW ALL MEN BY THESE PRESENTS, That we, ... as PRINCIPAL, and ..... as SURETY, are held and firmly bound unto the City of ....., State of ....., hereinafter called the "OWNER," in the penal sum of ..... Dollars, lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted to the Owner a proposal, dated....., 19....., herein included, proposing to enter into contract to furnish all necessary materials and labor and to perform all the work required to construct a Public Library Building, complete, ...

for the total lump sum consideration of..... Dollars.

NOW THEREFORE, If said proposal be accepted by the Owner, and if the Principal shall faithfully enter into such proposed contract, and shall well and truly perform all the requirements, covenants, terms and conditions of the Advertisement, the Questionnaire for Bidders, the Collusion Affidavit and the Information for Bidders included herein, and shall furnish Material and Labor Bond and Workmanship Bond sufficient and acceptable unto the Owner, then this obligation shall be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals this.....day of....., 19....., the name and corporate seal of each corporate party being hereunto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of—

..... (Attest)	..... (SEAL) (Individual Principal)
..... (Address)	..... (Address)
..... (Attest)	..... (SEAL) (Individual Principal)
..... (Address)	..... (Address)
..... (Attest)	..... (SEAL) (Individual Principal)
..... (Address)	..... (Address)
(Corporate) (Seal)	(Corporate) (Seal)
..... (Corporate Principal)	..... (Corporate Surety)
By..... (Name) (Title of Office)	By..... (Name) (Title of Office)
..... (Business Address)	..... (Business Address)
Attest:.....	Attest:.....

CERTIFICATE AS TO CORPORATE PRINCIPAL.

I, ..., certify that I am the.....Secretary of the corporation named as Principal in the above bond; that ....., who signed the said bond on behalf of the Principal was then.....of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing body.

(Corporate)
..... (Seal)
Secretary.

INSTRUCTIONS.

1.—The date of the bond must not be prior to the date of the instrument for which it is given.

2.—The signature of a witness, attesting the signature of each individual party to the bond, shall appear in the appropriate place.

3.—If the Principal or the Surety is a corporation, the name of the state in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be exe-

cuted and attested under the corporate seal as indicated in the form. If the corporation has no corporate seal the fact shall be stated, in which case a scroll or adhesive seal shall appear in lieu thereof.

4.—The official character and authority of the person or persons executing the bond for the Principal, if a corporation, shall be certified by the Secretary or Assistant Secretary, according to the form attached thereto. In lieu of such certificate there may be attached to the bond copies of so much of the records of the corporation as will show the official character and authority of the officer signing, duly certified by the Secretary or Assistant Secretary, under corporate seal, to be true copies.

5.—All signatures in the bond shall be uniformly and exactly alike as the same signatures, respectively, in all other instruments for which the bond is given.

6.—If the Principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, naming it, and all members of this firm shall execute the bond as individuals.

SECTION 6.

MATERIAL AND LABOR BOND.

KNOW ALL MEN BY THESE PRESENTS, That we, ...
..... as PRINCIPAL, and
.....
.....as SURETY,
are held and firmly bound unto the City of....., State of.....,
herein after called the "OWNER," in the penal sum of.....
..... Dollars,
lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain contract, included herein, with the Owner, dated....., 19.., for the construction of a Public Library Building, complete,.....
.....
.....

NOW THEREFORE, If the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements during the original term of said conract and any extensions thereof that may be granted by the Owner, with or without notice to the Surety, and during the life of any guarantee required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, and the aggregate value of which said modifications shall not exceed a total of twenty percentum of the value of the original contract; and shall promptly make payment to all persons supplying the Principal with labor and materials in the prosecution of the work provided for in the said contract, and any such authorized extensions or modifications thereof, then this obligation shall be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this.....day of....., 19....., the name and corporate seal of each corporate party being hereunto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of—

..... (Attest)	.....(SEAL) (Individual Principal)
..... (Address)	..... (Address)
..... (Attest)	.....(SEAL) (Individual Principal)
..... (Address)	..... (Address)
..... (Attest)	.....(SEAL) (Individual Principal)
..... (Address)	..... (Address)
(Corporate) (Seal)	(Corporate) (Seal)
..... (Corporate Principal)	..... (Corporate Surety)
By..... (Name) (Title of Office)	By..... (Name) (Title of Office)
..... (Business Address)	..... (Business Address)
Attest:.....	Attest:.....

CERTIFICATE AS TO CORPORATE PRINCIPAL.

I,....., certify that I am the.....Secretary of the corporation named as Principal in the above bond; that.....,
who signed the said bond on behalf of the Principal was then.....of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested and in behalf of said corporation by authority of its governing body.

(Corporate)
.....(Seal)
Secretary.

INSTRUCTIONS.

1.—The date of the bond must not be prior to the date of the instrument for which it is given.

2.—The signature of a witness, attesting the signature of each individual party to the bond, shall appear in the appropriate place.

3.—If the Principal or Surety is a corporation, the name of the state in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested under the corporate seal as indicated in the form. If the corporation has no corporate seal the fact shall be stated, in which case a scroll or adhesive seal shall appear in lieu thereof.

4.—The official character and authority of the person or persons executing the bond for the Principal, if a corporation, shall be certified by the Secretary or Assistant Secretary, according to the form attached thereto. In lieu of such certificate there may be attached to the bond copies of so much of the records of the corporation as will show the official character and authority of the officer signing, duly certified by the Secretary or Assistant Secretary, under corporate seal, to be true copies.

5.—All signatures in the bond shall be uniformly and exactly alike as the same signature, respectively, in all other instruments for which the bond is given.

6.—If the Principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, naming it, and all members of the firm shall execute the bond as individuals.

SECTION 7.

WORKMANSHIP BOND.

KNOW ALL MEN BY THESE PRESENTS, That we, ... as PRINCIPAL, and ..... as SURETY, are held and firmly bound unto the City of....., State of....., herein after called the "OWNER," in the penal sum of..... Dollars, lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain contract, included herein, with the Owner, dated....., 19....., for the construction of a Public Library Building, complete,.....

NOW THEREFORE, If the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements during the original term of said contract and any extensions thereof that may be granted by the Owner, with or without notice to the Surety, and during the life of any guarantee required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, and the aggregate value of which said modifications shall not exceed a total of twenty percentum of the value of the original contract; and shall promptly make payment to all persons supplying the Principal with labor and materials in the prosecution of the work provided for in the said contract, and any such authorized extensions or modifications thereof, then this obligation shall be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this.....day of....., 19....., the name and corporate seal of each corporate party being hereunto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of—

..... (Attest)	..... (SEAL) (Individual Principal)
..... (Address)	..... (Address)
..... (Attest)	..... (SEAL) (Individual Principal)
..... (Address)	..... (Address)
..... (Attest)	..... (SEAL) (Individual Principal)
..... (Address)	..... (Address)
(Corporate) (Seal)	(Corporate) (Seal)
..... (Corporate Principal)	..... (Corporate Surety)
By..... (Name) (Title of Office)	By..... (Name) (Title of Office)
..... (Business Address)	..... (Business Address)
Attest:.....	Attest:.....

CERTIFICATE AS TO CORPORATE PRINCIPAL.

I,....., certify that I am the.....Secretary of the corporation named as Principal in the above bond; that....., *who signed the said bond on behalf of the Principal was then*.....*of said* corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested and in behalf of said corporation by authority of its governing body.

(Corporate)
.....(Seal)
Secretary.

INSTRUCTIONS.

1.—The date of the bond must not be prior to the date of the instrument for which it is given.

2.—The signature of a witness, attesting the signature of each individual party to the bond, shall appear in the appropriate place.

3.—If the Principal or the Surety is a corporation, the name of the state in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested under the corporate seal as indicated in the form If the corporation has no corporate seal the fact shall be stated, in which case a scroll or adhesive seal shall appear in lieu hereof.

4.—The official character and authority of the person or persons executing the bond for the Principal, if a corporation, shall be certified by the Secretary or Assistant Secretary, according to the form attached thereto In lieu of such certificate there may be attached to the bond copies of so much of the records of the corporation as will show the official character and authority of the officer signing, duly certified by the Secretary or Assistant Secretary, under corporate seal, to be true copies

5.—All signatures in the bond shall be uniformly and exactly alike as the same signatures, respectively, in all other instruments for which the bond is given.

6—If the Principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, naming it, and all members of this firm shall execute the bond as individuals

SECTION 8.

INFORMATION FOR BIDDERS.

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Paragraph	Subject	Paragraph	Subject
801.	Definitions.	810.	Liability Insurance.
802.	Forms for Proposals.	811.	Fire Insurance.
803.	Verbal Proposals.	812.	Permits and Licenses.
804.	Return of Data.	813.	Rights of Contractors.
805.	Scope of the Work.	814.	General.
806.	Discrepancies.	815.	Right Reserved to Reject Proposals.
807.	Visiting Site.	816.	Time Limits.
808.	Substitutions.	817.	Reservations.
809.	Bonds.	818.	Alternates.

801. **DEFINITIONS.** For definitions of various terms used in these specifications, see paragraph 901 of these specifications.

802. **FORMS FOR PROPOSALS.** Proposals shall be made in duplicate upon blank form included herein, Section 2 of these specifications. "Questionnaire for Bidders," Section 2, and "Collusion Affidavit," Section 3, of these specifications, shall also be sworn to before a notary public or other officer legally authorized to administer oaths. All blanks shall be completely filled out. The set of specifications containing the original Proposal, Questionnaire for Bidders and Collusion Affidavit and Bidder's Bond acceptable to the Board, or Certified Check or Cashier's Check, in amount not less than Ten Per Cent of the amount of the proposal, (as a guarantee that if the proposal is accepted, the Bidder will enter into contract), shall be enclosed in a sealed envelope marked on the outside with the name of the job, the contract, and the name of the bidder, and delivered to the office of the Library Board,.....(Address).....at or before the time mentioned in the invitation to submit said proposal. **The signature of the bidder occurring in the Questionnaire for Bidders, Collusion Affidavit, Bidder's Bond, and all other necessary accompanying documents shall correspond exactly with the signature of the bidder on the proposal.**

The duplicate copy each of Proposal and Questionnaire for Bidders shall be detached from these specifications and retained by the bidder for his records.

Bidder's Bond, if used, shall be submitted only on form Section 5 of these specifications.

803. **VERBAL PROPOSALS.** No verbal, telegraphic or telephonic bids or modifications thereof will be considered.

804. **RETURN OF DATA.** All drawings, specifications and other data furnished to contractors shall be promptly returned at the time agreed upon when taken out.

805. **SCOPE OF THE WORK.** The bids will be held to include all minor details necessary to complete all the work in the very best mechanical manner. Unless specifically excepted, all work shall be of the best and not simply ordinary.

806. **DISCREPANCIES.** Should any bidder find discrepancies or omissions in, or in case of doubt as to the exact meaning of, the drawings or specifications, he shall at once notify the Architect in writing, who will send written instructions to all bidders. Neither the Board nor the Architect will be responsible for any verbal instructions given. In case any discrepancy or inconsistency occurs, the specifications will in all cases prevail and take precedence over the drawings.

807. **VISITING SITE.** Before submitting a bid, each contractor shall carefully examine the drawings and specifications, visit the site and fully inform himself as to all existing conditions and limitations applying to the work, and estimate to take the site as it shall be found and include in the bid a sum to cover the cost of all items, either labor or materials, whether they are or are not specifically or particularly shown or noted but which are nevertheless implied or required to attain the completed conditions contemplated by the contract.

808. **SUBSTITUTIONS.** Each item referred to in these specifications is intended to represent the standard of merit of the particular materials or methods which will be required. The bids shall cover every such item or method as specifically described and should bidders desire to suggest any substitution for same which they consider equivalent in merit to that specified, they may do so, subject to the conditions of paragraph 901-g of these specifications, and shall state in their bid the difference in cost of the proposed substitution, if any.

If substitutions of materials or methods are offered as "equals" for approval, at the time the bids are submitted, they will be considered and should the Board wish to accept any of said substitutions, arrangements will be made for the change in the specifications before a contract is entered into.

If no substitutions are offered and/or accepted at the time the bids are submitted, no substitutions

or deviations from the materials or methods specified will be accepted later.

809. **BONDS.** See General Conditions, paragraph 918.

810. **LIABILITY INSURANCE.** See General Conditions, paragraph 916.

811. **FIRE INSURANCE.** See General Conditions, paragraph 917.

812. **PERMITS AND LICENSES.** See General Conditions, paragraph 925.

813. **RIGHTS OF CONTRACTORS.** See General Conditions, paragraph 934.

814. **GENERAL.** For information concerning hoisting service, scaffolding and runways, toilet facilities, temporary office, telephone service, lights, and guards, etc., see Section 10 of these specifications.

815. **RIGHT RESERVED TO REJECT PROPOSALS.** The Board reserves the right to reject any or all proposals and to waive any informality in any proposal received.

816. **TIME LIMITS.** The Bidder shall state in his proposal the time (number of calendar days), in which he proposes to complete his contract.

All time limits stated in the contract are of the essence of the contract. All expense incurred by the Board for rental of other quarters, and all expense incurred by any other contractor for storage of equipment, beyond the time limit stated in the accepted proposal of the Contractor, and all other expense of any kind caused solely by the delay or negligence of this Contractor, shall, subject to provisions of paragraph 930 of these specifications, be a proper charge against and shall be paid by this Contractor before the final settlement of this contract.

817. **RESERVATIONS.** The following portions of the work will be reserved by the Board from the General Contract:

a. Water service and meter in to curb line.
b. Gas service and meter into meter location.
c. Furnishing and installing all lighting fixtures.
d. All floor covering and laying of same.
e. All seats, chairs, tables and desks; all furniture, furnishings and equipment not indicated on the drawings, and all furniture and equipment indicated on the drawings and noted thereon as being reserved.
f Landscape gardening and planting.
g. Lawn sprinkling system.
h. All other features deemed desirable to be withheld from any particular contract.

818. **ALTERNATES.** Alternate methods of construction, if any, are set forth in detail hereinafter in this paragraph.

ALTERNATE A. Substitution of genuine wrought iron pipe and wrought iron or extra heavy cast iron fittings, for all copper or brass hot and cold water pipe and red brass fittings within the walls or beneath the floors of the buildings. See Section 1, "Alternate A," and paragraph 3414.

SECTION 9.

GENERAL CONDITIONS.

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917.	Fire Insurance.	935.	Separate Contracts.
918.	Guaranty Bonds.	936.	Assignments.
919.	Changes in the Work.	937.	Advertising Sign.

901. DEFINITIONS.

a. The **"Contract Documents"** consist of the Advertisement, the Agreement, the Questionnaire for Bidders, the Collusion Affidavit, the several Bonds, the Information for Bidders, the General Conditions, and the Drawings and Specifications, including all modifications thereof incorporated in the documents before their execution. These together form the Contract.

b. **The Owner, the Board, the Architect and the Contractor** are those named as such in the sub-paragraphs immediately following. They are treated thruout the contract documents as if each were of the singular number and masculine gender.

c. **The "Owner"** shall be deemed to be the City of.. ....

scribed in words which so applied have a well-known technical or trade meaning shall be held to refer to such recognized standards.

903. DETAIL DRAWINGS AND INSTRUCTIONS. The Architect shall furnish with reasonable promptness, additional instructions, by means of drawings or otherwise, necessary for the proper execution of the work. All such drawings and instructions shall be consistent with the contract documents, true developments thereof and reasonably inferable therefrom. The work shall be executed in conformity therewith and the Contractor shall do no work without proper drawings and instruction. In giving such additional instructions, the Architect shall have authority to make minor changes in the work not involving extra cost to the Owner and not inconsistent with the purpose of the building.

904. COPIES FURNISHED. The Architect will furnish to the Contractor, free of charge, all copies of drawings and specifications reasonably necessary for the execution of the work.

905. SHOP DRAWINGS. The Contractor shall submit, with such promptness as to cause no delay in his own work or in that of any other contractor, two copies of all shop or setting drawings and schedules required for his work and the Architect shall pass upon them with reasonable promptness. The Architect's approval of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from drawings or specifications unless he has in writing called the Architect's attention to such deviations at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules.

906. OWNERSHIP OF DRAWINGS AND MODELS. All drawings, specifications and copies thereof furnished by the Board are its property, and are to be returned to it on request, at the completion of the work.

907. SAMPLES. The Contractor shall furnish for approval all samples as directed in Section 11 of these specifications. The work shall be in accordance with approved samples.

908. ARCHITECT'S STATUS. The Architect will have general supervision of the construction of the building. It shall be his duty to direct all works and give instruction for the conduct and execution of all contracts. All Contractors and their representatives shall be subject to such instructions and directions and shall comply strictly therewith when given verbally or in writing. The Architect has authority to stop the work whenever necessary to insure the proper execution of the contracts.

909. ARCHITECT'S DECISION. Should any dispute arise between the Architect and contractor respecting the interpretation of the drawings or specifications or progress of the work or the cost of extra work or materials, the same shall be submitted to the Board, who shall within a reasonable time, render a decision on the same, which decision shall be final.

910. CONTRACTOR'S SUPERVISION. The Contractor shall give efficient supervision to the work, using his best skill and attention. He shall carefully study and compare all drawings, specifications and other instructions and shall at once report to the Architect any error, inconsistency or omission which he may discover.

The Contractor shall keep on his work during its progress a competent Superintendent, and any necessary assistants, all satisfactory to the Architect. The Superintendent shall not be changed by the Contractor except with the consent of the Architect, unless the Superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The Superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor.

911. MATERIALS, APPLIANCES, EMPLOYEES. Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, tools, water for building purposes and all equipment necessary for the execution of his work.

Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of good and satisfactory quality.

The Contractor shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

Wheresoever practicable, all materials shall be purchased from local dealers, and only local labor shall be used on the work; and where it is claimed to be not practicable, the burden of proof of such impracticability shall be upon the Contractor to the complete satisfaction of the Board.

912. INSPECTION OF WORK. The Board and its representatives shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for inspection.

913. CORRECTION BEFORE FINAL PAYMENT. The Contractor shall promptly remove from the premises all materials condemned by the Architect as failing to conform to the contract, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the contract and without expense to the Board and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

914. CORRECTION AFTER FINAL PAYMENT. Neither the final certificate nor payment nor any provision in the contract documents shall relieve the Contractor of responsibility for faulty mate-

rials or workmanship and he shall remedy any defects due thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the time of compeltion, unless otherwise provided. Said responsibility to be guaranteed by Workmanship Bond as provided in Section 7 and paragraph 918 of these specifications. The Board shall give notice of observed defects with reasonable promptness.

915. **PROTECTION OF WORK AND PROPERTY.** The Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Owner's property from injury arising in connection with this contract. He shall make good such damage or injury and shall adequately protect adjacent property and shall comply with all laws and ordinances and the contract documents relating to such protection.

916. **CONTRACTOR'S LIABILITY INSURANCE.** The Contractor shall take out and maintain at all times full and unlimited compensation insurance covering all persons employed by the Contractor on the work covered by this contract or in carrying out this contract in accordance with the State law, and furnish the Board with a certificate from the insurance carrier showing that the Contractor has taken out the full liability of the Contractor for compensation to injured persons and their dependents, and as provided by said law, which insurance shall be subject to the approval of the Board, as to sufficiency and adequacy of protection afforded thereby.

The Contractor shall provide such lights, guards, temporary fences, walks, covers and protection as may be required by law, ordinance or governmental regulation, and shall indemnify the Board against any loss, damage, liability, claim, expense or payment of any kind whatsoever by reason of any violation of any law, ordinance or governmental regulation by the Contractor or any employee or agent of such sub-contractor. To this end, the Contractor shall carry public and contingent liability insurance in amounts satisfactory to and in companies selected with the consent of the Board.

917. **FIRE INSURANCE.** The Contractor shall effect and maintain fire insurance upon the entire structure on which the work of all contracts is to be done and upon all materials in or adjacent thereto and intended for use thereon. It is understood that such insurance policy or policies shall be for the benefit of the parties in interest as their respective interest may appear.

918. **GUARANTY BONDS.** The Contractorshall furnish the Board a Material and Labor Bond, and a Workmanship Bond, each with approved corporate sureties and each of the bonds to be not less than twenty-five per cent of the contract price herein provided to be paid by Owner. The first shall be for laborers and materialmen as required by law. The second shall be for the full, complete and faithful performance of each and all of the conditions of the contract to the Owner and shall continue in effect for one year following the completion of all work included in the general contract, as a guarantee against defective material, workmanship and installation in said general contract. The cost of both bonds shall be borne by the Contractor. Bonds shall be furnished only on forms Section 6 and Section 7 of these specifications. On contracts amounting to less than $2,000.00 the Material and Labor Bond may be waived at the option of the Board.

919. **CHANGES IN THE WORK.** The Board, without invalidating the contract, may make changes, not exceeding a total of twenty per cent (20%) of the contract price, by altering, adding to or deducting from the work, the contract sums being adjusted accordingly. All such work shall be executed under the conditions of the original contract except that any claim for extension of the time caused thereby shall be adjusted at the time of ordering such change.

No change shall be made unless in pursuance of a written resolution of the Board, transmitted by the Architect, or a written order from the Architect stating that the Board has authorized the change, and no claim for an addition to the contract sum shall be valid unless ordered specifically in the manner provided in this paragraph. The value of such change shall be determined in one of the following ways:

a. By estimate and acceptance in a lump sum;

b. By cost and percentage;

In case "b," the Contractor shall keep and present in such form as the Architect may direct, a correct account of the net cost of labor and materials, together with vouchers. In any case, the Architect shall certify to the amount, including a reasonable profit due to the Contractor.

920. **CLAIMS FOR EXTRAS.** If the Contractor claims that any instructions, by drawings or otherwise, involve extra cost under this contract, he shall give the Architect written notice thereof before proceeding to execute the work, and in any event within five days of receiving such instructions, and the procedure shall then be as provided in paragraph 919 above. No such claim shall be valid unless so made.

921. **APPLICATIONS FOR PAYMENTS.** The Contractor shall submit to the Architect monthly an estimate in triplicate for each payment, accompanied if required by receipts or other vouchers showing his payments for materials and labor.

Each estimate shall be submitted at least five days before the first day of each month, and the Contractors shall, accompanying the first of such estimates, submit to the Architect a schedule of values of the various parts of the work, segregating the total sum of the contract, supported by such evidence as to its correctness as the Architect may direct.

The estimate submitted shall be in the following general form:

Amount of Original Contract - - - - - - - - - - - - - - - $..... ....

Authorized Additions - - - - - - - - -	$.....	
Authorized Deductions - - - - - - - - -	$.....	$.....
		(Net Adjustment here)
Adjusted Contract Price to Date - - - - - - - - - - - -		$.....
Less Value of Uncompleted Work - - - -	$.....	
Less 10% Retained as per Contract - - - -	$.....	
Less Previous Payments on Account - - -	$.....	$.....
		(Total of Deductions here)
Value of this Estimate - - - - - - - - - - - - - - - - - -		$.....

922. **CERTIFICATES AND PAYMENTS.** Upon the receipt by him of the monthly estimate in triplicate, as provided in paragraph 921 preceding, the Architect shall, not later than the first day of each month, issue to the Contractor a certificate for such amount as he decides to be the proper value of the work completed at that date, minus a retainage of ten per cent, which will be paid to the Contractor upon satisfactory completion and acceptance of the entire contract.

No certificate issued nor payment made to the Contractor nor partial or entire use or occupancy of the work by the Owner, shall be construed as an acceptance of any work or materials not in accordance with this contract.

923. **PAYMENTS WITHELD.** The Architect may withold, or, on account of subsequently discovered evidence, nullify the whole or any part of any certificate for payment to such extent as may be necessary to protect the Owner from loss on account of:

a. Defective work not remedied.
b. Claims or liens filed or reasonable evidence indicating probable filing of claims or liens.
c. Failure of the Contractor to make payments properly for materials or labor.
d. A reasonable doubt that the contract can be completed for the balance then unpaid.
e. Damage to another contractor under paragraph 934.
f. Refusal or neglect to comply promptly with the instructions of the Architect in the execution of the work.

924. **LIENS AND CLAIMS.** Neither the final payment nor any part of the retained percentage shall become due until the Contractor, if required, shall deliver to the Board a complete release of all liens or claims arising out of this contract, or receive in full in lieu thereof, but the Contractor may, if any sub-contractor or materialman refuse to furnish a release or receipt in full, furnish a bond satisfactory to the Board, to indemnify it against any such claim.

925. **PERMITS AND REGULATIONS.** The Architect shall procure and pay for the general permit for the entire building. The Contractor shall procure and pay for all other permits and licenses required for his work, but not for permanent easements, and shall give all notices, pay all fees and comply with all laws, ordinances, rules and regulations bearing on the conduct of his work as drawn and specified. Such permits and licenses shall be in conformity with the plans and specifications but if the Contractor observes that, thru no fault of his own, the same are at variance with the drawings and specifications, he shall promptly notify the Architect in writing and any necessary changes shall be adjusted as provided in paragraph 919 of these specifications.

926. **ROYALTIES AND PATENTS.** The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except on account of such patented products as are expressly called for in the specifications.

927. **USE OF PREMISES.** The Contractor shall confine his apparatus, the storage of materials and the operation of his workmen to limits indicated by law, ordinance, permits, or directions of the Architect and shall not unreasonably encumber the premises or adjacent streets with his materials.

The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

The Contractor shall enforce the Architect's instructions regarding signs, advertisements, fires and smoking.

928. **CLEANING UP.** The Contractor shall at all times keep the premises thoroly free from accummulations of waste material or rubbish caused by his employees or work. At the completion of the work he shall remove all his rubbish from and about the building; all wood blocks, pieces of wood, shavings and all other wooden or cellulose debris of any nature whatsoever from beneath the wood floor of the building; and all his tools, scaffolding and surplus materials and shall leave his work "broom clean" or its equivalent, unless more exactly specified. In case of dispute, the Owner may remove the rubbish and charge the cost to the Contractor.

929. **CUTTING, PATCHING AND DIGGING.** The Contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts assemble properly and fit it to receive or be received by the work of other contractors shown in or reasonably implied by the drawings and specifications for the completed structure and he shall make good after them as the Architect may direct.

Any cost caused by defective or ill-timed work shall be borne by the party responsible therefor.

The Contractor shall not endanger any work by cutting, digging or otherwise, and shall not cut

or alter the work of any other contractor save with the consent of the Architect

930. **DELAYS.** If the Contractor be delayed in the completion of the work by any act or neglect of the Board or the Architect, or of any employee of either, or by any other contractor employed by the Board, or by changes ordered in the work, or by strikes, lock-outs, fire, unusual delays by common carriers, unavoidable casualties or any causes beyond the Contractor's control or by any cause which the Architect shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the Architect may decide.

No such extension shall be made for delay occurring more than seven days before claim therefor is made in writing to the Architect. In case of a continuing cause of delay, only one claim is necessary.

931. **OWNER'S RIGHT TO DO WORK.** If the Contractor should neglect to prosecute the work properly or fail to perform any provisions of this contract, the Board, after three days' written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then and thereafter due the Contractor, provided, however, that the Architect shall recommmend both such action and the amount to be charged to the Contractor.

932. **OWNER'S RIGHT TO TERMINATE CONTRACT.** If the Contractor should, except in cases recited in paragraph 930, persistently or repeatedly refuse or fail to supply enough properly skilled workmen or proper materials or persistently disregard laws, ordinances or the instruction of the Architect or otherwise be guilty of a substantial violation of any provision of the contract, then the Board, upon the recommendation of the Architect that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor three days' written notice, terminate the agreement with the Contractor and take possession of the premises and of all materials, tools and appliances thereon and finish the work by whatever method it may deem expedient. In such cases, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and the damage thru the Contractor's default, shall be certified by the Architect.

933. **APPROVAL OF SUB-CONTRACTOR.** Before sub-letting any portion of his work, the Contractor shall submit for the approval of the Architect a written list of the sub-contractors proposed for the various portions of the work, and no sub-contract shall be let to any sub-contractor without the written approval of the list of proposed sub-contractors by the Architect.

934. **MUTUAL RESPONSIBILITY OF CONTRACTORS.** Should the Contractor cause damage to any other contractor on the work, the Contractor agrees, upon due notice, to settle with such contractor by agreement, if he will so settle. If such other contractor sues the Owner on account of any damage alleged to have been so sustained, the Board shall notify the Contractor who shall defend such proceedings at his own expense and, if any judgment against the Owner arises therefrom, the Contractor shall pay or satisfy it and pay all costs, including any and all attorney's fees incurred by the Owner.

935. **SEPARATE CONTRACTS.** The Board reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and co-ordinate his work with theirs.

If any part of the Contractor's work depends for proper execution or results upon the work of any other contractor, the Contractor shall, before starting the work, inspect and promptly report to the Architect any defects in such work that render it unsuitable for such proper execution and results. His failure so to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other contractor's work after the execution of his work.

To insure the proper execution of his subsequent work, the Contractor shall, before the commencement of subsequent work, measure work already in place and shall at once report to the Architect any discrepancy between the executed work and the drawings.

936. **ASSIGNMENT.** Neither party to the contract shall assign the contract without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the previous written consent of the Board.

937. **ADVERTISING SIGN.** The Contractor may erect upon the site of the building, during the course of construction, an advertising sign setting forth the names, addresses and businesses respectively of the Architect, the General Contractor and all other sub-contractors; provided, that the cost of such sign shall not be included either directly or indirectly in the contract price, nor at the expense of the Library in any other way; and that the said sign shall be removed from the premises upon completion and acceptance of the building.

SECTION 10.

TEMPORARY STRUCTURES, EQUIPMENT AND SERVICE.

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1004.	Temporary Office.	1010.	Scaffolding.
1005.	Sheds.		

1001. **PRELIMINARY REQUIREMENTS.** The Contractor shall furnish, install and maintain all of the following temporary structures, equipment and service for the entire period of their necessity during the full life of this contract:

1002. **PROTECTION.** Protect the building, grounds, trees, shrubs and other property of the Owner from damage during building operations; cover and protect sidewalks and curbs with planks and earth where teams or trucks may cross, and repair all damage done thereto, in a manner satisfactory to the City authorities and to the Architect.

1003. **LIGHTS AND GUARDS.** Furnish and maintain, from the beginning to the completion of the work, all lawful or necessary guards, railings, lights and warning signs, and take all other precautions necessary to avoid injury or damage to all persons and property.

Protect all service mains, pipes, lamp posts, fire hydrants and adjacent property of all kinds in a proper manner as required by the local authorities or the Architect. Give ample notice to all public utility corporations so that they may take proper care of their equipment which may at the time be located on the premises.

1004. **TEMPORARY OFFICE.** Provide and maintain on the premises a temporary office building, not less than 10 ft. by 8 ft. inside dimensions, for the use of Contractors and Architect. Walls and floors shall be of surfaced lumber, roof or 2-ply composition. Wall, floor and roof shall be absolutely weather-tight.

1005. **SHEDS.** Furnish and maintain all the necessary sheds and storage facilities for the proper storage of cement, lime, and other perishable materials. The size, number and locations of such sheds shall be subject to the approval of the Architect. Sheds shall have floors not less than 12 inches above the ground. Roof, sides and floor shall be absolutely weather-tight; floor and sides shall be of strength adequate to support safely the maximum load imposed thereupon.

1006. **TOILET FACILITIES.** Provide and maintain in a sanitary condition ample toilet facilities for all employees of the contractor's while engaged on the building.

1007. **TELEPHONE SERVICE.** Provide, maintain and pay for (from start to completion of the building), such public service—water, electric, gas and telephone—for the use of the Architect, Owner, and all contractors or their authorized representatives, as may be necessary for the proper construction of the building. Long distance telephone calls may be made only by permission of the General Contractor, who shall be responsible for the collection and payment of all charges.

1008. **ENGINEERING SERVICE.** Employ a competent engineer to lay out the work and establish all points, lines, grades and elevations and be responsible for their accuracy.

1009. **HOISTING PLANT.** Furnish, maintain and operate where required, mechanical hoisting plants of modern approved type necessary for use in properly erecting the work. The location of the plant shall be arranged to cause no damage to the building and smoke or otherwise, and no delay to the progress of the work of any trades. This Contractor shall be responsible for any damage or injuries due to defective hoisting plants.

1010. **SCAFFOLDING.** Furnish, erect and maintain all scaffolding and runways required by all contractors on the building for the prosecution of their work. Same shall be erected, equipped and maintained in compliance with all statutes, laws, ordinances, rules or regulations of the State, municipal or other authorities or insurance carriers having jurisdiction, and shall be approved by the Architect.

SECTION 11.

SAMPLES.

Index.

Paragraph	Subject
1101.	Samples of Material.
1102.	Submission of Samples.
1103.	Sampling and Testing.

1101. SAMPLES OF MATERIAL. The following samples subject to laboratory tests, (if not conditionally approved) shall be submitted to the Architect with the names of the manufacturers and brands. The minimum time required for making tests is generally 7 days after the receipt of the sample. The quantities stated are the least that can be considered.

Portland cement, each kind, 8 pounds, except mill tested cement.
Masonry cement, 8 pounds.
Asphalt Coal Tar Pitch for roofing, one quart.
Asphalt or Coal Tar Saturated Rag Felt, 15-lb. full width of roll 40 in. long.
Asphalt or Coal Tar Saturated Flashing Felt, 30-lb. full width of roll 40 in. long.
Asphalt or Creosote Primer for roofing, one quart.
Elastic Pointing Compound for Masonry, 2 pounds.
Elastic Slaters Cement, 2 pounds.
Pyroxylin Lacquer, one quart.
Linseed Oil, raw, one quart.
Linseed Oil, boiled, one quart.
Drier, one quart.
Turpentine, one quart.
Floor Hardener, liquid, one quart.
Red Lead, dry, five pounds.
White Lead, paste, five pounds.
Zinc Oxide Paste, five pounds.
Finishing Wax, half pound.
Penetrating Varnish, one quart.
Floor Filler and Floor Finish, one quart each.
Whiting Putty, two pounds.
Water-Cement Paint, one quart.
Washable Cold Water Paint, one quart.
Insulating Material, 12 in. x 12 in. duplicate.
Sand for Concrete, two pounds.
Sand for Brick Mortar, two pounds.
Sand for Plastering, two pounds.
Sand for Stucco, two pounds.
Common Brick, ten representative bricks.
Face Brick, in sufficient number to show range of colors.
Paving Brick, in sufficient number to show range of colors.
Architectural Terra Cotta, 2 in.x6 in.x6in in duplicate of each finish and color required.
Stone, 2 in. x 12 in. x 12 in., finished as specified. (In duplicate showing the extreme in color and marking.)
Interior Marble, about one sq. ft. finished as specified. (In duplicate showing the extremes in color and marking.)
Stucco, 12 in. x 12 in., showing color and texture.
Ornamental metal work showing workmanship and finish.
Aluminum work; corner section of door and trim, showing construction. Separate samples, each about 3 in.x6 in., showing finishes.
Roofing Tile, showing shapes, quality and range of colors.
Floor Tile, each type showing colors and quality.
Wall Tile, each type showing colors and quality.
Terrazzo, about one sq. ft.
Liquid Waterproofing for stone work.
Glass, each kind, 6x12 in.
Builders' Hardware for one door to show work manship, materials and finish.
This is the minimum of hardware samples required and the Contractor may submit any additional samples or drawings that he considers necessary.
Aggregate, each kind except sand, two quarts.
Hollow Tile.

Gypsum Block, if used.
Metal Lath.
Corner Bead.

1102. SUBMISSION OF SAMPLES.

a. **Time of Submission.** No samples are required to be submitted with the bids. The samples specified shall be submitted after the award of the contract. Any other samples of materials for use in the work shall be submitted by the Contractor when so requested by the Architect. No action will be taken on samples until after acceptance of the Contractor's Bond.

b. **Transportation Charges.** All transportation charges on samples shall be prepaid. All samples shall be submitted in time for proper consideration and action by the Architect before materials which samples represented are delivered at the work.

c. **Packing.** All samples shall be so packed as to reach their destination in good condition. Each sample shall have a label indicating the material represented, its place of origin and the name of the producer, the name of the Contractor and the name of the building or work for which the material is intended.

d. **Letter of Transmission.** To insure consideration of samples each shipment shall be submitted by a letter, signed by the Contractor, and containing a list of the samples, the name of the building or work for which the materials are intended and the brands and names of the manufacturers of materials subject to laboratory tests. This letter must not be sent in the same package with the samples.

The Contractor shall furnish to the Board copies of all letters submitting samples to the Architect.

e. **Purpose of Testing.** The approval of any sample shall be only for the characteristic or for the uses named in such approval and no other. No approval of a sample shall be taken in itself to change or modify any contract requirement.

f. **Return of Samples.** Samples that are not approved will be returned to the Contractor only upon his request and at his expense.

g. **Waiver of Tests.** In case of materials subject to laboratory tests, the Contractor may submit in lieu of samples the names of the manufacturers and the brands of the materials proposed. Those of a known standard of merit that have been frequently tested and found to meet the requirements of the specification, may be approved at the discretion of the Architect without further test.

1103. SAMPLING AND TESTING. All sampling and testing of the respective materials used in the construction of the building shall be performed in strict accordance with the latest specifications of the American Society for Testing Materials. All tests shall be made by a standard testing laboratory approved by the Architect. All expenses of sampling and testing of materials shall be borne by the Contractor.

SECTION 12.

GRADING AND EXCAVATING.

Index.

Paragraph.	Subject.
1201.	Work Not Included.
1202.	Scope of the Work.
1203.	Excavation.
1204.	Termite Prevention.

1201. **WORK NOT INCLUDED.** The excavating and backfilling for gas, water, sewer and electric service or laterals, which are included in "Plumbing" and "Electrical Work," Sections 34 and 36 respectively, of these specifications.

1202. **SCOPE OF THE WORK.**

a. All excavating and removal from premises of all surplus earth, etc.
b. Protection.
c. All grading, making all cuts and fills, forming terraces, etc., and all backfilling.

1203. **EXCAVATION.** Do all necessary excavating for basement, walls, foundations, areas, walks, etc., as indicated by drawings, to the full width and depth indicated, and in level benches, squared neatly at all corners, enough extra width being allowed for building of forms where necessary and for waterproofing walls.

Material which is practicable to remove and handle with pick and shovel, or by hand, or to loosen and remove by power shovel, shall be classed and paid for as "earth." All other material shall be classified as "rock," and paid for under the provisions of paragraph 920 of these specifications. No rock excavation shall be performed until measured in place by the Architect, and written instructions given by him to proceed.

All footings must start on level, sound, undisturbed earth or rock and no footings shall be placed on refilled or unsafe soil.

The space under cement floors, concrete slab on terrace, and walks (where laid on the ground) shall be graded and filled with clay or gravel in layers not more than one foot thick, thoroly soaked and rammed for concrete base to the proper level to receive same. All walks shall be graded to the elevations shown and left smooth and even. Backfill and ram thoroly around all walls and foundations both inside and outside.

No earth from excavations to be left under building. Earth beneath wood floors shall be graded to a minimum of 30 inches from undersurface of floor to level of ground beneath. All other surplus earth shall be removed from the premises and disposed of by the Contractor. All finished surfaces where fills or cuts occur shall be neatly slab-harrowed smooth and even.

1204. **TERMITE PREVENTION.** After completion of the building, thoroly saturate the surface of the unexcavated ground beneath the floor with a solution of zinc chloride, 4 pounds of the dry crystalline salt to each 5 gallons of water.

SECTION 13.

SUB-DRAINAGE.

Index.

Paragraph	Subject
1301.	Scope of the Work.
1302.	Materials.
1303.	Workmanship.
1304.	Tests.

1301. **SCOPE OF THE WORK.** Work under this heading includes the complete system of sub-drains with their clean-outs, catch basins and out-fall or sewer connections. For extent and location see Drawings.

1302. **MATERIALS.** Cement, sand and aggregate are specified under "Concrete and Cement Work," Section 14, of these specifications. Metal work, except piping, is included under "Miscellaneous Metal Work," Section 20; Back-fill is specified under "Grading and Excavating," Section 12; Brick and mortar are specified under "Masonry Work," Section 16.

Drain tile shall be sound, hard-burned, agricultural tile, reasonably straight and smooth inside, and when tapped lightly with a hammer shall give forth a clear, ringing sound. Tile with bell-and-spigot joints shall be standard weight and quality; "Y" fittings at intersections and eighth bends at changes in direction of drains. Tile shall be 4 inches inside diameter, unless otherwise noted. Iron pipe shall be extra heavy cast iron soil pipe and fittings. Clean-out fittings, piping thru walls and footings and piping from catch basin to sewer shall be extra heavy cast iron. Each clean-out shall have iron ferrule and cast brass, screw-jointed plug with socket or raised head for wrench. Backwater valve in catch basin shall be extra heavy pattern brass-gated valve with brass screw plug hand hole.

1303. **WORKMANSHIP.** Drain tile and pipe shall be laid to true grades and alignment, with a continuous fall in the direction of the flow. Drain tile shall be laid on a bed of concrete placed as the tile are laid. Joints of plain agricultural tile shall be left open ½-inch and wrapped with No. 14 copper wire gauze. Joints of bell-and-spigot pipe shall be caulked with oakum and filled solid with cement mortar. Joints of cast iron piping shall be made with oakum gasket and caulked with lead. Concrete shall be mixed and placed as specified for similar work under "Concrete and Cement Work." Brick shall be laid in full mortar beds and all joints filled. Inside of catch basin shall be parged with mortar and troweled smooth. Metal work shall be built in as the work progresses.

1304. **TESTS.** Sub-drains shall be tested with water before they are covered and the entire system again tested after the back-fill is placed. Any obstructions found shall be removed and the test repeated until the system is satisfactory.

SECTION 14.

CONCRETE AND CEMENT WORK.

Index.

Paragraph	Subject	Paragraph	Subject
1401.	Work Not Included.	1415.	Mixing.
1402.	Scope of the Work.	1416.	Consistency.
1403.	Tests of Materials.	1417.	Placing.
1404.	Cement.	1418.	Construction Joints.
1405.	Reinforcing Steel.	1419.	Protection of Exposed Surfaces.
1406.	Aggregate.	1420.	Patching.
1407.	Crushed Rock.	1421.	Cement Floors.
1408.	Gravel Rock.	1422.	Cement Finishing.
1409.	Sand.	1423.	Marking.
1410.	Cleaning Forms.	1424.	Cement Base.
1411.	Proportions—Plain Concrete.	1425.	Wetting.
1412.	Water-Proofing.	1426.	Liquid Floor Hardener.
1413.	Reinforced Concrete.	1427.	Inserts, Etc.
1414.	Concrete Slabs Over Wood Joists.	1428.	Heat Ducts and Vents.

1401. **WORK NOT INCLUDED.** Foundation and walls for heating, air-conditioning and other mechanical equipment, and all brick, cast stone, hollow tile, plaster and stucco work, as specified elsewhere under the proper section in these specifications.

1402. **SCOPE OF THE WORK.** The following is a brief list of the work included but shall not be considered as a complete schedule:

a. All plain and reinforced concrete work, except as noted above. The forms are specified under "Carpenter and Mill Work," Section 22 of these specifications.

b. Furnishing and setting of all metal reinforcing.

c. Setting all inserts, wall plugs and spot grounds for trim, anchorages for stone trim (where they occur in concrete,) tin or G. I. pipe sleeves for all pipe work and mechanical work.

d. All cement finishing.

1403. **TESTS OF MATERIAL.** Materials of construction as noted below shall be sampled and tested as provided in Section 11 of these specifications. Tests made by the manufacturer, or by anyone in his employ will not be accepted. A certified copy of all test reports shall be filed each in the office of the Architect and the Board.

1404. **CEMENT.** All cement used shall be delivered at the site in unbroken original packages, stored in watertight sheds, with floor raised at least 12 inches above the ground. Best quality of reputable brand of Portland cement shall be used thruout, subject to approval by the Architect.

All cement used for all construction work shall be tested. The Architect shall determine whether the cement is to be sampled at the job, or at the warehouse, or at the mill. One report shall be furnished to the Architect, for every 200 bbls. of cement or fractional part thereof. Said test shall meet all the requirements of the latest specifications for "Uniform Tests of Cement" as adopted by the American Society for Testing Materials.

1405. **REINFORCING STEEL.** All steel for reinforcing shall be rolled from billets of structural grade and shall meet all the requirements of the specifications known as the "Manufacturers' Standard Specifications for Billet-Steel Concrete Reinforcement." Bars shall be deformed of approved shapes, new and free from rust scales, dirt, oils, grease or other matter detrimental to the positive adhesion to the concrete.

All reinforcing bars used in the concrete construction shall be tested. There shall be a tensile test and a bending test of one bar selected at random from each ten tons or fractional part thereof of each size and kind of reinforcing steel. All reinforcing steel must show by test report that it has an ultimate tensile strength of not less than 55,000 lbs. per square inch, a yield point of not less than 33,000 lbs. per square inch, and that it can be bent around a 1-inch rod parallel upon itself without breakage across the bend of any of the fibers.

All concrete floors, and steps and landings on fill, shall be reinforced for shrinkage with $\frac{\text{4 in. x 12 in.}}{\text{No. 8 - No. 12}}$ electrically welded wire mesh, free from rust.

1406. **AGGREGATES.** Either sand and washed screened gravel rock, or sand and crushed rock, at the option of the Contractor and with the approval of the Architect, shall be used for concrete aggregates. All shall be clean and free from quicksand, dirt, loam or vegetable matter.

1407. **CRUSHED ROCK.** All crushed rock shall be hard and durable, clean and free from fine dust or coatings and soluble substances, and of the following sizes: For footings and foundation walls, the rock shall pass thru a 1½-inch ring to mimimum size retained on a ¼-inch screen and uniformly graded for sizes. For reinforced work, other than footings and foundation walls, the rock shall pass thru a ⅝-inch ring, and from this size down to pea size, uniformly graded.

1408. **GRAVEL ROCK.** All gravel rock must be hard, clean and washed and of the sizes and proportions specified for crushed rock, free from dirt, loam or vegetable matter. Gravel containing mud balls will be condemned and rejected.

1409. **SAND.** All sand shall be clean sharp quartzite, granite or other equally hard material, graded from fine to coarse, with coarse particles predominating and containing not more than 5% of clay or silt. All sand shall comply with the requirements of the Standard Colorimetric (3% Sodium Hydroxide solution) test for excess organic impurities, tannic acid, etc. All the different grades of rock and sand must be delivered separately. Sand containing mud balls will be condemned and rejected.

1410. **CLEANING FORMS.** Forms shall be thoroly cleaned out, and all blocks, sawdust and debris of all kinds removed. Forms shall be saturated with water before concrete is poured. No forms shall be removed until concrete has thoroly set, as directed by the Architect. If trenches are straight and to proper size, no forms will be needed; otherwise, side boards must be set. Trenches shall be thoroly cleaned, as above specified, before placing concrete.

1411. **PROPORTIONS—PLAIN CONCRETE.** All concrete for footings and foundation walls, piers, areas, and other plain concrete work, shall be composed of a mixture not weaker than 1 part cement to 3 parts sand and 4 parts aggregate, leaving smooth, even surfaces when forms are removed.

1412. **WATERPROOFING.** All walls surrounding excavated spaces in basement, and concrete floors resting on earth foundation, shall be waterproofed with membrane waterproofing as provided in Section 15 of these specifications.

1413. **REINFORCED CONCRETE.** Concrete for lintels, beams, girders, steps, floor slabs, basement floors and walls, and other reinforced work, shall be composed of a mixture not weaker than 1 part cement, 2 parts sand and 3½ parts aggregate, forming a dense impervious concrete, leaving smooth surfaces when forms are removed, to which shall be added at the mixer 1½ lbs. diatomaceous silica mineral admixture, to increase workability for each 96-lb. sack of cement, before the mixture is wetted; (the mineral admixture may be measured in pre-determined volume and in such manner as will insure the accurate proportions by weight.)

1414. **CONCRETE SLABS OVER WOOD JOIST.** In toilets and janitor's room, and elsewhere, where tile and cement floors are indicated on drawings, concrete slab over wood joists shall be of thickness indicated on plans and reinforced with ¼-inch reinforcing bars every 12 inches O. C. both ways, laid on wood false floors.

1415. **MIXING.** All concrete shall be thoroly mixed with a batch mixer of approved make and size, for a period of not less than one minute after all materials are in mixer, at a speed of not more than 18 R. P. M. The mixing or use of droppings from the mixer, or mortar or concrete that has partly set, shall not be permitted.

1416. **CONSISTENCY.** The materials shall be mixed wet enough to produce a concrete of such consistency as will slump not to exceed 1¼ inches when tested under tentative Standard Slump Test D-138, American Society for Testing Materials, and will flow sluggishly into the forms and about the metal reinforcement, and which at the same time can be conveyed from the mixer to the forms without separation of the coarse aggregate from the mortar. **An excessive amount of water must not be used. The Architect shall have the option of changing the mix slightly as necessary, depending on the grade of the aggregate.**

1417. **PLACING.** The Architect shall be notified not less than twenty-four hours prior to placing of any concrete under this contract. No concrete shall be placed except under the personal supervision of the Architect, or other authorized representative of the Board.

All concrete while pouring, must be tamped and puddled by thoroly vibrating the forms with a No. 4 Black and Decker electric hammer, or by other standard vibrator approved in writing by the Architect. Concrete must be kept approximately level in the forms and not allowed to flow by gravity from one part of the forms to another. All footings shall be run separate from walls. In placing concrete, the mixture must entirely surround the reinforcing steel; all steel must be in proper position **and the concrete well worked into all corners to prevent honey-comb or air or gravel pockets.** Any concrete containing excessive honey-comb and porous spots shall be removed and replaced at the Contractor's expense. Slabs (where cement finish is to be applied) shall be stopped off not less than ¾-inch for cement finish; the landings, steps, platforms, copings, walks, etc., not less than ¾-inch; all concrete to be rough cross-scored to form bond for finish. Where tile brick paving or stone steps are indicated concrete shall be kept low enough to allow for 1-inch bed.

Construction joints shall be avoided where possible in work that is shown continuous. Vertical

joints shall be tongued or tenoned to bond the connecting sections. Horizontal joints shall be free from soft or spongy material and shall have a perfect bond between the layers of concrete.

The depths of footings and thickness of slabs as indicated are the minimum required. Footings shall have no horizontal joints and may have vertical joints only at junctions of wide and narrow section, or midway between concentrated loads or on center lines of structural divisions.

Columns or piers shall be placed continuously up to a level 1 inch below the column head or connecting beam or girder. Columns or piers shall be poured at least two hours in advance of the superimposed concrete.

Reinforced slabs, beams, girders, etc., shall be poured continuously if possible. Where construction joints cannot be avoided they shall be perpendicular to the axis or surface of the member jointed and at the center of the span. If an intersecting member occurs at that point, the joint shall be off-set twice the depth of the intersecting member.

Concrete soffits for steel framing shall be placed wholly from one side and forced thru to the other side.

1418. **CONSTRUCTION JOINTS.** As far as possible each unit of construction shall be poured in one operation without joints. All footings shall be poured in one operation until the whole footing is completed. Should it become necessary to make construction joints, except footings, same shall be done only under supervision of Architect and tied together with dowels of reinforcing steel.

1419. **PROTECTION OF EXPOSED SURFACES.** The surfaces of concrete exposed to premature drying shall be covered and kept wet for a period of at least seven days after pouring. The work shall be protected against any and all damage resulting from temperature changes or from the action of the elements at all times. Any damage from these or other causes shall be properly repaired by this Contractor at his own expense.

1420. **PATCHING.** Immediately after forms are removed, outside of all work shall be gone over and all spalls or gravel pockets carefully patched with cement mortar of same mix as concrete. All rough concrete shall be kept well wet down for at least ten days after pouring.

1421. **CEMENT FLOORS.** Where cement floor or paving slabs are laid on the ground, as noted on drawings, the earth shall first be brought to a level at under side of slab and the ground. well soaked with water and tamped, then laid with a base of concrete of the same proportions and mixture as set forth in paragraph 1413 above, reinforced where indicated on the plans, well tamped and finished monolithically as hereinafter specified.

1422. **CEMENT FINISHING.** Apply cement finish to all floors, steps, platforms, walks, copings, terrace borders, and the like, where indicated on drawings. Cement finish to be monolithic with pouring of concrete if possible to do so.

If it becomes necessary, temporarily, to omit cement finish and apply later, the concrete, just previous to applying cement finish, shall be treated as follows: Brush concrete with wire brush until aggregate is exposed, then give liberal coat of water and hydrochloric acid in proportion of 1 part acid to 5 parts water; wash thoroly with hose under pressure, until slab is thoroly saturated; remove surplus water and apply slush coat of neat cement brushed on with stiff broom. Follow immediately with finishing coat not less than ¾-inch thick of 1 part cement and 2 parts clean, sharp sand, trowel to a hard smooth plane, free from humps or depressions. Finish of ramps shall be rough float or broom finish. Cement finish that responds to tapping with a hollow sound shall be removed and replaced by the Contractor at no additional expense to the Owner.

Treads and landings of all interior and exterior stairways and steps shall be sifted evenly and uniformly with Carborundum No. 20 grit, or No. 20 non-slip emery, in a cheese-cloth or mosquito net bag, four ounces to every square foot over the cement topping, and lightly troweled before this topping has had time to set.

1423. **MARKING.** Marking shall be done with a marking tool, cut deep, clean and straight, as shown on the plans.

1424. **CEMENT BASE.** Run cement base, where and of height indicated on drawings, of same mix as cement finish. Cement base shall be applied directly to masonry or concrete; and on stud walls on metal lath, extending from ½-inch from top of base into floor 4 inches. Base shall finish ¼-inch beyond finish plaster, with rounded corner and at floor with 1-inch diameter cove.

1425. **WETTING.** All cement finish and base shall be kept wet down for at least one week after finishing. It shall be covered with at least 2 inches of sawdust or sand which shall be kept moist by sprinkling, as directed by Architect. No redwood shavings or sawdust shall be used.

1426. **LIQUID FLOOR HARDENER.** All interior cement floors shall be treated with an aqueous solution of magnesium fluosilicate and zinc fluosilicate. Each gallon of the solution shall contain not less than 2 pounds of magnesium fluosilicate and zinc fluosilicate crystalline salts. At least 25 per cent by volume of the salts shall be zinc fluosilicate. The liquid hardener shall be delivered ready for use and in the original wooden containers.

The cement finished surfaces shall be clean and dry when treated. The hardener shall be applied freely and evenly in at least three coats. For the first and second coats the hardener shall be diluted with an equal quantity of water, using ½-gallon of hardener and ½-gallon of water on each 100

square feet of floor surface. For the third coat the hardener shall be used full strength, using 1 gallon on each 100 square feet of floor surface.

After the final action is completed, any surplus material shall be removed from the surface, leaving the cement work clean and without discoloration.

1427. **INSERTS, ETC.** Set all anchors, bolts, inserts and the like that occur in the concrete. Also furnish and set all metal sleeves for all pipe work, mechanical work and railings, wheresoever shown on drawings.

1428. **HEAT DUCTS AND VENTS.** All heat ducts and vents of concrete, brick or vitrified tile, beneath concrete floor on earth fill, shown on plans, are included in and a part of the general contract.

SECTION 15.

WATER-PROOFING AND DAMP-PROOFING.

Paragraph	Subject
1501.	Scope of Work.
1502.	Materials.
1503.	Workmanship.
1504.	Stonework.
1505.	Exterior Brick Work.

1501. **SCOPE OF WORK.** Water-proofing of the floors and exterior sides of all inside and outside walls surrounding excavated rooms in the basement; damp-proofing the tops of foundation walls, and interior sides of all exterior masonry, concrete, brick, and tile walls to be plaster finished.

1502. **MATERIALS.** Materials shall conform strictly to the latest specifications of the American Society for Testing Materials for water-proofing asphalt, water-proofing coal tar pitch, asphalt primer for concrete, 15-pound asphalt, water-proofing felt, and 15-pound water-proofing tar felt, and colorless liquid water-proofing for stone and brick, respectively. Creosote oil, either grade 1 or grade 2, shall conform to the Standard Specifications of the American Wood Preservers' Association for these respective materials.

1503. **WORKMANSHIP.** All surfaces that are to be water-proofed shall be clean and dry, reasonably smooth and free from defects that would prevent the proper application and adhesion of the water-proofing. Joints shall be neatly struck and any holes, cracks, etc., pointed flush with cement mortar. Concrete surfaces shall be given a heavy coat of creosote oil or asphalt primer just before starting the water-proofing. The membrane shall consist of five layers of felt and six layers of bitumen and shall be continuous over entire area to be water-proofed, and shall be applied in one operation unless otherwise shown.

The pitch or asphalt shall be heated to flow freely, 375 degrees F. for pitch, and 400 degrees F. for asphalt, and mopped on in uniform coats of at least 30 pounds each per 100 square feet of surface. Felt and fabric shall be completely bedded in bitumen over all underlying surfaces and all air pockets, wrinkles, etc., shall be removed. The felt shall be laid in regular courses with lapped joints and the joints in succeeding courses broken at least one-third the width of the felt. The final course of felt shall be covered with a mopping of pitch.

Damp-proofing shall consist of one coat of creosote oil, or asphalt primer and at least two coats of coal tar pitch or asphalt. The bitumen shall be heated to flow freely, not above 375 degrees F. for pitch or 400 degrees F. for asphalt, and shall be evenly applied. The finished work shall present an impervious, patent-leather-like surface and any dull or porous spots that appear shall be corrected by additional coats of bitumen. Surfaces that are to be damp-proofed shall be clean, dry and reasonably smooth and all holes, cracks and open joints shall be pointed flush with mortar before damp-proofing.

1504. **STONE WORK.** Every piece of stone, cast or natural, used in the exterior or interior trim of the building, will be thoroly water-proofed all over with a standard, colorless liquid water-proofing, approved by the Architect, before setting.

1505. **EXTERIOR BRICK.** All exterior, exposed brick surfaces, after laying and when the mortar has thoroly set and dried, will be water-proofed in the manner provided for exterior and interior stone trim, paragraph 1504 preceding.

SECTION 16.

MASONRY WORK.

Index.

Paragraph	Subject	Paragraph	Subject
1601.	Work Not Included.	1609.	Mortar.
1602.	Scope of the Work.	1610.	Laying.
1603.	Common Brick.	1611.	Flue Lining.
1604.	Face Brick.	1612.	Hearth.
1605.	Paving Brick.	1613.	Ash Drops, Doors, Etc.
1606.	Fire Brick.	1614.	Loft Vents.
1607.	Concrete Tile.	1615.	Anchors, Ties, Etc.
1608.	Hollow Tile.	1616.	Pointing and Cleaning.

1601. **WORK NOT INCLUDED.** Brickwork for furnace setting, which is in "Heating and Air-Conditioning," Section 35 of these specifications; wood centering, scaffolding, runways and nailing blocks, which are specified in "Carpenter and Mill Work," Section 22 of these specifications; water-proofing of exterior, exposed brick surfaces, which is specified in Section 15, "Water-proofing and Damp-proofing," of these specifications.

1602. **SCOPE OF THE WORK.** The work shall include the following, if and as shown on the plans:

a. Face and common brickwork, stone tile, and hollow tile work.
b. Fire brickwork and flue lining.
c. Paving brick.
d. Hearth, rear of hearth, lining of fireplace and mantel, and lining of incinerator.

1603. **COMMON BRICK.** All common brick shall be first-class hard-burned, merchantable quality. No light brick shall be used on the job.

1604. **FACE BRICK.** Walls indicated on drawings to be face brick shall be laid as detailed on plan. Samples of the brick proposed to be used, showing range of color and texture, shall be approved by the Architect before the brick is purchased, and no other than such approved brick shall be used in this construction.

1605. **PAVING BRICK.** Cover paving surfaces wheresoever shown on plans with first quality hard-burned impervious paving brick as selected by the Architect, laid in patterns as indicated. Set brick on concrete slab, imbedding brick in cement mortar bed, grout joints with cement in colors as selected. Cover steps where indicated on plans with same quality of brick set on edge, using same methods as above specified for paving brick. All joints shall be struck flush and smooth.

1606. **FIRE BRICK.** Line back, floor and sides of fire place, flue and incinerator, as indicated on detail drawings, with commercial fire brick set in fire-clay mortar; joints out flush and struck.

1607. **CONCRETE TILE.** All concrete tile to be used under these specifications shall be "Labelled Stone Tile" approved by the Underwriters' Laboratories labelled service, 6-hour fire-retardant rating, or equal.

All concrete tile shall be of one-piece type designed to be laid in mortar with cells vertical. The side and end walls shall have minimum uniform thickness of not less than 1¾-inches. The transverse central web shall be of a uniform thickness of not less than twice the thickness of side and end walls. The bearing and exterior surfaces shall be clean, free from loose sand, dirt, etc., and shall be of sufficient toughness to provide a strong mechanical mortar and plaster bond. All concrete tile shall be sound and free from defects, and at least fourteen days old when delivered on the job.

1608. **HOLLOW TILE.** All walls shown on plans to be hollow tile shall be constructed of sound, hard-burned hollow tile, of the thickness indicated, laid in straight, even courses and evenly bonded.

1609. **MORTAR. All mortar for brick and hollow tile setting shall be made of 1 part fresh, well-burned lime to 3 parts clean, coarse sand, with 1 part of Portland cement added as used, to 6 parts of common mortar in bulk.**

1610. **LAYING.** All brick and tile in walls shall be thoroly wet before laying and shall be laid with bond as shown on plans, with shove joints on a full bed of mortar completely filling all joints. **Vertical end joints shall be "buttered" over the entire area of the end of each brick.** All exposed joints shall be cut flush, and not less than ¼-inch nor more than ½-inch thick, bonded with thru header courses at every sixth course and maintained to a uniform height as the work progresses. Back up stone trim where so indicated on plans. Where openings or chases are indicated on plans or required in walls, they shall be built of such sizes continuous from bottom to top of vent stack.

1611. **FLUE LINING.** Where flues are indicated on drawings, furnish and lay up brick work of vent stack fire brick flue lining as shown on plans. Fire brick shall be set on edge, with broken joints, in fire clay mortar and shall be continuous from bottom to top of vent stack.

1612. **HEARTH.** Hearth shall be constructed as shown on plans. Surface of hearth shall be higher than the surface of the adjacent finished floor, as necessary to bring flush with the floor covering.

1613. **ASH DROPS, DOORS, ETC.** Furnish at building and set cast iron ash drop, mechanical grates and door, clean-out door at bottom of flue as detailed on plans.

1614. **LOFT VENTS.** Where so indicated on detail plan, furnish and set loft vents in brick, stone tile, reinforced concrete or stucco, outside walls, etc.

1615. **ANCHORS, TIES, ETC.** Ties for brick and tile work shall be of wire or sheet metal so looped or corrugated as to form a secure bond and shall be zinc-coated. Wire shall be at least No. 11 gauge (.12 in.) and sheet metal shall be at least 7/8-inch wide and not lighter than 22 U. S. Standard gauge. Ties of wire netting shall be strips at least 8 inches long of 1/2-inch mesh and No. 16 wire fabric. Ties shall extend at least 4 inches into masonry backing and to within 1/2-inch of the face of the facing or furring. Anchorage to concrete backing is specified under "Concrete and Cement Work." Wire mesh for bonding courses shall be electrically welded and weigh not less than 50 pounds per 100 square feet. For type and method of installation see details on Drawing.

Anchors shall be of bar iron or steel not lighter than 1/4 x 1 1/4 inches with ends turned 2 inches. Anchors shall be of proper length for their location and, where practicable, shall extend 3 inches into brick work and concrete and 12 inches into hollow tile or gypsum blocks. Anchors shall be coated with asphaltum or red lead.

1616. **POINTING AND CLEANING.** Outside joints at the perimeter of exterior door and window frames (both wood and metal) shall be cleaned out to a uniform depth of at least 1/4-inch and filled solid with elastic pointing compound forced into place with a gun under pressure. Caulking shall include the joints at the ends of spandrels, cornices and similar features of door or window treatment.

Pointing compound shall be light in color, elastic and water-proof. It shall not stain limestone, marble or terra cotta nor corrode copper. It shall not be affected by long exposure to extremes of outside temperatures. Compound shall be free from volatile or drying oils. It shall be mixed to the proper consistency at the factory and shall be used as delivered.

On completion of the work, all face brick shall be cleaned down, removing excess mortar, mortar stains, etc. If acid is used, it shall not be stronger than a 10 per cent solution of muriatic acid, and all work connecting with the face brick shall be carefully and adequately protected against contact with the acid solution.

SECTION 17.

STONE WORK.

Index.

Paragraph	Subject	Paragraph	Subject
1701.	Scope of the Work.	1706.	Execution.
1702.	Shop Drawings.	1707.	Setting, and Pointing.
1703.	Description of Stone.	1708.	Patching.
1704.	Materials for Cast Stone.	1709.	Water-proofing.
1705.	Mortar.	1710.	Cleaning.

1701. **SCOPE OF THE WORK.**

a. Furnishing and setting at the building all stone work for the exterior of the building, as indicated on the drawings.

b. All other stone work shown on drawings and specified in notes thereon.

1702. **SHOP DRAWINGS.** Shop drawings, jointing diagrams, and other supplementary plans from the Architect's scale drawings and full-size details shall be prepared, submitted to, and approved by the Architect in advance of the actual work.

1703. **DESCRIPTION OF STONE.**

a. Cast Stone: All cast stone shall be made by the semi-wet cast process, manufactured by a reputable, well-organized manufacturer of recognized ability.

b. Natural Stone: Natural stone shall be specified by the Architect, in notes on drawings.

1704. **MATERIALS FOR CAST STONE.** The facing of all exterior cast stone trim shall be not less than 1 inch thick, composed of the following ingredients: ½ part No. 32 silica, ½ part No. 10 silica, ¼ part No. 16 silica, ¼ part No. 30 silica, and ½ part "Dolmite" marble to 1 part of washed sand.

The cement used shall be white cement approved by the Architect and the proportion of cement to gross aggregate shall be 1 of cement to 2½ of aggregate. All aggregates shall be clean and free from foreign or harmful substances.

1705. **MORTAR. All mortar for stone work shall be made of 1 part of fresh, well-burned lime to 3 parts of clean, white, coarse silica sand, with 1 part of white cement added as used, to 6 parts of mortar in bulk.**

1706. **EXECUTION.** All work shall be executed in strict accordance with scale and full-size detail drawings, with clean, sharp mouldings, returns, perforations, etc., and shall be equal to approved samples submitted to the Architect.

All ornamental work shall be carved or moulded in artistic manner by a skillful carver or modeler, who shall be subject to the approval of the Architect. Clay models must be inspected and approved before the final work is cast. All stone must be provided with enough anchors to tie the stone properly into the structure and otherwise meet the requirements of the building code. All cast stone must be cast under cover and kept wet until thoroly hardened and cured.

1707. **SETTING AND POINTING.** All stone shall be thoroly wetted, and set accurately, true to a line and level, by competent stone setters, with full flushed joints, filling all anchor holes. The face shall be set on thoroly soaked wooden wedges which shall not be removed until the building is cleaned and pointed. All bed and vertical joints shall be of a maximum width of ½-inch, except where otherwise indicated. All face joints shall be thoroly brushed out clean ¾-inch in depth, carefully removing all wedges and thoroly wetting the stone, then point all joints flush with stainless cement mortar of same color as stone.

1708. **PATCHING.** After stone is set, should any of the materials become broken or spalled, either in shipment or in laying, this Contractor shall patch and repair same in a first-class manner or replace pieces as directed by the Architect.

1709. **WATER-PROOFING.** All stonework, cast or natural used in exterior or interior trim of the building, shall be thoroly water-proofed before setting, in the manner provided in paragraph 1504 of these specifications.

1710. **CLEANING.** All stone shall be thoroly cleaned and left in first-class condition at completion.

SECTION 18.

ARCHITECTURAL TERRA COTTA.

Index.

Paragraph	Subject	Paragraph	Subject
1801.	Scope of the Work.	1807.	Mortar.
1802.	Materials.	1808.	Grout.
1803.	Drawings.	1809.	Anchors, Etc.
1804.	Workmanship.	1810.	Setting.
1805.	Color and Finish.	1811.	Pointing.
1806.	Protection and Replacement.	1812.	Cleaning.

1801. **SCOPE OF THE WORK.** The extent and details of terra cotta work are shown on the drawings.

1802. **MATERIALS.** The terra cotta shall be made from selected clays and fusible minerals carefully proportioned and mixed and thoroly burned to produce a strong homogeneous body that will give a sharp metallic bell-like ring when struck.

The shells and webs shall not exceed 6½-inches, and shall be less where the size and contour of the pieces or the superimposed loading makes additional strength desirable or necessary. Each piece of terra cotta shall have the necessary anchor holes and hand holes and shall be so formed as to properly engage the structure.

Beds generally shall be not less than 4 inches deep, unless otherwise shown. Where solid slabs or facing tiles are shown or noted on the drawings, they shall be formed with backs scored and dovetailed.

1803. **DRAWINGS.** Jointing and setting drawings in duplicate shall be submitted and approved before any of the material is burned. Setting drawings shall show the sections, dimensions and setting number of each piece, the connection with other work and the typical and special anchoring of all terra cotta.

1804. **WORKMANSHIP.** All lines and surfaces shall be as straight and true as can be obtained in terra cotta. Any pieces that are over or under-burned, warped or discolored or that have cracks or spalls on exposed surfaces or that show a tendency to peel will be rejected.

After the terra cotta is removed from the moulds, it shall be retouched, under-cutting where necessary, before burning. All terra cotta shall be laid out and fitted at the factory. Beds and joints shall be ground on a mechanical rubbing bed to secure accurate dimensions and true joints of uniform width. Mouldings and ornament shall be matched at joints. All pieces shall be numbered or marked to correspond with the numbers or marks given on the setting drawings.

Cornices shall have washes, drips and weepholes to quickly remove all surface water. Where other work is built upon wash surfaces, raised seats shall be formed to give level beds for such work. Projecting courses shall have raised fillets or seats at the back to keep water from entering the wall.

Reglets for sheet metal work shall be moulded in the terra cotta or formed by raking out or omitting all the mortar in the face joints to a depth of 1½ inches. Moulded reglets shall be dovetailed in section, at least 1 inch deep and ½-inch wide at the open edge.

1805. **COLOR AND FINISH.** For colors and textures see notes on drawings. Textures and finishes shall be obtained by surface treatments and the use of ceramic fixtures applied to the faces of the terra cotta and made permanent by burning. The finish shall cover all exposed surfaces perfectly. Colors shall be uniform and without marked variation in general tone, except where blended colors or mottled effects are specified.

Terra cotta not otherwise specified shall have a smooth body surface with an unglazed ceramic finish similar in color and texture to smooth, oolitic limestone.

The terms used in describing the colors and finishes desired under this specification are defined as follows:

The term **smooth** refers to the treatment of the clay prior to the application of ceramic finish.

Unglazed ceramic finish is a coating that burns without gloss and without a glassy texture.

Pulsichrome ceramic finish is a congolmerate mixture of two or more colors applied and may be either unglazed, mat glazed or lustrous glazed.

1806. **PROTECTION AND REPLACEMENT.** Terra cotta shall be so delivered, stored and handled at all times as to protect it from stain or damage. The patching or hiding of defects will not be permitted. The Contractor will be held responsible for any delay in the work due to time lost in replacing defective, damaged or rejected terra cotta or because of failure to make delivery in proper sequence.

1807. **MORTAR.** Mortar for setting terra cotta and for setting the masonry backing that is

built into the terra cotta shall be that specified in Section 17 of these specifications, using a high calcium lime putty.

Pointing mortar for terra cotta trim in connection with stone work shall be the same as the pointing mortar for the stone work.

Pointing mortar for terra cotta facing shall be tinted with non-fading mineral oxides as directed by the Architect.

1808. **GROUT.** Grout shall consist of 1 part cement and 6 parts sand. Grout shall be of a consistency that will flow freely without separation of the aggregate.

1809. **ANCHORS, ETC.** Anchors, hangers, pins and rods for securing terra cotta shall be of wrought iron or steel and shall be zinc-coated. Anchors and hangers shall be not lighter than No. 6 gauge wire (0.20 inch diameter) and shall be heavier where shown on the drawings or required by special conditions. Pins and rods shall not be lighter than No. 00 gauge wire (0.33 inch diameter). Threaded rods and anchors shall be at least ⅜-inch diameter.

Ashlar and courses balanced on the wall shall have at least one anchor for every linear foot of horizontal bed joint of the terra cotta. Projecting courses not balanced on the wall shall have at least one anchor for every foot of horizontal bed joint and in no case shall there be less than one such anchor for every cubic foot of terra cotta and its filling.

1810. **SETTING.** All terra cotta shall be cleaned, then sponged or drenched with clean water just before setting. Each piece shall be set level and true to line in a full bed of plastic mortar and tapped home to a full, even bearing. All rebates at backs and cross joints from front to back and top to bottom shall be filled solid with setting mortar or grouted, leaving no voids. Face joints shall be uniformly ½-inch wide and shall be raked out ½-inch deep at the time of wetting, leaving clean surfaces for pointing. Faces of terra cotta shall be kept free of mortar.

Brick or other masonry backing shall be built into terra cotta as the setting progresses, or the terra cotta shall be solidly grouted. The grout shall fill all of the voids in the terra cotta and the spaces between the terra cotta and the structural work back of same as well as around all forms of anchors, rods and reinforcings.

The grout shall be placed carefully in layers about 6 inches deep so as to insure proper filling without disturbing the set position of the terra cotta and the anchors.

The vertical joints of projecting courses shall be moistened and filled solid with grout to within 1½ inches of the top.

1811. **POINTING.** Pointing shall be done during the process of setting and as soon as the setting mortar is hard enough to safely permit it. Face joints generally shall be brushed clean ½-inch deep, wet thoroly and pointed solid and flush with pointing mortar.

Joints in the washes of projecting courses shall be cleaned and filled solid with elastic pointing compound. Pointing compound shall be light-colored, elastic and water-proof. It shall not stain the terra cotta nor corrode copper nor be affected by extremes of outside temperatures. Compound shall be free from volatile or drying oils. It shall be mixed to the proper consistency at the factory and shall be used according to the manufacturer's printed directions.

1812. **CLEANING.** Upon completion of the work, all surfaces of terra cotta shall be cleaned down, using soap powder boiled in clean water and applied with stiff fiber brushes and then rinsed with clean water. Hard lumps of mortar may be removed by using sharpened wood paddles. Metal cleaning tools or brushes or acid solutions shall not be used.

SECTION 19.

STRUCTURAL METAL WORK.

Index.

Paragraph	Subject	Paragraph	Subject
1901.	Steel.	1907.	Workmanship.
1902.	Mill and Shop Inspection.	1908.	Pipe Columns.
1903.	Castings.	1909.	Other Work.
1904.	Shop Drawings.	1910.	Erection.
1905.	Bearing Plates.	1911.	Painting.
1906.	Steel Lintels.		

1901. **STEEL.** Structural steel shall comply with the requirements of the latest specifications for "Structural Steel for Building," of the American Society for Testing Materials. It shall also be clean and free from mill scale or flake rust or rust pitting.

1902. **MILL AND SHOP INSPECTION.** Mill and shop inspection will be made by the Owner or its authorized representative, unless such inspection is waived. After the award of the contract the Contractor shall inform the Architect as to where the material is to be rolled, and where it is to be fabricated, and the estimated tonnage. In case mill inspection is waived by the Architect the Contractor shall furnish certified copies of the mill analysis showing that the material to be used is in conformity to the contract requirements.

1903. **CASTINGS.** Castings shall be of tough, gray iron, true to pattern, clean and free from injurious flaws or defects.

1904. **SHOP DRAWINGS.** Shop drawings in duplicate showing setting diagram and details of all structural members, and based on the contract requirements, shall be submitted for approval of the Architect. Any approved steel shapes may be used which will not change the Architectural lines. Beams shall have sectional moduli equal to those called for. Columns shall have cross-sectional areas and radii of gyration equal to those called for.

1905. **BEARING PLATES.** Bearing plates shall be provided for all beams, etc., resting on masonry. Unless otherwise indicated, bearing plates shall be "Standard" sizes as given in the structural steel manufacturer's hand books.

1906. **STEEL LINTELS.** Steel lintels shall be provided for all square head openings in masonry where other lintels are not indicated. Built-up lintels shall be bolted or riveted together. Provide separators where indicated.

Lintels shall be provided for all square head openings in partitions of hollow tile, gypsum block or concrete masonry units. Lintels for single partitions shall be steel channels of widths equal to the thickness of the tile. Lintels for double partitions shall be of steel angles of width and depth not less than the thickness of the tile. Lintels shall have bearings not less than 4½ inches nor less than 1 inch per foot of span.

Angle lintels shall be provided for all openings in tile wall furring. Lintels for arched openings shall be bent concentric to the arch. Lintels shall extend to the face of the furring, have equal legs and at least 4½-inch bearing at each end.

1907. **WORKMANSHIP.** Shearing and punching shall be without ragged or torn edges. The diameter of the punch shall not exceed that of the rivet, or the diameter of the die exceed that of the punch, by more than 1/16-inch. The thickness of material in punched work shall not exceed the nominal diameter of the rivet plus ⅛-inch. Holes shall be accurately spaced so that when parts are assembled hot rivets will enter without distortion. Holes shall be enlarged only by reaming. Drift pins shall not enlarge or distort the holes.

Rivets shall have well finished concentric heads in full contact with the metal. All rivets shall be tight. Shop rivets shall be machine driven. Riveted parts shall be closely drawn together before riveting. Shop connections generally shall be riveted.

All members shall be free from twists, kinks, buckles or open joints. Parts assembled with rivets or bolts shall be in close contact, except where separators are required. All members shall be so accurately made that when assembled the parts shall come together without distortion and without shimming. Separators for beams shall be close fitting.

1908. **PIPE COLUMNS.** Pipe columns shall be of Standard Wrought Iron or Steel Pipe with screwed-on cast caps and bases. Pipe diameters when given are nominal internal diameters.

1909. **OTHER WORK.** Open holes shall be provided as necessary for bolted connections of other work under the general contract to structural metal work.

1910. **ERECTION.** All structural metal work shall be accurately set and properly secured in

place. Unless otherwise specified field connections of steel work shall be riveted.

Bolted connections shall be made with close-fitting bolts of the exact required lengths. Bolted parts shall be closely drawn together and nuts drawn up tight and bolt ends upset.

Bolts for structural work exposed to the weather shall be dipped in red lead paint just before they are put into place.

Anchor bolts and anchors shall be properly located and built into the connecting work in advance. Column bases shall be set on metal shims and grouted solid with equal parts of Portland cement and sand Bearing plates shall be set in 1 to 2 Portland cement mortar.

1911. PAINTING. All structural metal shall be cleaned free from scale, rust and all foreign matter and, after inspection, shall be given a shop coat of paint. Surfaces in contact or inaccessible after assembling shall be painted before assembling. Machine finished surfaces shall be protected from corrosion.

After erection the field connections and all abraded places shall be painted, and the entire work be given an additional coat of paint.

Painting materials shall conform to Specifications of Section 31, and shall be mixed as follows:

First Coat		Second Coat	
Red lead, dry	25 lbs.	Red lead, dry	25 lbs.
Raw linseed oil	1 gallon.	Raw linseed oil	1 gallon.
Turpentine	½ pint.	Turpentine	½ pint.
		Lamp black in oil	4 ounces.

No paint shall be used after the pigment has caked or hardened. The paint shall be kept well stirred while it is being applied. Paint shall be thoroly brushed on and well worked into joints and open spaces. All surfaces shall be clean and dry when painted.

SECTION 20.

MISCELLANEOUS METAL WORK.

Index.

Paragraph	Subject	Paragraph	Subject
2001.	Scope of the Work.	2014.	Iron Stairs.
2002.	Materials.	2015.	Painting.
2003.	Shop Drawings.	2016.	Brass Rails.
2004.	Workmanship.	2017.	Exterior Lamp.
2005.	Curbs.	2018.	Thresholds.
2006.	Miscellaneous Cast Iron.	2019.	Other Work.
2007.	Ladders.	2020.	Expansion.
2008.	Pipe Sleeves.	2021.	Hardware.
2009.	Pipe Rails.	2022.	Aluminum Doors.
2010.	Rail Brackets.	2023.	Steel Windows
2011.	Flag Pole.	2024.	Anchors.
2012.	Wrought Iron Gratings.	2025.	Setting.
2013.	Sash Angles.		

2001. **SCOPE OF THE WORK.** All miscellaneous and ornamental iron, steel, brass, bronze and aluminum work shall be furnished and installed complete with all necessary anchors, bolts, hardware and other accessories.

2002. **MATERIALS.**

a. **Steel and Iron.** Steel and wrought iron shall be standard, well finished, structural shapes, or bar iron. No distinction will be made between steel and wrought iron. Cast iron shall be soft, tough, gray iron. Wire not otherwise specified shall be cold drawn steel. Gauges of plate and sheet iron or steel are U.S. Standard.

b. **Aluminum Work.** Aluminum shown, indicated or specified as cast, estruded, drawn or rolled, shall have the following chemical composition:

Silicon	4.5% to 6%
Copper (not over)	0.6%
Iron (not over)	1.0%
Zinc (not over)	0.2%
Manganese (not over)	0.2%
Aluminum (minimum)	91.7%

Test specimen of cast aluminum poured in sand moulds and tested without machining shall show a tensile strength of 17,000 to 23,000 lbs. per square inch and an elongation of 3% to 8% in 2 inches. The lower range shall be guaranteed as minimum values.

Rolled, drawn or extruded sections shall have the same mechanical properties as cast aluminum, except elongation which shall average 2.4% in 2 inches.

Sheet aluminum panels (8 B. & S. gauge) shall be full hard and have the following chemical composition:

Silicon (Maximum)	1% to 1.5%
Copper (Maximum)	0.2%
Aluminum (Minimum)	97.0%

The Contractor shall furnish the Architect with a certified copy of the mill analyses of the several forms of aluminum alloy delivered for use.

Aluminum shall have no finish other than that involved in the process of fabrication, except as noted on the drawings or herein specified.

c. **Samples.** Samples of ample size of the several aluminum alloys and of typical sections shall be submitted to the Architect for his approval. Samples of materials after they are delivered on the project may be required, and any materials shown by laboratory tests as not complying with the contract requirements shall not be used in the work. Samples shall show color and finish. The finished work shall correspond in every detail with plat of approved samples.

2003. **Shop Drawings.** Complete shop drawings in duplicate for all ornamental metal work shall be submitted for approval of the Architect and no work shall be fabricated until such approval is given. Shop drawings shall show the method of jointing, the thickness of the metals, the profiles of all mouldings and all ornamentation, and shall contain full and complete instructions regarding concealed joints and screws; they shall show the proposed reinforcements, anchorage and structural supports. Careful measurements shall be made of previously installed other construction into which aluminum work is to be fitted or which is to be combined therewith, before fabrication or connecting aluminum work is done, and the aluminum work as installed shall closely fit and be rigidly secured. Rattling or buckling of sheet aluminum installation will not be accepted. Where necessary to make rigid installation, steel bucks and angles shall be furnished in place.

2004. WORKMANSHIP.

a. **Iron and Steel.** Wrought iron and steel shall be well formed to shape and size, with sharp lines and angles and smooth surfaces. Members in contact shall be welded or riveted unless otherwise specified. Wide bars shall be drilled or punched for small bars to pass thru and the small bars secured by rivets or spot welding. Similar bars where passing shall be halved together and abutting members shall be welded or tenoned and riveted. Screws shall not be used in assembling where they can be avoided.

Castings shall be of fine texture, unwarped and sound. Lines shall be sharp, true and accurate and ornament full and true to pattern. Castings shall come from the mould clean and smooth. Joints shall be machined to a tight fit with mouldings and ornament in alignment. Work executed from details or models furnished shall faithfully reproduce same in form and feeling.

Provide the necessary rebates, lugs and brackets so that the work can be assembled in a neat substantial manner. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where possible. Thickness of metal and details of assembly and support shall give ample strength and stiffness. Built up parts shall be out of wind. Joints exposed to the weather shall be formed to exclude water.

Metal work shall be properly countersunk to receive hardware and provided with the proper bevels or clearances. Plates for mounting hardware shall be riveted or welded in place, and for locks or latches shall be of proper size to prevent operation from the outside without a key.

b. **Brass and Bronze.** Exposed plain surfaces of brass shall have a bright polished finish, natural color; and similar surfaces of bronze shall be finished smooth but not polished. Bronze shall be oxidized medium statuary bronze color. Ornamental surfaces shall be acid dipped and oxidized to match color of the smooth surfaces. All visible fastenings shall match the material and finish of the brass or bronze.

c. **Aluminum Work.** All workmanship must be first-class in every particular and in accordance with the best practice. All work must be clean and sharp and shall be artistically treated by skilled workmen. All aluminum work shall be fabricated and assembled in accordance with approved shop drawings, and F.S. drawings. Enrichment and moulded work shall be done in an artistic and spirited manner. All units shall be properly laid out and spaced between terminals so that there shall be no "Cut-off" or other uncertain finish. Each rod shall be in one length, without splicing. Screw threads shall be carefully cut. Burrs and heads shall be standard and washers shall be provided where needed.

Ornamental wrought aluminum shall be forged and finished by hand. Square turns and corners shall be forged. Square corners shall be true and rings, loops, etc., shall be without visible joints. Where possible members in contact shall be riveted, heads countersunk and finished flush.

Wide bars shall be drilled (not punched) for small bars to pass thru; the small bars to be secured by rivets or by spot welding. Similar bars where passing shall be halved together and welded, while abutting bars shall be shouldered and headed. All joints shall be of such character that they will be as strong and rigid as adjoining sections. Screws shall not be used in assembling wrought aluminum work except where indicated on approved shop drawings.

d. **Aluminum Castings.** Ornamental aluminum castings shall be sand blasted, the ornamentations on raised portions to be high-lighted. Highlights shall be satin finished. Exterior surfaces of all ornamental castings shall be sprayed with one coat of clear pyroxylin lacquer before being shipped to the job, in order to provide a better finish, particularly during the finishing of the building.

Castings shall be of fine texture, unwarped and sound; all lines shall be sharp, profiles accurate and ornament true to pattern artistically reproducing the spirit of models or full size drawings. All ornaments shall be delicately hand chased and under-cut where necessary to restore and faithfully reproduce details of the models. The background of all ornament shall be cleaned and left as it comes from the mold. Castings shall be of proper thickness to insure perfect work and the required strength for their intended purpose. All cast aluminum work shall be secured with bolts or tap screws; where practicable all screw and bolt heads shall be concealed. Where this is impracticable on exterior faces, they shall be countersunk. All jointed cast aluminum work shall be closely fitted (metal-to-metal hair joints) and finished smoothly and evenly. All exposed joints shall be lapped flush. All mouldings and ornament shall be in perfect alignment at joints. Bolt and screw holes shall be drilled and countersunk flush.

Joints in cast work shall be so formed as to prevent the entrance of water. Castings which are not rebated shall have lugs for connection to adjacent sections and to other work and shall be fitted with shoulders or brackets. All miters shall be cut and finished to a perfect fit. Necessary ribs, brackets, fillets and other reinforcements shall be supplied.

Aluminum strong alloy screws shall be used for the work.

Members of drawn or extended metal shall be fitted together at contact points with similar metal or with cast metal with pins and rivets, or by welding. Welding rods shall match the metal in color.

Where two or more pieces are used in built-up members, contact surfaces shall be brought to true, smooth and even surface and be so secured that joints shall be absolutely tight and invisible, without the use of pointing or caulking. Putty or other pointing materials for such purpose will not be accepted. Where exposed rivets, screws, or bolts cannot be avoided, they shall be of the same metal and color as that of the parts joined, malleted to the metal and finished to match the texture of adjoining work.

2005. CURBS. For plate steel curbs, see Detail Drawing. Anchors shall be ¼ x 1¼ inch in size riveted to the curbs near the ends of each section and at points between not over 4 feet apart.

2006. MISCELLANEOUS CAST IRON. Metal of covers and frames shall be at least ⅜-inch thick. Solid covers shall have flush drop handles. Stock covers and frames of similar design may be

used provided cuts or drawings of same are first submitted to and approved by the Architect. Catch basin and cleanout of sub-drains shall have solid cast iron covers and frames as shown by details. Coal hole ring and cover are shown by detail. Locking bar shall be welded or riveted together at ends. Lower end of hook shall be headed to prevent loss of tail nut. Ash dump, ash door and incinerator grates and door, to be of cast iron as shown on detail. Provide one incinerator door on each floor.

2007. **LADDERS.** Wrought iron ladders are shown by details. They shall be anchored at top and bottom and at points between not over 6 feet apart. Rungs in stack and catch basin shall be formed from ¾ inch diameter zinc coated wrought iron bars. Ends shall be hooked and built into the masonry or concrete at least 4 inches. Rungs shall be spaced 12 inches apart and extend full height of stack.

2008. **PIPE SLEEVES.** Pipe sleeves thru masonry or concrete walls and footings shall be standard wrought iron mild steel or cast iron sleeves with about ¼-inch space all around between the sleeve and pipe.

2009. **PIPE RAILS.** Pipe shall be standard weight wrought iron or mild steel, with malleable iron screw fittings cast to the proper angle to fit the work. Pipe threads shall not show in the assembled work. Threads of joints exposed to the weather shall be coated with red lead and linseed oil. For typical construction, see detail on drawings.

Posts on concrete shall be set in pipe sleeves cast in place, and posts on granite shall be let in as indicated; the joint grouted with cement or caulked with lead and covered by the floor plates. Posts and rails shall be secured to metal work by tap screws and to masonry by bolts thru flanged fittings, except as otherwise detailed. Foot rests shall have flanged fittings with countersunk bolts or screws.

2010. **RAIL BRACKETS.** For brackets of wall rails on stairs see detail drawings. Brackets shall be spaced not more than 6 feet apart and secured with expansion or toggle bolts. Brackets shall be of cast iron.

2011. **FLAG POLE.** For Flag Pole see detail. All steel and iron parts of trimmings shall be zinc coated. Joints shall be made to exclude water.

The flag pole shall be made up of standard weight wrought iron or steel pipe with telescoped, metal-to-metal joints made tight by caulking the metal of the pipes and without the use of other materials.

The truck shall have machined bearings, and the balls of ball bearings shall be at least ¾-inch in diameter. Each set of halyards shall be fitted with swivel snap hooks and the ends shall be spliced around metal thimbles.

2012. **WROUGHT IRON GRATINGS.** For construction of wrought iron gratings of areas see detail. Frames shall be formed from ½ x 1¾-inch bars. Gratings for areas shall be 1¼-inches deep and each section shall be bolted to the walls.

2013. **SASH ANGLES.** Double hung wood sash over 40 inches wide shall have the bottom rail of the upper sash reinforced with 1⅛ x 1¼ inches hot rolled steel angles, fastened with countersunk 1 inch x No. 8 screws at ends and about 8 inches apart in both legs and staggered.

2014. **IRON STAIRS.** For typical details of iron stairs, see drawings. Structural strings and framing of landings shall be of hot rolled steel plates or shapes. Members shall be closely fitted, assembled with bolts and rivets and securely anchored to walls and floor construction.

Supports for treads and risers shall be 2 x 2 x ⅛ inch hot rolled steel angles riveted to the steel strings and drilled for fastening the treads with screws from the underside.

Metal of castings shall be at least ¼-inch thick. Cast risers for treads shall be drilled for screws or cast with dowels to hold the treads in place; dowels or screws to be near the ends of treads. Cast treads and landings shall have checkered top surfaces.

Railings shall be wrought iron with cast posts, strings, base and facias. Balusters shall be headed into top and bottom rails of 1-inch steel channels or ½ x 1 inch flats; ends of rails to be fastened to the posts thru knee braces or bent ends. Top rail shall be drilled and countersunk every 12 inches for fastening the hand rails with screws from the under side. Bottom rails on base and strings shall be tap screwed every 18 inches. Base of balusters shall extend to the framing of stair well or to underfloor.

2015. **PAINTING.** All iron and steel work shall be thoroly cleaned and given a shop coat of paint. Painting materials shall conform to specifications, Section 31. Red lead paint shall consist of 25 lbs. of dry red lead to each gallon of linseed oil and not exceeding ½ pint of oil drier.

2016. **BRASS RAILS.** Brass rails shall be seamless tubing; iron pipe sizes, with cast fittings and threaded joints; no threads to show when work is assembled. Ball pattern rail fittings shall be used unless otherwise specified. Rails shall be fastened with screws or bolts of proper size and type to suit the conditions.

2017. **EXTERIOR LAMP.** Exterior lamp at main entrance shall be of bronze. See details on drawings. Lamp shall be rigidly secured as shown in detail. Reflector in lamp shall be of steel with white porcelain enamel finish on inside and shall be rigidly connected to bronze frame. Glass of lamp shall be ⅛-inch thick plate held in place by glazing beads secured by screws. Glass shall be set with polished side facing out. The inside shall be ground.

2018. **THRESHOLDS.** Bronze thresholds shall be at least ¼-inch thick and have checkered or channeled pattern on the upper surface to within 3 inches of jambs. Thresholds at double doors shall be countersunk for door bolts. Thresholds shall be fastened by bronze bolts, or screws; two at each end and intermediate ones staggered and spaced not over 15 inches on centers. Bronze thresholds at main entrance doors and at vestibule doors shall be of sufficient width to accommodate the cover plate of the checking floor hinges specified. They shall be of uniform width thruout the entire length.

2019. **OTHER WORK.** The Contractor shall do all drilling, cutting, fitting and work of similar character required in joining and setting the materials in place. He shall provide all connecting members needed for properly securing the ornamental metal work to the masonry, structural framing or other parts of the building, as needed in each case. He shall do all drilling and shall furnish screws, bolts, etc., needed for attaching other adjoining materials to aluminum work. All connecting members, bolts, anchors, etc., which are to be covered with masonry, shall be installed so far as is practicable as the masonry work progresses in order to avoid cutting or drilling.

2020. **EXPANSION.** All aluminum work shall be designed and secured to other construction in a manner to take care of the movements of contraction and expansion which might lead to the shearing of bolts, screws and other fastenings.

Where other metals are to have physical contact with aluminum and be constantly exposed to the weather, the portion of such other metal coming in direct contact with aluminum shall be coated with a bituminous paint to arrest any galvanic action which might occur.

2021. **HARDWARE.** Hardware shall be fitted and applied to the doors and their frames at the factory where they are fabricated. Sinkage and reinforcements for application of the specified operating hardware shall be provided for the doors and their frames.

2022. **ALUMINUM DOORS.** Aluminum doors shall be assembled entirely of extruded shapes and sections having a minimum thickness of ⅛-inch. Rails and stiles shall be not less than 1¾ inches thick. All fastening arrangements (burrs, bolts, etc.) shall be entirely concealed. Rivets will not be permitted. All joints are to be electric arc welded and the welds thoroly cleaned with brush and water on the inside and on the outside to remove all welding flux before assembling.

Panels of doors and of paneled ends to vestibules shall finish at least ¼ inch thick and shall have a continuous core of compressed insulating material.

Rail and stile sections of doors shall be insulated on the inside against sound with compressed cork or asbestos filling fastened in place. Bottom rails of doors shall have interior crossed bracing. Rails and stiles of doors and of vestibule ends, exclusive of applied mouldings, shall be made from single sheets.

Applied mouldings and glazing beads shall be made up in frames with welded or brazed miter joints. Glazing beads shall be fastened with oval head screws 6 inches apart.

2023. **STEEL WINDOWS.** Frames, sash and muntins shall be of solid hot rolled steel sections at least 1¾ inches deep, front to back. Glass rebates to be at least 5/16 inch deep. Frames shall have a continuous flat bearing of at least ½ inch against the masonry, concrete or metal work of openings, when set.

Steel sections shall be straight and true and closely fitted at all joints. Abutting members shall be coped or mitered, then welded or tenoned and riveted. Muntin intersections shall be interlocked, or mitered and welded.

Sash shall be side hinged and open outward. Applied weathering members shall be not lighter than 16 U.S. Standard gauge and shall be welded in place. Design of weathering to include outside drips at top and bottom rails, and the removal of condensation at the bottom. Hardware shall be of steel or iron.

2024. **ANCHORS.** The anchors specified under "Setting" shall be ⅛ x 1½ inch flat steel or iron, zinc coated. They shall be built into, or bolted to, the jambs of openings and fastened securely to the windows or frames.

2025. **SETTING.** Sub-frames shall be set after the walls are built or they shall be built into the wall, at the option of the Contractor. Windows without sub-frames shall be set after the walls are built. All frames or windows shall be braced as necessary to prevent distortion and shall be set straight, plumb and level. Sub-frames that are built in and windows set in prepared openings shall have jamb anchors near the top and bottom and at points between not over 4 feet apart. Windows shall be adjusted and hardware attached after the building is inclosed. Windows shall be left in a substantial and weather-tight condition and perfect working order.

SECTION 21.

SHEET METAL WORK.

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Paragraph	Subject	Paragraph	Subject
2101.	Work Not Included.	2109.	Splash Plates.
2102.	Scope of the Work.	2110.	Flashing and Counterflashing.
2103.	Materials.	2111.	Cooler Lining.
2104.	Workmanship.	2112.	Skylight.
2105.	Inlet Boxes.	2113.	Globe Vents.
2106.	Gutters.	2114.	Basement Vent Duct.
2107.	Valleys.	2115.	Painting.
2108.	Downspouts.		

2102. WORK NOT INCLUDED.

a. Sheet metal work in connection with heating and air-conditioning work (which is in "Heating and Air-Conditioning," Section 35 of these specifications).

b. Lead flashing for plumbing pipes (which is in "Plumbing," Section 34 of these specifications).

2102. SCOPE OF THE WORK. Furnish and install at the building the following work, wheresoever shown on drawings:

Gutters,
Valleys,
Sheet Metal downspouts and heads,
Globe vents,
Metal flashing,
Counterflashings,
Skylight,
Splash plates,
Cooler lining,
Basement vent duct.

2103. MATERIALS. All G.I. work shall be made of galvanized pure ingot sheet iron. All copper shall be 16-oz. or 20-oz. hard rolled copper, as specified below.

2104. WORKMANSHIP. All work shall be executed in strict accordance with detail drawings. Mouldings shall be true and sharp and perfectly straight; joints shall be neatly made, riveted and heavily soldered. Where required by location, the joints shall be locked and ample provision made for expansion and contraction. Metal shall be secured in place with nails or rivets as may be required; heads shall be soldered or capped. Furnish all light ties, straps, braces or other work necessary to support and secure the metal work.

2105. INLET BOXES. Wheresoever shown on plans, install inlet boxes, of dimensions indicated, and of the same material as gutters, paragraph 2106 following.

2106. GUTTERS. Furnish and install 20-oz. rolled copper or No. 24 gauge G.I. gutters as shown and of sizes where indicated on plans, tied up to the roof with proper connections. All gutters shall have a separate apron 10 inches wide of the same material extended 9 inches up under tile and 6 inches under composition roofing, and down over back of gutters, as indicated. All gutters shall have expansion joints midway between all eave spouts.

2107. VALLEYS. All valleys shall be 24 inches wide, broken up 1 inch at center and ¼-inch at edges, of same material as gutters.

2108. DOWNSPOUTS. Downspouts shall be 20-oz. rolled copper or No. 24 gauge G.I., as shown on plans and of sizes indicated, well secured to the walls every 6 ft. with bands and expansion bolts; same shall be made with slip joints, connected with gutters, offset where crossing belts or other projections. Where so indicated, connect downspouts with rainwater drains at grade and where they terminate on other roofs they shall finish with 8-inch shoes.

2109. SPLASH PLATES. At base of downspouts emptying on roofs, furnish and set 24 in. by 24 in. splash plates, of same material as downspouts, secured to roof and made watertight.

2110. FLASHING AND COUNTERFLASHINGS. Where composition roofs are used the roofing materials will be turned up as flashing. 16-oz. rolled copper or No. 26 gauge G.I. step flashing, as shown on drawings, shall be set on at chimneys.

All composition and metal flashing shall be counterflashed with same material as chimney flashing, not less than 8 inches wide, crimped at the top and let not less than 1½ inches into reglets in brick or tile work, or under plaster or wooden siding, as the case may be, and turned down to level lines 1 inch from roof. Spot solder each piece of counterflashing on raking roofs and every 6 ft. where level. All reglets shall be pointed flush with elastic pointing compound specified in paragraph 1811 of these specifications.

2111. **COOLER LINING.** Line the inside of cooler on four sides, including doors, top and bottom, with No. 28 gauge G.I. as shown on detail plans.

2112. **SKYLIGHT.** Furnish and install, wheresoever and of size indicated, on plans, skylight of 20-oz. rolled copper or standard No. 24 gauge G.I. construction complete and covered with ¼-inch corrugated wire glass. Skylight shall be of best standard construction, caps over joints bolted and the whole made watertight. The curbs shall be covered with 16-oz. rolled copper or No. 26 gauge G.I. down to roof, as shown on drawings. Skylight shall be guaranteed against all leaks and shall pass all requirements of the City ordinances governing same. Submit shop drawings of skylight to Architect for approval.

2113. **GLOBE VENTS.** Furnish and install on roofs where indicated, standard No. 24 gauge G.I. globe vents, securely fasten in place, and equip with No. 18 gauge ½-inch mesh galvanized wire screens, flanged to expand under roof.

2114. **BASEMENT VENT DUCT.** Construct ventilating duct in basement as indicated of No. 24 gauge G.I. and securely fasten in place. Furnish and install in duct at top and bottom, wire screen of No. 18 gauge ½-inch mesh galvanized wire.

2115. **PAINTING.** All concealed parts of exterior G.I. work shall be given a coat of red lead and linseed oil paint before building in and one additional coat on exposed surfaces after putting on. The other coats to be applied under the specifications of Section 31. Omit prime coat on exposed surfaces of lining of cooler.

SECTION 22.

CARPENTER AND MILL WORK.

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2208.	Floor Joists.	2235.	Sash.
2209.	Joist Bridging.	2236.	Sash Weights and Cord.
2210.	Ceiling Joist.	2237.	Sash and Glass Stops.
2211.	Rafters.	2238.	Architraves.
2212.	Wood Trusses.	2239.	Base Mold.
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2214.	Saddles.	2241.	Picture Mould.
2215.	Counterflooring.	2242.	Shelves.
2216.	False Floors.	2243.	Coat Rails.
2217.	Drop Siding.	2244.	Cabinets, Cases, Etc.
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2219.	Paper.	2246.	Cooler.
2220.	Nailing Blocks.	2247.	Screens.
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2222.	Studs.	2249.	Wood Stairs.
2223.	Rough Hardware.	2250.	Stair Rails.
2224.	Exterior Surfaced Lumber, and Millwork.	2251.	Hatch.
2225.	Foundation Vents.	2252.	Ceiling Sash.
2226.	Door Frames.	2253.	Mail Slot.
2227.	Window Frames.	2254.	Finish Hardware.

2201. **WORK NOT INCLUDED.** W.I. and pipe railings, metal thresholds, W.I. grilles, and other metal work, are specified "Misc. Metal Work," Section 20 of these specifications. Battleship linoleum and cork carpet base are specified under Section 38 of these specifications. Roof strips for tile roof are specified under "Tile Roofing," Section 29 of these specifications.

2202. **SCOPE OF THE WORK.** The work in general includes the following items; which shall not be considered as a complete schedule:

a. All wood forms, centering and other temporary work required for the proper execution of the concrete, cement, and masonry work.

b. All wood barriers required for the protection of finished work, etc.

c. All wood nailing blocks and strips and all wood grounds for plastering, including blocks for door and window frames.

d. Furnishing and setting all rough hardware, including C.I. sash weights and cord for D.H. windows, etc.

e. All insulating materials.

f. Fitting and applying all finish hardware.

g. Furnishing and hanging of all fly screens.

h. All rough painting and creosoting

i. All cutting and framing for heating and ventilating ducts.

2203. **MATERIALS—FRAMING.** All sheathing, counterflooring and form lumber (unless otherwise specified) shall be No. 1 common O.P. All other framing lumber shall be select common. All in conformity with the "American Lumber Standards" Rules for Grading, of sizes marked on the various drawings, straight grained and all dry and well-seasoned as the market affords, free from imperfections impairing durability or strength. Sheathing, counterflooring and form lumber shall be S1S1E. Joist, rafters (except as noted) and studs S1E. Truss timber, purlins and rafters S4S.

2204. **CONCRETE FORMS.** Furnish and set all forms for concrete work, plain and reinforced, and strip all forms when concrete is set and remove all centering. All sheathing for forms shall be of 13/16-inch not over 8 inches wide, driven up tight and thoroly secured, braced and wired to maintain true and straight surfaces. Place the rough sides of boards next to concrete where same is to be applied—finished. Build forms for concrete steps, copings, curbs and piers and the like, of 2 inch stock.

Forms for bottoms of beams and lintels shall be 2-inch stock, supported at close intervals to prevent deflection. Forms for all beams shall be given 1/20-inch camber for each foot of span to insure that the finished work shall show no deflection or sag. Supporting framework for forms must be of good sound lumber of sufficient size and strength to withstand the imposed loads without bending or crushing. The construction shall be thoroly braced and tied together so that the pressure of the concrete or the movement of men or materials shall not throw the work out of line. Wall, beam and pier forms shall be held together with wire ties spaced to insure ample strength and shall be held apart with wood separators that can be easily removed as the work progresses. Forms for concrete exposed as a finished surface shall be of ¾-inch 5-ply O.P. or approved equal, with tight, flush joints, thoroly braced, accurately shaped and set to the required lines and levels. Before pouring of concrete begins, all forms shall be tested with an instrument for position, both horizontally and vertically. All wedging of the bracing must be completed in advance of pouring. Openings shall be left in walls for crawl holes, girders, pipes, etc., and chases for pipes and conduit formed as indicated and as otherwise directed. All necessary nailing blocks shall be set for finish, etc., where occurring in concrete. No forms shall be removed until concrete is sufficiently set to permit of this being done with safety. The minimum time after pouring shall be five days for piers, walls and sides of beams, and fifteen days for beams or girders.

2205. **GIRDERS AND POSTS.** Wood girders and posts wheresoever required on drawings shall be placed as indicated. Posts shall be set on concrete footings with full bearing on ends.

Girders may be laminated or solid at the option of Contractor. If solid girders are used, bolsters of size shown on plans shall be set on top of posts under girders, where they are spliced. If laminated, no joints shall occur between posts and girders shall be well spiked together.

2206. **JOIST HANGERS.** All double headers shall be hung in malleable iron hangers or stirrups of proper size for the size used, to be furnished by this Contractor. Tail joist to rest on 2-inch by 3-inch bearings well spiked to headers.

2207. **TERMITE PROOFING.** Mud sills and all other wood to be placed directly in contact with concrete; stone, tile or brick shall first be thoroly creosoted in accordance with the Standard Specifications of the American Wood Preservers' Association, by the empty cell process with 6 pounds of oil retained per cubic foot, using either grade 1 or grade 2 creosote oil. All cut ends shall be painted again just before placing. Girder supports, girders, joists, posts and sub-floor, or counterfloor, of first floor over unexcavated ground, and all joists, girders or other timbers to be embedded in walls, shall be treated with zinc chloride, using the one-pound (dry-salt) treatment in accordance with the specifications of the American Wood Preservers' Association.

2208. **FLOOR JOIST.** All wood joist shall be set with crown edge up, doubled under all partitions that are parallel with joist, and around all openings; well spiked where crossing inside walls or girders. Joist anchors 1 inch diameter, 18 inches long, with 4-inch C.I. washer; embedded in wall end, shall be placed at each end of every fourth floor and ceiling joist bearing in masonry and concrete walls both outside and in, and every 6 ft. outside walls that are parallel with joist, notched in flush with top of joist, and extended to third joist from wall where they parallel walls. Same style anchors shall be set in all gable where parallel with trusses, and on the ends of all trusses and purlines where they rest in walls. All anchors shall extend 8 inches, into concrete or masonry walls.

2209. **JOIST BRIDGING.** All wood floor joist shall be lattice X-bridged every 10 feet or fractional part thereof their span with 2 by 3's toe-nailed with two 10d nails at each end. All ceiling joists shall be bridged with 2 by 4's (as noted) set on edge on top of joist at points indicated by sections, well toe-nailed to each bearing.

2210. **CEILING JOIST.** All ceiling joist, wheresoever required, shall be of sizes indicated on plans, spaced 16 inches O.C. Ceiling joist and rafters shall be trussed together as indicated by drawings, well braced and thoroly spiked.

2211. **RAFTERS.** All rafters, wheresoever required on plans, shall be braced, tied and trussed with ceiling joists as indicated by the various details.

2212. **WOOD TRUSSES.** Construct wood trusses of solid timbers as indicated on drawings, joints neatly and rigidly bolted together. All holes for bolts, rods and the like shall be cut exact size. Parts of trusses exposed below panels shall be smoothed and made ready for painter work. All roof trusses shall be cambered not less than 1/20-inch for each foot of roof span.

2213. **SHEATHING.** Sheath all shingle, tile and bituminous roofs with 13/16-inch sheathing, laid horizontally close and with joints well broken. Concrete form lumber may be used for sheathing if in good condition. Cover all knot holes in roof sheathing with tin to make tight for roofer. Sheathe all shingle roofs, with sheathing as set out above in this paragraph, spaced not to exceed 3 inches apart, and laid parallel.

Sheathing for exterior sides of frame-stucco buildings shall be 1 inch by 6 inches No. 2 O.P., applied horizontally, drawn close, and nailed at every stud with at least 2 6d nails.

2214. **SADDLES.** Saddles shall be formed on roofs to pitch water to points wheresoever indicated on plans. Where composition roof is to be applied, furnish and set cant strips in angles where roof abutts vertical surfaces.

2215. **COUNTERFLOORING.** Underlay all finished wood floors throut the building with 13/16-inch O.P., not over 6 inches wide, laid diagonally at an angle of 50 degrees with bearings. All this flooring to be laid tight and extend to walls, joints cut parallel with and on bearings and double nailed with 8d common on every bearing.

2216. **FALSE FLOORS.** In all rooms where tile and cement floors are to be laid over wood floor, lay false floors of 13/16-inch T & G O.P not over 6 inches wide, with top of false floor 5½ inches below finish floor line under tile floors, and 4¾ inches under cement floor, supported on 1 inch by 3 inch strips well nailed to joist. Bevel top of joist from center 2 inches down each side.

2217. **DROP SIDING.** Drop siding, if required, shall be best quality clear select redwood, bevelled, or approved equal, of extreme net cross-sectional dimensions not to exceed ⅞ inch by 8 inches, laid over a layer of 15-lb. asphalt or tar saturated felt, lapped 2 inches at all joints and well nailed with flat-headed nails. All siding shall be well back painted as provided in paragraph 2229 of this specification, before placing, neatly and tightly mitered and nailed at all corners, all vent openings clearly cut and fashioned, all in exact conformity with the full size detail. All siding shall be closely butted at all joints and well laid to every bearing with 6d nails, neatly countersunk for puttying.

2218. **DEADENING.** Under counterfloor over basement heater room, wheresoever required on plans, lay one thickness approximately ½ inch in thickness, of insulating material approved by the Architect. Neatly joint deadening parallel with and on bearings, fit snug against walls and face nail to every bearing with 4d common nails 8 inches apart.

2219. **PAPER.** On top of counterfloors, and on false floors in toilets, lay one layer of heavy, sized building paper, snug against walls, lapping 2 inches at joints, and turning up 4 inches against walls.

2220. **NAILING BLOCKS.** Wood blocks 3 inches by 4 inches and of the required length shall be provided for all window and door frames in masonry or concrete walls. Provide all required anchorage and nailing blocks for plaster grounds and wood trim.

2221. **GROUNDS.** Furnish and set plaster grounds around all door and window openings, for base, chair rail, picture mould, at top of wall cases and for all trim and wood finish thruout. Grounds on brick, concrete or tile walls shall be ⅝ inch thick for hardwall plaster and ⅞ inch for acoustical plaster, and where metal lath is used, ¾ inch thick. No grounds to be less than 1¼ inch wide. Set grounds straight and plumb over one another and square at angles. Grounds for base shall be 4 inches high, solid from finish floor level to top of base, unless otherwise shown on plans.

2222. **STUDS.** Wood studs shall be spaced 14 inches O.C., doubled at sides and top of all openings; both of the double studs at sides of openings to extend from floor to ceiling in one piece. Triple the studs at all corners and spike solid. Provide all partitions with fire stops at floor line and 2 inches herringbone cross-bridging the full width of studs, half-way between floor and ceiling, nailed with two 8d nails at each end.

Place ¾-inch anchor bolts near top, bottom and center of last stud at each intersection of a stud wall with a masonry or concrete wall.

2223. **ROUGH HARDWARE.** Furnish and set all rough hardware, including sash weights, cords and pulleys, nails, spikes, brackets, shelf pins, and all other similar fittings required to properly secure all woodwork in its proper position and which is not specified under "Finish Hardware," Section 33, or "Misc. Metal Work," Section 20 of these specifications.

2224. **EXTERIOR SURFACED LUMBER AND MILLWORK.** All exterior wood sash shall be of clear kiln dried sugar pine. All window jambs and stops shall be of clear kiln dried O.P. Sills and staff beads of clear redwood, unless otherwise specified in this section. Outside wooden door frame of main entrance shall be of clear kiln dried white oak, unless otherwise specified. Basement outside door frame shall be clear kiln dried O.P. All other exterior lumber and outside millwork shall be of clear, well-seasoned redwood.

2225. **FOUNDATION VENTS.** As indicated in notes on drawings, cover vent frames in foundation with ½-inch galvanized 14-gauge wire mesh, and also inside of terra cotta roof vents in exterior walls.

2226. **DOOR FRAMES.** Wooden frames shall be run from the solid, rabbeted for doors, jambs and head housed together and solidly spiked, complete as detailed.

2227. **WINDOW FRAMES.** All wooden windows marked "D.H." on plans to have double hung sash, complete with boxes, pulley stiles and separate pockets for all weights, furnished and fitted with best quality ball-bearing 2½-inch round groove steel pulleys. Sills and heads shall extend to back of box both sides with jambs dadoed into same.

2228. **STAFF BEADS.** Where frames occur in plastered walls the staff shall be removed while plastering is being applied, and permanently set after plastering is completed.

2229. **BACK PAINTING.** Backs, soffits or sills, tops of all wood door and window frames, and all unexposed wood work shall be given one good coat of varnish, in which is mixed for each gallon

of varnish, 1½ pounds of aluminum bronze powder, conforming to specification D-226-28T (or the latest revision thereof) of the American Society for Testing Materials, before setting by this Contractor.

2230. **INTERIOR LUMBER, CABINET AND MILLWORK.** Wood fly screen frames, where required on drawings, shall be made of sugar pine. Interior finish woodwork, including cases and shelving, shall be selected edge grain O.P., unless otherwise specified in notes on plans.

All finishing lumber shall be thoroly kiln dried and selected for matching grain.

All mouldings, casing, stools, sills, stops, and similar work shall be made out of solid stock except for such items for which the use of veneered stock would be more practicable, and shall match well with adjoining veneered work.

2231. **INSTALLATION OF WORK.** All interior trim shall be securely nailed in place, concealing nails wherever possible and practicable; those parts coming in contact with plastering shall fit snugly against same, internal angles coped, external mitred, glued and nailed.

All mouldings shall be well glued in position except shoe moulds and glazing moulds which shall be left loose.

All work shall be installed in a workmanlike and substantial manner using all necessary clips, anchors, dowels, bolts, screws, rings, gluing or other means or methods of attachment and anchorage as may be approved by the Architect.

2232. **SMOOTHING AND SANDING.** All interior finish and woodwork thruout shall be hand-smoothed and sanded to a smooth, uniform surface free from scratches, machine or tool marks or other blemishes, ready for finishing.

2233. **WOOD DOORS.** Doors shall be framed from solid stock, unless otherwise specified in notes on plans.

All doors, including those for cases, cabinets, and the like, shall be of thickness noted, raised or solid mould as indicated, and raised or flat panel as shown. All doors shall be constructed with blind mortise and tenon joints and glued, and where glass is indicated, stops shall be provided.

All panel work shall be laminated, of thickness indicated or as required to prevent warping and twisting and insure substantial work.

2234. **TRANSOMS.** Wood transoms, where required on plans and not otherwise shown, shall be 1¾ inches thick and framed together as specified for sash, hinged at bottom and equipped with lifts, as approved by the Architect.

2235. **SASH.** Metal sash, where required on plans, including all sash, frames, mullins and transom bars, shall be as specified in "Misc. Metal Work," paragraph 2030 of these specifications. All wood sash to be mortised and tenoned, glued and wedged, where so shown, shall have muntins mortised and tenoned into sash. Lugs of side stiles of top sash of double hung windows shall extend 2 inches below meeting rail. All sash for exterior windows shall be 1¾ inches thick. Bottom of upper D. H. sash over 10 inches wide shall be rebated full width for reinforcing angles specified in paragraph 2013 of these specifications.

2236. **SASH WEIGHTS AND CORD.** Each sash of D. H. wood sash windows shall be evenly counterbalanced with C. I. or lead sash weights hung with wire cord, phosphor bronze, six strands of nineteen wires each, with cotton core, total diameter ⅛-inch. Tensile strength at least 400 pounds. Cord attachments to be socket eye at sash end and clasp at weight end, both soldered.

2237. **SASH AND GLASS STOPS.** All stops for D. H. wood sash window and glass beads for entrance doors and doors where detailed shall be fastened with stop bead screws as noted on details.

2238. **ARCHITRAVES.** Architraves where so detailed on plans shall be carried around all door and window openings as per various details, mitred at angle.

2239. **BASE MOULD.** Run wood base mould, where so detailed, on top of cork carpet linoleum base, after base has been set, on all walls, bottom of book stacks, cases and the like and wherever linoleum is to be installed, including base of all shelving installed by the furniture contractor.

2240. **CHAIR RAIL.** If required by drawings, run moulded rail around rooms and elsewhere as shown on detail plans.

2241. **PICTURE MOULD.** If shown by drawings, run picture mould around interior plastered walls and elsewhere as shown on detail plans.

2242. **SHELVES.** All places where noted on drawings shall have built-in shelving made adjustable where noted and where not adjustable shall rest on neat cleats.

2243. **COAT RAILS.** In coat closets install 13/16 inch by 5½-inch coat strips, set 5 feet 6 inches from floor to top of strips.

2244. **CABINETS, CASES, ETC.** Furnish and build in where indicated on drawings all miscellaneous cabinets, cases, wood shelving, etc. All shall be well built in accordance with various details, with substantial framework. Shelves made adjustable where so noted, with brass pins approved by the Architect, furnished and set by this Contractor. Cases shall have exposed ends made solid or

paneled with moulded cornices and bases where indicated. Double doors shall have rabbeted tile at center. All drawer fronts shall be 1⅛-inch thick; small drawers 2 ft. wide or less ½-inch sides; larger ones 13/16-inch sides; all bottoms 3-ply veneer. All drawers shall have top center guides.

2245. **CONCEALED SAFE.** Furnish and install where indicated on plans one concealed safe, 4¼ by 13¾ by 20 inches, of 14-gauge sheet metal, welded joints, with approved hinge and dial combination lock; 2-coat baked enamel, color selected by Librarian.

2246. **COOLER.** Furnish and build in where indicated air cooler substantially as specified for cases, etc. Line inside, including doors, with ¼-inch "Celotex" board. (Metal lining of cooler is specified under "Sheet Metal, paragraph 2111 of these specifications.) Furnish the required number of 12-gauge G. I. ½-inch wire mesh shelves, built on ½-inch G. I. round rod frames, and sufficient adjustable pins to support the same, as shown on detail drawings.

2247. **SCREENS.** All movable exterior doors and all exterior windows (except those in basement) shall be equipped with insect screens, of metal or wood as shown on plans, covered with copper or "Monel" metal fly screen cloth with not less than 14 meshes to the inch. Metal frames shall be non-ferrous, of extruded aluminum to a 1x7/16x.062-inch section, finished in natural metal finish. All necessary accessories shall be furnished by the screen manufacturer. Same to be non-ferrous and to match screen frames. All wood fly screen shall be mortised, tenoned, glued and pinned together as in the best standard practice. Stiles and rails of widths matching those of sash. Door screens shall be protected by three horizontal brass or iron push bars as shown on detail plans. Window screens to open outward.

Hardware shall be furnished and applied by this Contractor. The fly screen cloth shall be neatly and securely fastened in grooves and mouldings planted in grooves. Each screen shall be legibly marked with a number and a corresponding number on the jamb.

2248. **FINISHED FLOORS.** All wood shall be 13/16-inch, 3¼-inch face T. and G. No. 2 clear O. P. flooring. Flooring shall not be laid until after plastering is completed and standing trim is in place; it shall be tightly driven together, jointed over bearings, blind nailed at every bearing with 8d common wire nails; face nail both ends of head joints with two 8d finish nails and countersink. Flooring shall extend under base to walls. Machine sand all wood floors to a smooth, even plane. Cover vents where they occur beneath wall shelving with copper fly screen cloth having not less than 14 meshes to the inch, as specified in paragraph 2247 above.

2249. **WOOD STAIRS.** Where wood stairs are indicated on plans, build open stairs (no risers) from main floor to basement as indicated on plans, with supporting carriages 2 inches by 16 inches S4S, correctly notched for treads. Treads shall be of correct width, with uniform rise, nosed, S4S, 15/16 inches finished thickness, returned on open ends and securely nailed to carriages. Run 3 saw cuts ½-inch deep lengthwise of each tread.

2250. **STAIR RAILS.** Furnish and install 2-inch diameter wall rails with acorn-shaped ends, wheresoever indicated on plans, well secured with brackets, as specified in paragraph 2011 of these specifications.

2251. **HATCH.** Construct hatch in ceiling, where indicated on plans, 24 inches by 30 inches with jambs, trim and paneled door set on stops.

2252. **CEILING SASH.** Where required on plans, furnish and install sash in ceiling under skylight as detailed; provide wood stops for leaded glass.

2253. **MAIL SLOT.** Install in lower door panel of front entrance one brass mail slot, 2 inches high by 11 inches wide, as shown on detail drawings.

2254. **FINISH HARDWARE.** Fit, apply and adjust all finish hardware complete before painting is done. It shall then be removed, except butts on doors, properly indentified, stored under lock and key and reset after painting work is finished. Correctly tag all keys with 1 inch diameter brass disc tags and deliver to party authorized to receive them.

SECTION 23.

LATHING AND PLASTERING.

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Paragraph	Subject
2301.	Scope of the Work.
2302.	Materials.
2303.	Mixtures.
2304.	Workmanship.
2305.	Plastering.
2306.	Ornamental Work.
2307.	Stucco.

2301. **SCOPE OF THE WORK.** Plaster work shall include all interior plastering, lathing, metal grounds and corner beads and furring, and exterior stucco work. Gypsum plaster shall be used for scratch and brown coats, unless otherwise specified.

For extent and character of plaster work, see notes and details on drawings. Plastered "ceilings" shall include beams and the soffits of stairs, etc., with the other overhead plaster work, unless otherwise specified. Plastered "walls" shall include walls, piers and columns and plaster reveals, except where finish is required. Plastering on masonry and concrete shall be two-coat work generally, and plastering on lath and plaster boards shall be three-coat work. Walls and ceilings of public reading rooms shall be plastered with acoustic plaster. Plastering will be omitted back of marble and tile finish. Furring strips back of tile wall finish shall be lathed.

2302. **MATERIALS.** All materials will conform to the requirements of the latest specifications of the American Society for Testing Materials for the respective materials named herein.

a. **Gypsum Plaster** may be "Neat" or "Wood-Fibered." Neat plaster shall be fibered for scratch coat.

b. **Calcined Gypsum** shall be Class "C" for cast and run work; Class "F" for plain finish coat. Keene's cement plaster with Keene's cement finish may be substituted for the gypsum plaster with white finish, all as specified, at the option of the Contractor.

c. **Lime** shall be hydrated lime, or shall be finely pulverized quick lime. Quick lime shall pass a No. 20 sieve and at least 90 per cent shall pass a No. 50 sieve. Plaster for scratch and brown coats shall be either gypsum plaster or lime plaster at the option of the Contractor.

d. **Keene's cement** shall be a true Keene's cement that will combine perfectly with lime and stand retempering without detriment. For cast, run and finish work it shall be pure white and capable of taking a high polish.

e. **Acoustic Plaster** shall be an open, porous material in successful use for not less than five years and approved by the Architect.

f. **Hair and Fiber** shall be clean and in various lengths from 1 inch to 2 inches.

g. **Sand** shall be washed clean, well graded from fine to coarse and free from organic matter. When dry all sand shall pass a No. 8 sieve, not more than 80 per cent shall pass a No. 30 sieve, not more than 20 per cent shall pass a No. 50 sieve.

h. **Water** shall be clean, fresh and free from alkali.

i. **Expanded Metal Lath** shall be painted and free from rust. Lath not otherwise specified shall be either 24 gauge, flat, not lighter than 3.4 pounds per square yard, or 2½ mesh per inch 19 gauge woven wire lath not lighter than 2.48 pounds per square yard or 14 gauge wire fabric not lighter than 2 pounds per square yard. Rib lath shall have ⅜-inch ribs and shall be either expanded metal of at least 26 gauge and weighing not less than 4 pounds per square yard or 2½ mesh per inch 19 gauge woven wire weighing at least 3.3 pounds per square yard.

j. **Corner Beads** shall be zinc-coated sheet metal not lighter than 26 gauge. Corner beads shall have perforated or expanded flanges not less than 2½ inches wide so shaped as to secure a good bond with the plaster. All vertical external plaster corners not covered by other finish shall have metal corner beads.

k. **Metal Grounds** shall be zinc-coated sheet metal not lighter than 26 gauge and keyed for the plaster. The top edges of cement wainscot and of cement base shall finish to metal grounds.

l. **Metal Furring** shall be either hot rolled or cold rolled steel shapes. Cold rolled channels shall have flanges ½-inch wide and the following minimum weights per 1000 linear feet; 276 pounds for ¾-inch, 352 pounds for 1 inch, 442 pounds for 1½-inch and 553 pounds for 2 inches. Channels shall be painted similar to lath. Hot rolled steel shapes shall be at least ⅛-inch thick and of the depth required. Furring shall include all bolts, inserts, clips, fastenings and hangers and all material (other than structural steel) necessary for a complete installation.

Attachments for hangers, brackets and all furring members shall be of such size, number and design as will develop the full strength of the members. Wire for hangers and fastenings shall be zinc-coated. Metal furring shall be provided for all lines, contours and planes where lath is required for plastering.

m. **Brackets** for beams, cornices, etc., shall be not lighter than 1-inch channels or 3/16 by 1-inch flats, and spaced not over 3 feet apart.

n. **Longitudinal Bearers** for lath of beams, cornices, etc., shall be not lighter than ¾-inch channels or ⅝-inch rods, and shall be placed at all principal angles and at points not over 12 inches apart.

2303. MIXTURES.

a. **Gypsum Plaster.** Neat gypsum plaster shall be mixed 1 part plaster to 2 parts sand for scratch coat, and 1 part plaster to 3 parts sand for brown coat and for use on masonry. Parts are by weight. Wood fibered plaster shall be used without sand for scratch coat, and mixed 1 part plaster to 1 part sand, by weight, for brown coat and for use on masonry. Gypsum plaster (neat or wood fibered) shall be used without sand on concrete. Finish coat for gypsum plaster shall be a prepared white finish, or shall be mixture of lime putty and plaster of Paris that will produce a smooth, hard white finish.

b. **Lime Plaster.** For scratch coat, lime plaster shall consist of 1 volume of putty and 2 volumes of sand with 7½ pounds of hair per cubic yard of mortar. For brown coat and for use on masonry it shall consist of 1 volume of putty and 3 volumes of sand with 3½ pounds of hair per cubic yard of mortar. An equivalent bulk of fiber may be substituted for hair as specified. Finish coat for lime plaster shall be the same as specified for Gypsum.

c. **Keene's Cement.** Keene's cement plaster shall be mixed 1 part cement, 1½ parts lime putty and 7 parts sand for scratch coat; and 1 part cement, 1¾ parts lime putty and 10 parts sand for brown coat and for use on masonry; and 1 part cement, 1 part lime putty and 4½ parts sand for use on concrete. Scratch coat shall have hair or fiber as necessary. Parts are by weight. Keene's cement finishes shall consist of the following parts by weight of cement and lime putty:

Finish generally; 1 of cement and not over 1 of putty.
Run work; 2 of cement and 1 of putty.
Cast work; neat cement without putty.

d. **Lime Putty.** Lime putty shall be a stiff mixture of lime and water, thoroly slaked and allowed to cool. Putty from hydrated lime shall soak at least 24 hours, and putty from pulverized lime shall soak at least 72 hours after cooling, and be kept moist until used. Aged lime putty made from lump lime may be used provided the total estimated amount required for the job is slaked, strained and stored in a vat or vats for at least three weeks before any of the lime or putty is delivered on the site. The putty shall be made by a firm regularly engaged in supplying the trade with putty in bulk and with a plant fully equipped with the proper machinery and storage capacity; and the methods used to be subject to inspection and approval of the Architect.

2304. **WORKMANSHIP.** Metal furring shall be erected to true lines and surfaces and be rigidly supported and fastened in place. Furring for cornices, beams and irregular surfaces shall be shaped to within 2 inches of the finished profiles. Grounds, furring framing, etc., shall be tested and all needed corrections made before lathing or plastering is begun.

Lath shall be laid with edges of sheets lapped ½-inch and ends of sheets lapped at least 1 inch. Ribbed lath shall have the ribs "nested" at joints. Wire lath shall be tightly stretched. End joints of sheets shall be made only at bearings and shall be staggered. Lath shall be continuous around the corners of intersecting plaster surfaces. Flat and wire lath shall be fastened every 6 inches along supports, and side joints wired once between supports. Rib lath shall be fastened at all ribs. Lath abutting masonry or concrete surfaces that are to be plastered shall extend onto same at least 4 inches and be fastened every 6 inches. All fastenings shall be zinc-coated. Lacing wire shall be at least 18 gauge. (.048 in.).

Plaster board shall be laid with ¼-inch open joints. The horizontal joints on vertical surfaces and the joints at right angles to ceiling framing or furring shall be broken at each board. Joints shall not be made between supports. Where plaster board abuts unfurred masonry or concrete, the intersection shall be covered by strips of flat metal lath bent to extend 8 inches onto the abutting surfaces and with edges fastened every 6 inches. All fastenings for plaster board shall be zinc-coated. Nails shall be 1¼ inches long by 11½ gauge and with 7/16-inch heads. Nails shall be spaced 3 inches apart along nailing edges and 6 inches apart at intermediate bearings. Plaster board shall be fastened to metal furring with metal clips spaced 8 inches apart along "nailing" edges, with a clip at every intersection of broken joints. Similar clips shall be placed at the center of the unsupported edges of boards. Clips shall be designed to space the boards ¼ inch apart and to receive the edges of the boards and hold them in the same true plane.

Metal grounds and corner beads shall be set to straight, true lines and securely fastened in place. Beads shall be plumb and grounds parallel with floors and rake of stairs.

2305. **PLASTERING.** The exterior openings shall be kept closed as necessary to properly regulate the drying and curing of the plaster. Plaster shall be protected from rapid drying and from frost. All surfaces that are to receive plaster shall be clean and free from dust and efflorescence. The preparation of concrete for plastering is specified under "Concrete and Cement Work." Mixing boxes and tools shall be cleaned for each batch. Concrete, masonry and all under coats of plaster, shall be moistened to secure proper spreading and adhesion of the plaster or finish when applied.

No lumpy or caked or frozen materials shall be used. All ingredients shall be accurately measured and thoroly mixed until evenly distributed thruout. Mortar that has commenced to set shall not be retempered or used.

Screeds shall be run on all surfaces at such intervals as shall establish the exact surface of the brown coat and serve as guides for rodding wherever grounds for the finish surface are not available.

Plaster shall be applied with sufficient force to cause perfect adhesion, to form good keys on lath, and to fill the joints of plaster board. The scratch coat shall be cross-scratched in both directions before the mortar has set. Plaster on concrete ceilings, beams and soffits shall be applied in thin coats and shall be no thicker than necessary to secure a true, even surface.

The brown coat of gypsum plaster shall be applied after the scratch coat has set but before the scratch coat is dry. The brown coat of lime plaster and Keene's cement plaster shall not be applied over a scratch coat until it is thoroly dry. The brown coat shall be| rodded and brought to true uniform surfaces, lightly broomed and allowed to set and dry for the finish coat. If no finish coat is required the brown coat shall be floated to a true, uniform surface flush with the grounds.

The finish coat shall cover the rough plaster so completely that no part of the under coat shall show thru, and shall be troweled to a dense, close grained surface with a high polish. The finished work shall be true to the grounds and guide lines and be straight, level and plumb, with true surfaces and sharp lines and arrises. The finished work shall show no visible joints, cracks, crazing, tool marks or discoloration.

Acoustic plaster shall be in one layer one-half inch thick, of rough texture as directed by the Architect, applied on a foundation of two coats, (scratch and brown) in public reading rooms on ceilings, and on walls **except** those immediately in rear of open wall shelving, which shall be finished with a smooth putty coat ready for painting.

2306. **ORNAMENTAL WORK.** Mouldings and beds for ornament shall be run, and plaster ornament set in place, before the finish coat of plaster is applied. Where moulded work is of such character that it cannot be run in place, it shall be run or cast on the bench and then firmly secured in place. Cornices and mouldings shall be straight and true to line, make true intersections and be neatly mitered at corners. Covers shall finish with a ¼-inch offset or fillet at the lower edge. Ornament shall be spaced uniformly and the finish at corners and ends of panels shall be symmetrical. Ornament shall be firmly secured and pointed to show no joints. Ornamental work shall faithfully reproduce the models or designs furnished, and shall be reinforced as necessary with fiber or zinc-coated wire fabric.

2307. **STUCCO.**

a. **Materials.** Sand, lime, water, hair and fiber shall be of the same quality specified for similar materials under "Lathing and Plastering." Sand for finish coat shall be white or light-colored.

Portland cement shall conform to the latest specifications of the American Society for Testing Materials for Portland Cement for Stucco Work.

Colors shall be finely ground non-fading mineral oxides. Furring shall be that specified for plaster work. Lath for cornices and other furred work shall be 2½ mesh No. 18 gauge welded and zinc-coated wire fabric. Metal grounds shall be zinc-coated sheet metal not lighter than 26 gauge. All other lath shall be either expanded steel fabric not larger than 1½x3-inch mesh and weighing at least 1.8 pounds per square yard, or 2x3-inch mesh zinc-coated wire fabric weighing at least 1.7 pounds per square yard.

b. **Preparation.** Masonry shall be clean and damp when stucco is applied. Lath shall be lapped 1 inch at all joints and formed continuous around all angles in lathed surfaces that are to be stuccoed. Lath on furring shall be secured every 8 inches by zinc-coated No. 16 gauge lacing wire; joints to be wired at least once between supports over 10 inches apart. Other lath shall be fastened with self-furring nails about 1½ inches long that will hold the lath ⅜ inch from the supporting surface; at least one nail every square foot of lath. Metal grounds shall be provided at edges of stucco where required or indicated on drawings.

c. **Mixtures.** Stucco shall be mixed in the following proportions by volume; one sack of cement being considered equal to one cubic foot:

First coat: 1 of cement, 2½ of sand and 1/5 of lime putty, with hair or fiber as necessary for proper application.

Second coat: 1 of cement and 2½ of sand.

Third coat: 1 of white cement, 3 of sand and 1/5 of lime putty; mixture to be tinted to secure the required shade when dry.

Each coat shall be made waterproof by the addition of integral waterproofing approved by the Architect, mixed in accordance with the manufacturer's directions.

Option: A factory-mixed, non-fading stucco finish composed of white Portland cement, color pigments, integral waterproofing and fine aggregates and specially prepared for use with the addition of water only may be substituted, at the option of the Contractor, for the third coat above specified, provided a 10-pound sample of the material is first submitted to and approved by the Architect.

d. **Application.** Materials for each batch shall be accurately measured and thoroly mixed until evenly distributed thruout. Special care shall be taken with tinted mortar to secure a uniform color in the finished work. No frozen, caked or lumpy materials shall be used. Mortar that has commenced to set shall not be used.

Stucco shall be applied with sufficient force to cause perfect adhesion, and to fully embed the lath. All under-coats shall be dampened to the proper degree by sprinkling before the succeeding coats are applied. Stucco shall not be applied in freezing weather.

Stucco shall be applied in three coats with a total thickness of at least 1 inch. The first coat should be as thin as practicable. As soon as it has attained its initial set, the first coat shall be cross-scratched to form a good key and the second applied.

The second coat shall be brought to true surfaces parallel to the finished face and cross-scratched

as required for the first coat. The second coat shall be kept moist at least 4 days, or until satisfactorily hardened, and allowed to become dry.

The finish coat shall be brought to true surfaces and arrises and finished with a cork float with as little delay as possible. The finish shall have a coarse, granular surface of uniform texture and tone, free from laps, waves, tool marks and crazing.

e. **Curing.** As soon as the finish coat has taken initial set, the stucco shall be covered with cloths and protected against frost or rapid drying for at least six days. During this time the stucco shall be kept moist by frequent spraying.

SECTION 24.

MARBLE WORK.

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2401. SCOPE OF WORK. This section of the specifications includes interior marble, and the metal trim, fastenings and supports for same, together with the hardware for doors to plumbing inclosures. The extent, general character, typical details and kinds of materials are shown and noted on the drawings.

2402. SHOP DRAWINGS. Shop Drawings in duplicate showing jointing and anchoring of work generally shall be submitted for the approval of the Architect.

2403. MARBLE. The naming of marbles, on the drawings or in the specification is for the purpose of indicating the type that is required, but it is not intended to exclude any marble which, in the opinion of the Architect, are so nearly like those scheduled on the drawings or named in the specification that they will give practically the same results.

Marble shall be representative of its kind and shall come within the extremes indicated by the approved samples Pieces that show unusual contrasts or markings that would detract from the general appearance of the work shall be eliminated.

Marble (except for purely decorative work) shall be sound and free from filling. Marble for floors, treads and platforms shall be hard and durable. Marble for toilet rooms and plumbing inclosures shall be dense and, where no particular kind is indicated, shall be either gray or pink with reasonably uniform tone or white moderate cloud or veining.

Marble for floors shall have a smooth rubbed finish. Marble so indicated shall have a fine honed finish. Standing marble not otherwise specified shall have a high polish.

2404. TRIM. Metal fastenings and supports for plumbing inclosures and the hardware for the doors of inclosures shall be heavy pattern cast brass and brass tubing. Metal work shall be secured in place with ¼-inch bolts or screws having hexagonal,round heads and cap nuts. All metal work shall be finished and chromium plated to match the trim of plumbing fixtures.

2405. FILL. The fill under floor strips and borders shall be the same as specified for the tile or terrazzo field.

2406. ANCHORS, DOWELS, ETC. Shall be of brass or bronze and except where special anchors are required shall be not lighter than No. 6 B & S gauge (.162 in.), For special anchors see drawings.

2407. WORKMANSHIP. Finishes shall be full and uniform and free from scratches. Plain surfaces shall be flat and straight All joints shall be square and true and dressed to a close fit. Mouldings and arrises shall be full and true to line and accurately matched at joints. Mouldings at miters and returns shall be cut from the solid

2408. SETTING. Wall finish and base shall be set straight, level and plumb and well backed up and jointed with plaster of Paris. Each piece of standing work (except partitions) shall be secured in place with at least two anchors so placed as to be concealed in the finished work. All joints shall be close and flush.

2409. TOILETS AND SHOWERS. For typical details of work in toilet rooms, see the general arrangement of partitions and inclosures as shown on the contract drawings. The work shall be laid out from actual dimensions taken at the building.

Inclosure doors are shown in notes on drawing. Toilet accessories and the seats of shower inclosures are included under "Plumbing," Section 34 of these specifications. All work shall be properly cut, drilled and countersunk for outlets and the fastenings of hardware and accessories.

The joints of shower bath inclosures shall be made water-tight with a cement composed of glycerine and litharge. The sill at shower entrance shall be secured with dowels.

Safety pans of six-pound sheet lead shall be furnished and set by this Contractor, complete for all

shower baths. The pans shall be made without seams and the corners folded and soldered instead of being cut. The connection of pan to floor drain will be made by the plumber.

Toilet rooms having terrazzo floors shall have covered floor borders of the same material as the base or wall slabs, unless otherwise specified.

Each shower inclosure shall have floor slabs a covered floor borders of the same material as the of the same material as the inclosure.

Each door of inclosure shall be fitted with latch and stop and hung on spring hinges. Springs shall be reversed in the hinges of doors that open into inclosures.

SECTION 25.

TILE WORK.

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2503.	Certificate of Grade.
2504.	Setting.

2501. **SCOPE OF THE WORK.** The extent of tile work and the colors, sizes and pattern required are indicated on the drawings. The sizes noted are nominal and slight variations will be permitted, but in any case the tile shall lay to the patterns indicated and without noticeable variation in the width of joints.

2502. **TILE.** All tile shall be standard grade and of as nearly uniform shape and size as can be produced in the kinds and sizes noted. Base and wall tile shall include trimmings. Internal and external angles shall finish with cove and convex tile of 1 inch radius, including stops and miters, unless otherwise specified.

Floor and wall tile shall be unglazed hard-burned shale or clay tile (quarry tile) in range of colors noted on drawings.

Tile wainscot shall have plain bullnose cap.

2503. **CERTIFICATE OF GRADE.** Before setting any tile, the Contractor shall furnish the Architect a certificate of grade in duplicate properly filled in and signed by the tile manufacturer. The certificate shall state the grade, kind and full quantities of tile and shall give identification marks for all packages of tiles furnished under the contract. Packages shall be branded with corresponding shipping marks and shall be subject to inspection by the Architect before being opened.

2504. **SETTING.** Floor fill under tile shall be 1:3:4 concrete, reinforced with shrinkage fabric. Setting mortar shall be 1 part Portland cement and 2 parts sand. Structural slabs shall be swept clean, drenched and then dusted with neat cement as the concrete is placed. The fill shall be laid only in such quantity each day as will be covered by tile not later than the following day. Concrete and masonry back of tile shall be damp when the tile are set. All tile shall be bedded solid in Portland cement mortar.

Wall tile shall be set with close joints and in the bond indicated on drawings. The tile work shall be straight and plumb, with courses level and abutting tile shall be flush at joints. Joints of tile shall be filled with cement mortar and finished smooth.

Floor tile shall be laid in the pattern indicated, leveled to a true, even surface and the joints made straight and flush. Joints shall be uniformly $\frac{1}{8}$-inch wide.

All exposed joints shall be filled with colored mortar, made with white Portland cement and non-fading mineral oxides shall be used as directed by the Architect.

The finished tile work shall be left clean and free from loose, cracked or broken tile.

Mortar for floor work shall be made waterproof by the addition of integral waterproofing approved by the Architect and mixed in accordance with the manufacturer's directions.

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TERRAZZO WORK.

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2601.	Materials.
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2603.	Terrazzo.

2601. **MATERIALS.** Portland cement for terrazzo and the materials and mixing of concrete fill under terrazzo shall conform to the requirements for similar work under "Concrete and Cement Work."

Marble chips shall be hard and durable. For color of marble, see notes on drawings.

White Portland cement shall be used and shall be made waterproof by the addition of integral waterproofing approved by the Architect and mixed in accordance with the manufacturer's directions. Cement shall be colored as noted on drawings.

2602. **CONCRETE FILL.** The fill under terrazzo shall be 1:3:4 concrete reinforced with shrinkage fabric and shall be spread over a continuous layer of 15-pound bituminous roofing felt. The concrete shall be well tamped and leveled off to a true surface 1½ inches below the finished floor level. All concrete fill placed each day shall be covered by terrazzo not later than the following day.

2603. **TERRAZZO.** Terrazzo shall be composed of Portland cement and hard marble chips. The chips shall be a mixture of 2 parts passing a ⅜-inch mesh, and retained on a ¼-inch mesh sieve, and one part passing a ⅜-inch mesh and retained on a ⅛-inch mesh sieve. Two parts of this mixture shall be mixed with one part Portland cement with only sufficient water to provide a workable degree of plasticity after being thoroly mixed.

Terrazzo shall be tamped or rolled and troweled to the required level, then marble chips shall be rolled into the surface until no more can be imbedded, and the terrazzo finally rolled to a dense, even surface. Terrazzo shall finish 1½ inches thick. After curing, the terrazzo and the floor borders shall be ground smooth and even to a true plane, removing all surface cement, holes or pits and then be washed clean.

Terrazzo shall be jointed on straight, true lines where indicated with brass dividing strips not less than .05 inch thick, extending the full depth of the terrazzo, with firm anchorage, and showing on the surface when finished.

Terrazzo shall cure at least 6 days before grinding. During this period it shall be covered uniformly with one inch of clean, wet sand or one inch of clean, wet sawdust free from tannic acid, and shall be kept wet by sprinkling with clean water at intervals of not more than 10 hours. A strong, two-ply kraft paper with asphalt membrane in the center may be used instead of the sand or sawdust; the paper to be reinforced with crossed fibers completely imbedded in the asphalt. This paper shall be laid with as few joints as practicable; the joints to be lapped at least 3 inches and sealed with gummed kraft paper tape or glue as directed by the manufacturer.

SECTION 27.

WOOD SHINGLE ROOF.

Index.

Paragraph	Subject
2701.	Work Not Included.
2702.	Scope of the Work.
2703.	Materials.
2704.	Laying.

2701. **WORK NOT INCLUDED.** Furnishing and laying of sheathing for wood shingle roof, which is specified in paragraph 2213 of these specifications.

2702. **SCOPE OF THE WORK.** This work will include the furnishing and laying of wooden shingle roof, of the material and in the manner specified in this section.

2703. **MATERIALS.** Roof shingles shall be sixteen (16) inch, XXX (6/2 inch) "Perfects" red cedar shingles, or approved equal, strictly clear, edge grain, free from sap, dipped 100% by machine in creosote stain approved and of color selected by the Architect. No shingles shall be narrower than 3 inches.

2704. **LAYING.** All shingles shall be laid in straight, true courses, exposed 3½ inches to the weather. Break all joints on side laps at least 1 inch, taking care that no joint comes directly over another joint on any three consecutive courses. All shingles shall be placed ⅛-inch apart in course, nailed with two three-penny (3d) fine galvanized shingle nails in each shingle, all nails covered by lap. All shingles 9 inches wide or more shall be split.

On roofs with open valleys the shingles shall lap the valley flashing not less than 7 inches on each side. At all ridges and hips a 26-gauge galvanized pure ingot iron sheet cap shall be provided over the sheathing. The ridge course shall be doubled on each side, butting and lapping off in a neat and workmanlike manner.

SECTION 28.

COMPOSITION ROOF.

Index.

Paragraph	Subject
2801.	Scope of the Work.
2802.	Materials.
2803.	Workmanship.
2804.	Plastic Flashings.

2801. **SCOPE OF THE WORK.** This specification shall cover roof noted on plans as "Composition Roof."

2802. **MATERIALS.** Roofing asphalt, Roofing Tar, Asphalt Primer for Concrete, 15-lb. Asphalt Felt, 15-lb. Tar Felt, 30-lb. Asphalt Felt, 30-lb. Tar Felt, Plastic Roofing Cement and Gravel for composition roof, shall conform to the latest specifications of the American Society for Testing Materials for the respective materials herein specified. Manufactured materials shall be delivered on the job in original packages marked with the manufacturer's name and brand. To insure compliance with specifications it is suggested that materials for this work be shipped direct from the factory.

Composition roof shall be either 5-ply asphalt or 5-ply tar on concrete. 5-ply asphalt roof shall have not less than the following quantities of materials per 100 square feet.

Asphalt Primer	7.5 lbs.
5 Layers Asphalt Felt	76. "
Asphalt	170. "
Gravel	400. "
—or—	
Slag	300. "

5-ply tar roof shall have not less than the following quantities of materials per 100 square feet:

5 Layers Tarred Felt	76. lbs.
Coal Tar Pitch	210. "
Gravel	400. "
—or—	
Slag	300. "

2803. **WORKMANSHIP.** 5-ply asphalt roof shall have the roof surface uniformly coated with asphalt primer, using not less than one gallon per 100 sq. ft. The roof shall then be given a coating of hot asphalt, using not less than 30 pounds per 100 sq. ft. Over this coating shall be laid 5 layers of felt. The laps of all sheets of felt shall be mopped full width of the lap, using not less than 20 pounds per 100 sq. ft. in each mopping.

5-ply tar roof shall have the roof surface uniformly coated with hot coal tar pitch, using not less than 40 pounds per 100 sq. ft. Over this coating shall be laid 5 layers of felt. The laps of all sheets of felt shall be mopped full width of the lap, using not less than 25 lbs. per 100 sq. ft. in each mopping.

Asphalt shall not be heated above 400 degrees F. Coal tar pitch shall not be heated above 375 degrees F. They shall be hot when the felts are laid. Asphalt and coal tar pitch shall be evenly applied so as to leave no bare spots.

The surface material shall always be dry when applied and in addition shall be heated in cold weather.

The final coating of asphalt shall be not less than 60 pounds, and of coal tar pitch shall be not less than 70 pounds per 100 sq. ft. and into which while hot the surfacing material shall be embedded.

The flashing and all connections of roofing with other work shall be complete before the final coating and the surfacing materials are applied.

Felts shall be smoothly laid without wrinkles. Felt laid over asphalt or pitch shall be rolled closely behind the mopping so that no voids or air pockets shall occur under the felt.

Felts shall be laid with not less than the following laps:

	32" Felt	36" Felt
2 layers	17" lap	19" lap
3 layers	22" lap	24½" lap
4 layers	24½" lap	27½" lap
5 layers	26½" lap	29½" lap

Ends of sheets shall be lapped 6 inches. Felts shall, so far as practicable, be laid at right angles to the inclines of the roof, starting at the low points.

Not less than two layers of felt shall be carried up above the plane of the roof at least 5 inches against all abutting structures. Where cant strips occur all layers of felt shall be carried to the upper edge of same.

The parts of all metal flashings and fittings overlapping the roofing felt shall be bedded in hot bitumen of the type specified for the roof and then covered with not less than two strips of felt; the

first extending at least 8 inches beyond the edges of the underlying metal, and the second at least 2 inches beyond the first and both laid in hot bitumen.

2804. **PLASTIC FLASHINGS.** Plastic flashings of 30-lb. felt shall be used where composition roofing intersects abutting walls or other structures and where necessary to make the roof intersections permanently watertight.

The flashings shall consist of three layers of flashing felt set in the angles or on the cant strips and extending up to the counter-flashing reglet or to the height required where no reglets occur. Where cant strips occur, the flashing felts shall extend to the bottom edge of same. The felts shall be cemented together and to the underlying materials with plastic roofing cement evenly applied with a trowel. The last layer shall be evenly coated with not less than 1/16 inch thickness of the same cement.

Counter flashings shall be installed to cover top edges of the flashings wherever they would be otherwise exposed and not permanently secure and water-tight. The counterflashings shall be installed after the flashing is completed.

Metal counterflashings are specified in connection with the "Sheet Metal Work."

SECTION 29.

TILE ROOF.

Index.

Paragraph	Subject
2901.	Scope of the Work.
2902.	Materials.
2903.	Laying.

2901. **SCOPE OF THE WORK.** For extent of work and general character of the roof tiles required, see drawings. Roof surfaces where tile are to be laid shall be covered with felt. All sheet metal flashings and counterflashings necessary for a complete and water-tight installation shall be provided. Other sheet metal is included under "Sheet Metal Work."

2902. **MATERIALS.** All materials shall comply with standard specifications of the American Society for Testing Materials for burned clay or asbestos tile, sheet copper, sheet lead, 30-lb. asphalt felt, etc.

a. **Sheet Metal Work.** Shall be of hard copper weighing at least 16 ounces per square foot, or of hard lead weighing at least 3 lbs. per square foot. Hard lead shall be a commercially pure lead-and-antimony alloy containing not less than 6 percent nor more than 7.5 percent antimony.

b. **Nails** for securing the tile shall be either copper clad steel nails not smaller than No. 8 gauge (.162 inch) with a copper coating at least one-twelfth the over-all diameter of the nail, or they shall be solid copper not smaller than No. 10 gauge (.135 inch). Nails shall be long enough to penetrate the wood nailers or sheeting 1 inch when the tiles are in their final position. Wire for fastening the tile shall be at least 14 gauge (.08 inch) solid copper.

c. **Felt** shall be asphalt saturated roofing felt weighing at least 30 pounds per square foot.

d. **Tiles** shall be of shale or mixtures of shale and clay and shall be dense, hard-burned, reasonably straight and true and free from checks and blisters of exposed surfaces. Spanish type tile shall be one-piece pan and cover tile about 13½ inches long with flat pan. Hips and ridges shall have roll pattern cover tile with closed hip starters and plain terminals. Field tile that verge along hips shall be cut before burning. Top fixtures shall be furnished at deck and at the lower side of abutting vertical surfaces. Tile at eaves shall be fitted with eave closures. For finish at deck see details. Sizes specified are nominal and a plus or minus tolerance of not more than ¼ inch in width and ½ inch in length from the dimensions given will be permitted, it being understood that each kind or type of tile furnished shall be reasonably uniform in size. Colors shall be as specified in notes on plans.

2903. **LAYING.** The felt shall be laid horizontally, lapped at least 4 inches over gutter metal and turned up 5 inches against all abutting vertical surfaces where possible. The joints shall be lapped at least 3 inches and cemented together. The felt shall extend over hips and the surfaces left unbroken. Holes shall not be made in the felt except as necessary for securing the tile

All tile shall be laid in regular courses parallel with the eaves and no attempt shall be made to stretch the courses. Tile shall be laid with an end lap of at least 3 inches. All nails shall be covered in the finished work. Eave closures shall be recessed at least 1½ inches from the lower end of the tile.

Every piece of tile shall be secured by at least one nail or wire fastening, and two nails shall be used where practicable. Where nailing is not practicable, or to avoid nailing thru sheet metal, the tile shall be secured with wire attached to nails driven above the metal line or to other permanent fastening.

A limited amount of elastic cement may be used for leveling tile, for pointing around the edges of top fixtures and eave closures, between the joints of hip rolls and where field tile abut the hip stringers.

Where the sides of tiles along slopes abut vertical surfaces, the flashings shall extend under the tile at least 4½ inches with an upturned edge as high as the contour of the tile will permit.

At the upper side of abutting vertical surfaces, the flashings shall extend under the tile at least 6 inches, and farther where necessary, with the upper edge turned back ½ inch.

Flashings at the lower side of vertical surfaces shall extend onto the roof tile or top fixtures at least 4½ inches and have the edges fastened with storm nails set between the tiles or turned down 1 inch onto the face of the top fixtures and malleted flat.

Spaces between the field tile and hip stringers shall be filled with elastic cement making a water proof joint.

SECTION 30.

UNIT WOOD BLOCK FLOORING.

Index.

Paragraph	Subject
3001.	Scope of the Work.
3002.	Materials.
3003.	Workmanship.
3004.	Finish.
3005.	Guarantee.

3001. **SCOPE OF THE WORK.** Wood floors where specified on plans shall be of the unit wood block type and shall be laid in mastic directly on concrete.

3002. **MATERIALS.** The kind and quality of wood and the shape and thickness of block used in the various locations shall conform with the following schedule, unless otherwise shown on plans:

a. All reading rooms, lecture room, Librarian's office, to be of clear quality quarter-sawed oak, or wood to match the trim; square blocks, 25/32 inch thick.

b. Stacks, work room, rest room and kitchenette, to be of clear quality plain sawed oak, square blocks, 25/32 inch thick.

Square blocks shall be not less than 9 inches nor more than 10½ inches square. Rectangular blocks shall be not larger than 6 inches by 12 inches in size. All blocks shall be thoroly sound and free from any defect that would impair the strength or wearing quality of the wood. All blocks of a specified size shall be milled to uniform dimensions thruout.

The individual blocks shall be made up of solid wood strips which shall be tongued and grooved on the edges to a tight fit. The strips of square blocks shall be not less than 1½ inches face width. The strips of rectangular blocks shall be not less than 1½ inches nor more than 3¼ inches face width. The strips of each unit block shall be fastened together by two metal splines forced into the underside of the block or by two hardwood dowel pins extending entirely thru the block or by dovetail tongues and grooves Wood dowels shall be set in waterproof glue. Each unit block shall have integral tongues on two sides and grooves on the other two sides to form inter locking joints with adjacent blocks; or blocks may be grooved ⅜-inch on all four sides, and interlocked with iron splines ⅛-inch by ¾-inch the full width of the block Provision shall be made on the underside of the block to take up excess mastic in which the blocks are bedded and to prevent any mastic being forced up thru the joints.

The flooring shall be finished smooth at the mill, then filled with a penetrating varnish or other liquid filler that will protect the flooring against the absorption of moisture until it is laid and finished. The filler shall have little or no color and shall be practically odorless when the flooring is laid. The flooring, when being laid, shall have a moisture content of not less than 8 per cent nor more than 12 per cent.

3003. **WORKMANSHIP.** The concrete slab or fill shall be dry and clean and a priming coat shall be applied before the flooring is laid. The priming coat shall be an asphalt primer and shall be well worked into the concrete, using not less than one gallon to 100 square feet of surface.

The flooring shall be laid in an asphalt mastic of troweling consistency. The mastic shall be tough and elastic when "set" and shall have a tensile (adhesive) strength when used with wood blocks on concrete of not less than 30 pounds per square inch at a temperature of 77 degrees F. and of not less than 20 pounds per square inch at a temperature of 100 degrees F.

Asphalt mastic shall be free from coal tar products and shall show a loss in weight of less than 5 per cent when held at a temperature of 200 degrees F. for seven hours, and a loss in weight of less than 10 per cent when held in a temperature of 325 degrees F. for seven hours. All tests shall be made in accordance with the methods of the American Society for Testing Materials. Asphalt emulsion of the soap type will not be acceptable.

Laying generally shall be done in accordance with the printed directions of the manufacturer and in a manner that will prevent any settling or displacement of the blocks or sections of blocks. The mastic shall be applied in such quantity and by such means or method as will cause perfect adhesion to the concrete and prevent the formation of blisters or air pockets. Flooring shall be laid with tight joints and shall extend under the base with expansion joints from ¾ inch to 1 inch wide at walls, columns, thresholds and permanent fixtures. The joints at walls and columns shall be filled with cork strips or mineral wool. The joints at thresholds and fixtures shall be filled with strips until the moisture content of the flooring has become constant when the cork shall be replaced with wood strips to match the flooring. Square blocks shall have the strips of each block at right angles to the strips of adjacent blocks in the same row. Flooring shall be protected against use for at least 48 hours after laying.

Flooring shall be scraped and sanded or machine finished to a smooth, even surface, then brushed clean and the first coat of painter's finish applied immediately.

3004. **FINISH.** Painter's finish shall consist of three coats of penetrating floor varnish, or at the option of the Contractor, one coat of floor filler and two coats of the floor finish specified for use in connection with such filler. Each coat of penetrating varnish or filler and finish shall be applied in accordance with the manufacturer's directions and, when set, shall be rubbed smooth with fine steel wool. Penetrating varnish, floor filler and floor finish are specified under "Painting and Finishing," Section 31 of these specifications.

When stains are required, they shall be mixed with the first coat of varnish or the first coat of finish. On oak floors, the first coat of varnish or the first coat of floor finish shall have 2 pounds of dry silex filler per gallon of varnish or finish.

Finished floors shall be protected from dirt, grit, etc., until the completion of the contract.

3005. **GUARANTEE.** No consideration will be given to the installation of unit wood blocks of a type or of a manufacture that has not been in satisfactory use for a period of at least one year prior to the date of award of the contract for the construction of the building, under conditions fairly comparable to the present requirements.

If, within one year from the date of final payment of the general contract for the construction of the building, defects of any kind shall develop in the flooring caused by the use of defective material or workmanship, the Contractor shall replace the flooring, or place the same in a condition satisfactory to the Owner without additional cost. And failure to do so shall give the authority to make all repairs or replacements necessary and charge the cost thereof to the Contractor, under the "Workmanship Bond" provided in paragraph 918 of these specifications.

SECTION 31.

PAINTING AND FINISHING.

Index.

Paragraph	Subject	Paragraph	Subject
3101.	Work Not Included.	3112.	Gold Leaf.
3102.	Scope of the Work.	3113.	Proportions.
3103.	Shop Coating.	3114.	Factory Mixed Paint.
3104.	Colors and Samples.	3115.	Portland Cement Paint.
3105.	Materials.	3116.	Preparation of Surfaces.
3106.	Cold Water Paint.	3117.	Painting.
3107.	Stains.	3118.	Varnishing.
3108.	Filler.	3119.	Oiling.
3109.	Floor Varnish.	3120.	Gilding.
3110.	Floor Filler and Finish.	3121.	Lettering.
3111.	Finishing Wax.	3122.	Touching Up.

3101. **WORK NOT INCLUDED.** This section of the specifications is intended to include all painting and finishing required for the completion of all work embraced in the contract, except as follows:

a. Shop and field painting of structural steel.
b. Shop painting of miscellaneous and ornamental metal.
c. Shop painting of steel windows.
d. First coat on exterior sheet metal and on metal covered work.
e. Finish complete on wood block flooring, is included under "Wood Block Flooring."
f. Finish complete on vault doors and work specified to be finished by the manufacturer.
g. Painting of plaster work.

3102. **SCOPE OF THE WORK.** Exposed surfaces of iron and steel work of every description (except work finished by the manufacturer) shall have two coats of oil paint in addition to any previous painting. Work finished by the manufacturer shall be carefully protected at all times and, at the end of the contract, exposed surfaces shall be cleaned and given a light coat of wax rubbed to a dull gloss.

Exposed surfaces of exterior and interior sheet metal work (except aluminum, copper and lead) shall have three coats of oil paint in addition to any previous painting.

All exterior wood work, including the outside of doors and sash, shall have three coats of oil paint in addition to priming. The inside of exterior doors and sash shall have a finish similar to that of adjoining wood trim and shall match same in color tone.

Interior wood finish exposed in attic spaces, and furnace room and fuel room and basement storage rooms shall have two coats of oil paint in addition to priming.

All other interior wood finish shall have finish as shown on plan. Under this specification the term "interior wood finish" shall include doors and sash and all other wood work (except floors) not otherwise specified.

The unexposed edges of doors and movable sash shall be touched up after fitting and then finished as required for the exposed parts.

Register faces and frames of steel or iron and the fronts of electric cabinets shall be painted to match the color of the surrounding finish.

All unplated iron or steel hardware and composition ornament shall be finished to match the work to which it is attached.

Cement finished floors and base in basement (except in fuel room) shall have two coats of cement floor paint.

The walls and ceilings of boiler room and adjacent storage room shall be given two coats of washable cold water paint.

Painting of pipe covering and exposed plumbing is included under "Plumbing," Section 34.

3103. **SHOP COATING** for wood work shall be as follows:

All frames and wood finish (except flooring) shall be stained, filled and shellacked or stained and shellacked or shellacked or oiled or otherwise prepared for the finish specified; and all unexposed surfaces and surfaces that are to be painted or enameled shall be given a priming coat of paint. Panels shall be primed, stained or filled and given one coat of finish before they are set in place.

3104. **COLORS AND SAMPLES.** Colors shall be pure, non-fading pigments finely ground in linseed oil. Colors that are to be used on cement shall be limeproof. The finished work shall match samples of colors and finishes which will be furnished by the Architect to the Contractor upon request.

3105. **MATERIALS** shall be high grade products of well known manufacturers and when

approved shall be delivered on the work in original unbroken packages bearing the makers names and brands. Materials not otherwise specified shall conform to the Standard Specifications of the American Society for Testing Materials, for same, viz:

Linseed oil, raw.
Linseed oil, boiled.
White lead, paste.
Turpentine, gum spirits or wood.
Zinc oxide, French process.
Drier.
Putty, white lead-whiting.
Varnish.
Shellac varnish, bleached, light body.

3106. **COLD WATER PAINT.** Washable paint shall be delivered in paste or powder form ready for use with the addition of water.

The pigment shall consist of either light-proof lithopone, titanium pigment, zinc sulphide or any suitable mixture thereof, with extender (such as clay, mica or similar material), free lime, casein with a non-poisonous preservative, and lime proof tinting color when required. The sum of the zinc sulphide (ZnS) and titanium dioxide (TiO^2) shall be at least 20 per cent by weight of the total pigment. Paint shall be free from compounds of mercury.

The paste pigment shall be at least 7 per cent casein, not more than 35 per cent volatile matter (mostly water) and shall be free from the odor or color of decomposed casein. Hydrated lime may be added to the paste paint ready for use to increase workability, but the amount of lime added shall not exceed 7 ounces per gallon of paste. The paste shall be of smooth, uniform consistency, free from curds, coagulated or granulated material. Each gallon of paste shall require approximately 2 quarts of water to thin to suitable painting consistency.

The powder shall contain from 7 to 10 per cent by weight of casein and 5 to 15 per cent by weight of free lime figured as calcium hydrate. The powder shall mix readily with water and boiled linseed oil or refined glycerine. Each ten pounds of powder shall be properly mixed with 4 quarts of water and 1 pint of oil or glycerine and shall give a smooth paint of average brushing or spraying consistency, free from undissolved particles of casein and without offensive odor.

The paint shall be mixed and applied in accordance with the printed directions of the manufacturer. The paint shall have good hiding power, shall spread easily and shall give smooth, even coverage without streaking, running or sagging. It shall set to touch within 2 hours and dry within 18 hours to a smooth, uniform, opaque, flat finish that is non-yellowing and non-rubbing. The white paints shall show a light reflection value of at least 88 per cent. After 5 days of drying, marks made with a soft lead pencil (No. 2) shall be easily removed with warm water and soap without appreciably marring the surface.

3107. **STAINS.** Stains shall be clear toned, penetrating, non-fading materials that will not cloud or obscure the grain of the wood.

3108. **FILLER.** Filler shall be finely ground silica, linseed oil and drier, tinted as required. Dry filler shall be finely ground silica and, if colored, shall be tinted with dry pigment.

3109. **FLOOR VARNISH.** Floor varnish shall be a penetrating varnish with a china wood oil base, shall contain at least 17 per cent gum drying oil solids and shall be free from wax. The varnish shall seal the pores of the wood against moisture, grease, oils, dirt, etc., and produce a finish similar to a waxed and polished surface without leaving a film on the surface. The material shall have a record of successful use for at least 4 years.

3110. **FLOOR FILLER AND FINISH.** The filler shall be liquid product having a creamy consistency and containing not less than 17 per cent solids of varnish, gum, wax and linseed oil. The filler shall dry within an hour, shall not check, crack or peel, and when buffed with steel wool or a floor polishing machine shall have a dull luster that is not sticky or gummy.

The finish to be used with the above filler shall be a product containing at least 10 per cent solids of varnish gum and wax, and shall be of such a nature and consistency as to permit quick drying when applied with a lamb's wool mop. It shall spread evenly and thinly and shall dry within an hour after application. When finished with a floor polishing machine it shall take a high, hard, non-slippery sheen, and shall not have a sticky or gummy surface. The product shall not check, crack or peel, nor show marks of overlapping when applied for the purpose of repairing worn spots or lanes in the floor finish.

3111. **FINISHING WAX.** Finishing wax shall be mixed in the proportions of 2 parts Carnauba wax, 2 parts ceresin and 3 parts turpentine by weight, thinned to proper consistency by gasoline.

3112. **GOLD LEAF.** Gold Leaf shall be XX, 23 karat fine. Size for gilding shall be slow drying fat oil gold size.

3113. **PROPORTIONS.** Oil Paint shall be proportioned approximately in accordance with the following tables, unless otherwise specified. Pigment shall be composed of 80 per cent white lead paste and 20 per cent zinc oxide paste.

Color pigments shall be added to produce the required tints or shades. For dark colors, the percentage of pigment to color is to be varied as necessary.

a. **Paint for Outside Wood Work:**

Coats	Pigment	Oil	Turpentine	Drier
Back Painting—Specified under "Millwork and Finish."				
Body	100 lbs.	1½ gals.	2 gals.	1 pint
Finish	100 lbs.	3½ gals.	1 quart	1 pint

b. **Paint For Exterior Metal Work** shall be as specified above for body and finish coats of outside wood work.

c. **Paint For Inside Wood Work:**

Coats	Pigment	Oil	Turpentine	Drier
Priming	100 lbs.	3 gals.	3 gals.	1 pint
Body	100 lbs.	1½ gals. Varnish	2 gals.	1 pint
Finish (gloss)	100 lbs.	1¼ gals.	1½ gals.	½ pint
Finish (flat)	100 lbs.	1 pint	2 gals.	½ pint

d. **Paint For Inside Metal Work** shall be as specified above for body and finish coats of inside wood work. Paint for ornamental metal work shall be applied in thin coats that will not obscure the ornament and texture of the metal, and the finish coat shall be flat.

e. **Paint For Cement Floors:**

Pigment	Oil	Varnish	Turpentine	Drier
100 lbs.	4½ gals.	2 gals.	½ gal.	1 pint

Pigments for floor paint shall be composed of 65 per cent white lead paste and 35 per cent zinc oxide paste and the necessary tinting colors.

3114. **FACTORY MIXED PAINT.** Factory mixed oil paint, if used, shall be delivered on the work in original unbroken packages bearing the manufacturers certificate that the ingredients and proportions comply with the requirements of this specification for the use to be named in the certificate and giving formula for reducing to proportions herein specified for other uses. If factory mixed paint is used the Architect will forward one quart samples of the various mixtures to the Laboratory for test.

3115. **PORTLAND CEMENT PAINT.** Cement Paint shall be 60 per cent pigment and 40 per cent vehicle of the following compositions:

Pigment		Vehicle	
Zinc oxide	30%	Linseed oil	36%
Lithopone	30%	Tung oil varnish	45%
Titanium oxide	10%	Thinner, drier and emulsion	19%
Portland Cement Aggregate	30%		
	100%		100%

Paint for the prime or sizing coat shall be reduced with suitable thinners at the factory. All paint shall be delivered ready for use and shall be applied without changing its consistency at the job. A limited amount of color pigment may be added as necessary to obtain the exact shade desired.

Portland cement paint may be substituted at the option of the Contractor for the oil paint specified for the body and finish coats on exterior metal and sheet metal work and for all coats on interior wood work that is to be painted.

3116. **PREPARATION OF SURFACES.** All surfaces shall be clean and dry at the time any coating is applied. Base coats provided by others shall be in good condition and the surfaces well covered by touching up any bare or abraded spots. Base coats on work subject to close inspection shall be rubbed smooth.

Woodwork shall be smooth and free from raised grain or other surface imperfections. Knots and pitch streaks shall be shellacked before painting. Nail holes, cracks, and similar blemishes shall be neatly puttied and sanded smooth after priming or staining and before body or finish coats are applied.

Cement and concrete surfaces that are to be painted shall be cleaned and then washed with zinc sulphate solution (2 lbs. per gallon of water) and allowed to dry before painting.

Paints and finishing materials shall be free from skins, lumps or any foreign matter when used, and pigments, fillers, etc., shall be kept well stirred while being applied.

Work that is not to be finished under this section shall be protected by this Contractor against spatters, stains or soiling and each type of finish shall be protected against similar defacements by other finish and shall be left clean.

3117. **PAINTING.** Each coat of paint shall be evenly worked out and allowed to dry before any subsequent coat is applied or rubbing done. Each coat shall be a different tint from that of the preceding coat. Finish coats shall be the exact shades and textures selected. The finished work shall be free from runs and sags, defective brushing and clogging of lines or angles.

3118. **VARNISHING.** Hardwoods shall be sponged with clear water to raise the grain, then sanded smooth. Apply acid stain of the required shade, then a thin coat of shellac and three full coats of varnish. Open grained woods shall be filled between the shellac and first coat of varnish and wiped off across the grain. Each under-coat of shellac, filler and varnish shall be rubbed smooth with fine steel wool or sandpaper, and the last coat rubbed to a dull gloss with pumice stone and water and wiped clean.

Varnish shall not be thinned in any manner, and shall not be applied in a temperature below 70 degrees F. nor in any place not properly closed and protected from drafts and from dust. Varnish shall be evenly flowed on without runs, sags or brush marks.

3119. **OILING.** The unexposed edges of double hung sash and the runs for same (except where exposed on the outside) shall be given one coat of raw and one coat of boiled linseed oil. After the oil is dry, the edges of sash shall be given a coat of wax.

3120. **GILDING.** Flag staff heads shall be gilded with XX gold leaf. Gilding shall be done with two layers of gold leaf.

Surfaces to be gilded shall be thoroly cleaned and all rust removed and shall be given one coat of red lead and two coats of yellow lead paint.

3121. **LETTERING.** Interior doors given on the plans. Doors opening from lobbies, halls and corridors, and doors to toilet rooms, shall be lettered with the names of the rooms or the titles of the occupants as directed. Lettering showing in public places shall be in gold leaf, outlined in black. Lettering elsewhere shall be in black.

3122. **TOUCHING UP.** At the completion of other branches of the work, all painted and finished work shall be touched up and restored where damaged or defaced and the entire work left free from blemishes.

SECTION 32.

GLASS AND GLAZING.

Index.

Paragraph	Subject
3201.	Scope of the Work.
3202.	Materials.
3203.	Workmanship.
3204.	Cleaning.

3201. **SCOPE OF THE WORK.** All glass required by the contract shall be furnished and installed complete. Just before final inspection, the glass shall be carefully and thoroly cleaned and any glass that has been broken, scratched, or otherwise damaged shall be replaced with new glass to the satisfaction of the Architect.

3202. **MATERIALS.** Each piece of glass shall bear the manufacturer's label giving the name of the manufacturer and the quality of the glass, including its weight or thickness. Absence of label will constitute cause for rejection.

Glass shall be clear, except where obscure glass is specified. Glass that is specified to be polished shall be ground and polished. Obscure glass shall have a smooth (fire finish) surface on one side, unless otherwise specified. Glass shall conform with the following schedule:

a. **Polished Plate—** ¼ inch thick, glazing quality:
Public entrance doors.
Public entrance vestibule.

b. **Polished Plate—** 3/16 inch thick, glazing quality:
Exterior windows and interior sash not otherwise specified.

c. **Wire Glass—** ¼ inch thick, polished both sides·
Doors so indicated on the drawings.

d. **Drawn Window Glass—**39 ounce, glazing quality·
Basement and attic windows.
Basement entrance doors.

e. **Drawn Window Glass—**Double strength A quality:
Interior transoms and all glass not otherwise specified.

f. **Obscured Glass—** ¼ inch thick highly translucent but not transparent glass, having smooth hammered-like surfaces but without definite geometric patterns; or having one face ground;
All doors marked "Obscure Glass."
Toilet room windows.
Doors shown on plans.

g. **Rolled and Pressed Wire Glass—**¼ inch thick, with prism pattern one side and fine rib one side:
Ceiling lights — amber colored.

h. **Putty** not otherwise specified shall be whiting putty and conform to Standard Specifications of the American Society for Testing Materials.

i. **Putty for Metal Sash** shall be a high grade special putty for metal sash and shall be delivered on the work in the manufacturer's original package.

3203. **WORKMANSHIP.** Glass shall be set without springing. Glass shall be bedded in putty and back puttied. Glass shall be face puttied except where glazing beads or moldings are required. Puttying shall be smoothly finished to true even lines.

Rebates that are to receive putty shall be primed before puttying. Rebates and edges of beads in contact with glass shall be finished to match the color adjoining work before the glass and beads are set.

Obscure glass shall generally be set with the smooth side out and the roughened side toward the place to be obscured. Ground glass shall be set with no putty in contact with the ground face. Ceiling lights shall be set with the ribbed side up.

Glass for exterior wood sash 1¾ inches or less in thickness shall be set with glazing points and putty. Glass for interior sash and for doors, shall be set with glazing beads. Beads for doors shall be fastened with brass screws; and wood beads for sash shall be fastened with brads. Metal beads for ceiling sash shall be fastened with flush head screws. Glass for metal sash shall be set with glazing clips and putty, or with glazing beads, as required on plans.

3204. **CLEANING.** Immediately prior to the final inspection and acceptance of the building, all glass shall be carefully cleaned by this Contractor, and any glass that has been broken, scratched or otherwise damaged shall be replaced with new glass to the satisfaction of the Architect.

SECTION 33.

FINISH HARDWARE.

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Paragraph	Subject	Paragraph	Subject
3301.	Scope of the Work.	3307.	Locks and Latches.
3302.	Templates.	3308.	Trim Specialties.
3303.	Materials and Finish.	3309.	Bolts.
3304.	Keying.	3310.	Stops.
3305.	Key Tags.	3311.	Door Closers.
3306.	Schedule of Hardware.	3312.	Butts and Hinges.

3301. **SCOPE OF THE WORK.** Hardware for doors to marble inclosures or plumbing fixtures, is included in Section 24 of these specifications.

All other hardware necessary for the proper fastening and operation of all movable parts of the building (other than mechanical equipment) shall be furnished hereunder.

If the hardware for any particular location is not described herein, it shall be like that specified for similar locations so far as practicable.

Where the finished shape or size of members taking hardware is such as to prevent or make unsuitable the use of the exact types specified, suitable types shall be furnished having as nearly as practicable the same operation and quality as the type specified. All sizes shall be ample for the service required. Samples of hardware shall be submitted to the Architect for approval, marked with the name of manufacturer, catalog number and otherwise labeled for identification. Only standard hardware of first class quality by approved manufacturers and as noted on detail plans will be accepted.

3302. **TEMPLATES.** Hardware for hollow metal work shall be sent to the factory and there applied, or templates shall be furnished to the factory from which the work may be fitted to receive the hardware.

3303. **MATERIALS AND FINISH.** All hardware, except for aluminum doors, shall be of bronze, and shall have the following finishes:

a. **In toilet rooms,** polished chromium plate on double nickel plate.
b. **On bronze work** to match the color of the bronze.
c. **For aluminum doors,** aluminum finish, polished.

3304. **KEYING.** All exterior and interior cylinder locks and pin tumbler padlocks shall be master-keyed one system with three master keys. Latches and locks that are keyed alike shall have three keys for each group.

3305. **KEY TAGS.** Each key shall have attached a bronze tag about 1 inch in diameter stamped with the number of the opening to which it belongs as indicated by the openings numbers of the drawings. In case of locks keyed alike the key tags shall be stamped with distinguishing numbers or letters.

3306. **SCHEDULE OF HARDWARE.** The complete schedule of hardware for use in the building shall be as follows:

Opening Item Manufacturer Catalog Name or Number Number of Item in Catalog.

(Architect will prepare and insert complete schedule at this point.)

3307. **LOCKS AND LATCHES.** Fronts and strikers shall fit the details. Stiles of double acting doors will be rounded. All other stiles more than 1½ inches thick will have standard bevel. Single swing double doors will have rebated meeting stiles. When lock stiles required are too narrow for the backsets specified, special backsets shall be furnished. Backsets of rebated locks are on long side.

Mortise locks and latches with knobs shall have brass or bronze hubs with machined bearings. Cylinder locks shall have the key change number stamped on the shell or cam. Metal frames shall have wrought box strikes.

3308. **TRIM SPECIALTIES.** Escutcheons shall be 8 x2 ½ inches, unless otherwise specified herein. Door handles shall be offset on push side for clearance. Outside knobs shall be pinned. Inside knobs shall have sleeves to cover the set screws. Catches shall have strikes, and bolts shall have keepers, to fit the location and protect the connecting work.

3309. **BOLTS.** Double doors with locks or latches shall have top and bottom bolts on standing leaf.

3310. **STOPS.** Doors without closures that open into trimmed and plastered spaces shall have stops with expansion sleeves except on wood or metal. Doors that open against plumbing fixtures shall have round rubber bumpers about 1 inch diameter.

3311. **DOOR CLOSERS.** Closers with cast iron cases in toilets and similar spaces with chromium plated finish shall have aluminum bronze finish. Closers with hold-open arms shall be set to stop the door at 135 degrees where practicable, but in no case to permit the door or hardware to strike the adjacent wall finish.

3312. **BUTTS AND HINGES.** Doors and side-hinged sash shall have two butts or hinges as specified. Sash hinged at bottom shall have two butts. Butts for metal doors and sash shall be template butts. Metal covered doors and sash shall have half surface butts the surface flap on doors more than 1½ inches thick to be fastened with machine screws and grommet nuts.

Proper sizes of spring hinges shall be as indicated in notes on plans. Floor hinges shall be single acting or double acting as indicated by swing of doors on drawings, and shall be of ample size for the service required.

SECTION 34.

PLUMBING.

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Paragraph	Subject	Paragraph	Subject
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3404.	Jointing and Connections.	3424.	Water Closets.
3405.	Soil Pipes, Fittings and Connections.	3425.	Slop Sinks.
3406.	Backfilling of Trenches.	3426.	Setting of Flanges.
3407.	Open Sewer Manhole.	3427.	Urinals.
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3409.	Traps.	3429.	Kitchen Sink.
3410.	Area Cesspool.	3430.	Shower Fixture.
3411.	Back Water Valve and Gate Valve.	3431.	Accessories.
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3414.	Alternate.	3435.	Non-Conducting Covering.
3415.	Erection.	3436.	Painting.
3416.	Valves.	3437.	Tests of Plumbing and Drainage System.
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3418.	Water Supply System.	3439.	Smoke Tests.
3419.	Pressure Reducing Valve.	3440.	Test of Water Supply System.
3420.	Sizes of Piping.	3441.	Cost of Tests and Certificate.

3401. **SCOPE OF THE WORK.** This portion of the specification includes the installation, complete, of all plumbing, sanitary, and roof drainage, shown on drawings.

3402. **GUARANTIES.** All work under this contract shall be guaranteed for one year from the date of final settlement under this contract and any special guaranties subsequently mentioned in the specification shall be subject to the terms of paragraph 918 of these specification. Wherever work, repairs or changes are required under any guaranty, included in this contract, the Contractor, whenever notified by the Owner, whose decision in all cases shall be final, shall immediately—

a. Place in satisfactory condition in every particular any of such guaranteed work;

b. Make good all damage to the building or grounds, or the equipment or contents thereof; if such unsatisfactory condition or damage develops within the period stipulated by the guaranty and is due to the use of materials or workmanship which is inferior, defective, or not in accordance with this contract, and must make good any work or materials, or the equipment and contents of said building or grounds, which is disturbed in fulfilling any such guaranty. In any case where, in fulfilling the requirements of this contract or of any guaranty, embraced in or required thereby, this Contractor disturbs any work guaranteed under another contract, he must restore such disturbed work to a condition satisfactory to the Owner and guaranteed under such other contracts. Usual wear and tear and the results of accidents not chargeable to the Contractor or his agents are excepted from the requirements of this paragraph. Everything done in the fulfillment of any guaranty must be without additional expense to the Owner.

3403. **PIPING AND HANGERS.** All piping shall be run parallel with the lines of the building unless otherwise distinctly shown or noted on drawings. Such service pipes as are practicable shall be placed at same elevation and hung on multiple hangers. Electric conduits shall not be hung on hangers with any other service, and so far as possible, shall be hung above all other service pipes. Branch pipes from such service lines shall be taken top of bottom of main, or side of main, using crossover fittings, as may be required by structural and operating conditions. All different service pipes, valves, fittings, etc., shall be kept a sufficient distance from other work to permit finished covering not less than ½ inch from such other work and not less than ½ inch between finished coverings of the different services. All hangers must be spaced not more than 10 feet apart on all services, and those of different service lines running parallel with each other and near together must be in line with each other and parallel to the lines of the building. All finished brass piping run on face of marble or plaster shall be set with not less than ¾ inch nor more than 1 inch clear space between back of pipe and face of marble or plaster. Plated brass pipe shall be supported by suitable cast-brass finished chromium-plated supports. All bolts, screws, etc., for securing such supports shall have all exposed heads, etc., finished chromium plated. Pipes run on face of plaster shall have not less than ¾ inch and not over 1 inch clearance between pipe and face of plaster. All pipe sleeves must be built in place as the walls, footings, etc., are laid up. All pipes passing thru the footings, walls etc., shall be provided with pipe sleeves under this section of the specifications. Such sleeves shall be two pipe sizes larger than pipes passing thru same and shall be of same material as pipes.

3404. **JOINTING AND CONNECTIONS.** All joints in piping and connections to fixtures shall

be made as specified for pipe or fixture in question. No threads shall be exposed on finished brass waste pipe.

3405. SOIL PIPE, FITTINGS AND CONNECTIONS. All soil, waste, vent, and drain piping in the building below basement floor or ground and outside of building below ground, including the main connection from the building to the city sewer shall be **extra heavy** bell-and-spigot cast iron soil pipe and fittings. Either coated or uncoated pipe may be used. (Pipe and fittings with or without the lead groove will be acceptable.)

All soil, waste, and vent pipes, above basement floor or ground (except the portions hereinafter specified to be brass) shall be galvanized genuine wrought-iron pipe. Fittings shall be as specified for pipe in question. Special "upright Y" branches shall be used where vents connect in chases and other places when required by structural or space conditions.

Soil, waste, vent, and drain piping shall be of the size noted and run as indicated on the drawings. Pipes below basement floor and ground shall be run at grades noted. Soil and waste pipes above basement floor or ground shall be given a grade of ¼ inch per foot where possible, except where pipe would reduce head room materially. In such cases the grade shall be reduced not less than 1/10 inch per foot if so directed by the Architect. The soil and waste pipe so shown and noted on the drawings shall be extended as vent pipes to above the roof line and project above roof line not less than 12 inches nor more than 18 inches. Where so noted or indicated on the drawings two or more vent pipes shall be connected together and extended as one pipe. Connections of vent pipes shall be made in roof space or at least 4 feet above floor on which the fixture vented is located so as to prevent the use of any vent line as a waste. In roof or attic space where walks or passageways are provided, vent pipes shall be run as close as possible to underside of roof with a grade down to the vertical stacks. Necessary fittings must be used to accomplish this result in order to preserve headroom.

3406. BACKFILLING OF TRENCHES. All trenches must be backfilled in a manner to secure a stable surface, and approved by the Architect.

3407. OPEN SEWER MANHOLE. Install open sewer manhole in sewer outside of building as indicated on scale drawings; this work to be done by the Plumbing Contractor.

3408 CLEANOUTS. Rodding holes shall be installed on cast-iron pipe below basement floor or ground where shown on drawings. Where soil and waste lines connecting to an underground sewer or drain pass out of building above the basement floor the fitting at the base of the drop shall be a bell-and-spigot sanitary T branch with a brass caulking ferrule and a cast brass trap screw in hub on run of the fitting.

When clean-outs occur on concealed pipes in finished rooms, provide cover as shown on detail drawings.

Clean-out plugs on wrought-iron piping shall be fitted at or near the base of each soil, vent, and waste pipe (except such pipes as occur in shower-bath inclosures or behind urinal) just above floor. Screwed cast-brass plugs same size as pipe shall be fitted for clean-outs on pipes above ground or above basement floor where shown or noted on drawings.

3409. TRAPS. Running traps, S traps or P traps, as indicated, shall be placed on connection from area cesspools, where same connect to a sewer carrying sanitary drainage, on wastes from drinking fountains, on wastes from urinals, and at other points indicated on drawings. Traps shall be extra-heavy cast-iron bell-and-spigot pattern when connected to cast-iron piping; and recessed, screw jointed, when connected to wrought-iron piping.

Running traps shall have clean-out on each side and when below floor or grade clean-outs shall be extended up to floor level or grade and shall be provided with brass caulking ferrules and brass trap screws with countersunk heads. (See drawings for ferrule and trap screw.) P and S traps above basement floor shall have brass-screw clean-out plug in bottom of same.

3410. AREA CESSPOOL. Each basement window and entrance area shall be provided with cast-iron cesspool, connected with sewer or storm drain. Side outlet cesspools shall be used only when elevation of drain requires same.

3411. BACKWATER VALVE AND GATE VALVE. A 4-inch backwater valve and gate valve shall be placed where shown on scale drawings. Backwater valve shall be bell-and-spigot, of balance disk type which normally stands open, but will positively close against water backing up. All pinions, bushings, etc., must be of non-corrosive metal: A ¾-inch iron pipe size and thickness brass air relief line shall be taken from body of valve and connected to nearest vent line of the plumbing system at least 3 feet above the highest fixture on the line.

Provide gate valve of standard weight, double hub, with non-rising stem, iron body, non-corrosive seat and disk, and placed on sewer side of backwater valve. These valves shall be placed in manhole of size required to properly contain valves used.

The manhole, cast-iron frame and cover shall be furnished and installed under this section of the specification.

3412. FLASHING CONNECTIONS. Openings in roof for vent shall be flashed and soldered water-tight.

3413. BRASS WATER PIPE, FITTINGS AND CONNECTIONS. All cold water, hot water, hot water circulating and drinking water pipes in the building, including connections between the water heaters and hot water storage tank shall be Grade A, unfinished brass pipe or copper pipe (iron pipe

size and thickness) of Standard manufacture approved by the Architect. All pipe must be marked with the trade-mark of the manufacturer, and all brass pipe with grade letter "A."

Nipples shall be of the same material and composition as the pipe furnished.

Fittings and couplings for brass and copper water pipe shall be unfinished red brass with flat band guaranteed for 175 pounds water working pressure. Composition shall be not less than 83% copper, 4¼% tin, not more than 5% lead, balance zinc. Fittings shall weigh not less than the following, in pounds:

Inch	45-Degree Ells	90-Degree Ells	Tees	Couplings
½	.18	.20	.27	.16
¾	.28	.33	.45	.24
1	.46	.52	.72	.39
1-¼	.75	.84	1.11	.62
1-½	.98	1.20	1.56	.83
2	1.62	1.98	2.58	1.33
				1.38

3414. **ALTERNATE.** When submitting proposal for the work, the Contractor will include in his proposal an alternate for the use of genuine wrought-iron pipe, with wrought-iron or extra heavy cast-iron fittings, in lieu of Grade A brass pipe or copper pipe, iron pipe sizes with red brass fittings, herein specified.

3415. **ERECTION.** In erecting pipe, friction wrenches and friction vises must be used exclusively except on pipes larger than 3 inches in diameter. Any pipe cut, dented, or otherwise damaged must be replaced by the Contractor with new brass or copper pipe. All pipes shall be reamed out before being screwed into fittings.

Unions shall be extra heavy pattern, all brass, ground joint unions with both screw ends hexagonal or octagonal; openings thru unions shall be full area of the pipe on which they are placed.

The screw joints between pipe and fittings shall be made up, metal to metal, with a compound of red lead and linseed oil as a lubricant applied on the male thread only. Not more than three exposed threads will be permitted beyond fittings, nor will the use of lampwick or other material for packing threads in making up pipe and fittings be permitted. Caulking to correct leaks or defects will not be permitted.

Horizontal runs of suspended pipe over 50 feet in length in basement shall be anchored about midway of the run, to walls or to the first floor construction, so as to force the expansion equally to the ends. Swing joints shall be used off all branch connections from mains.

Additional swing joints, offsets, etc., shall be used where necessary to provide properly, for expansion of the pipes, which will be about 2½ inches in 100 feet of run in the hot water supplies.

All exposed water supply piping (including valves and fittings) in toilet rooms from floor to a point 6 feet above and all exposed water supply branches below lavatories in all other parts of the building shall be finished and chromium-plated.

3416. **VALVES.** Install all valves where specified or indicated. Those on chromium-plated brass pipe shall be finished and chromium-plated.

3417. **WALL HYDRANTS.** Install all wall hydrants where indicated on plans.

3418. **WATER-SUPPLY SYSTEM.** The water main in street so noted on the drawings shall be tapped at the point directed by the Architect and approved by the water authorities, and a water-supply pipe of size shown on drawings shall be brought into the building. A gate valve with T-handle and with a cast-iron extension box and cover shall be placed on the water-supply pipe near the curb line. The manner of making connections with the street main and the manner of laying pipe from street main to inside of building wall must be in accordance with the rules and regulations of the water works authorities. From the water main to inside of building wall the pipe shall be brass or copper pipe as hereinbefore specified for water piping, or cast- iron water pipe or lead pipe as directed by the local water authorities. The size of the pipe must be as shown on drawings, and if the water authorities object to the size of pipe shown, the matter must be referred to the Architect for decision.

On the water main just inside of the building wall a gate valve shall be placed and outlets of same size as main shall be left in horizontal pipe for water meter; said outlet shall have gate valves.

A drain connection with ¾-inch globe valve provided with ¾-inch hose nipple shall be installed on main water pipe on house side of meter connections. After leaving meter connections the main water-supply pipe shall be run up to basement ceiling and along same, with branches of the sizes noted.

3419. **PRESSURE REDUCING VALVE.** A suitable brass pressure-reducing valve, approved by the Architect, as hereinafter specified, fitted with a removable strainer, shall be placed where shown on plans on the main water pipe in basement that supplies the plumbing fixtures; gate valves shall be placed on each side of reducing valves, and a by-pass connection (provided with a gate valve) shall be installed around reducing valve. A 3½-inch dial, japanned-iron case, pressure gauge, graduated to 200 pounds, shall be provided on the water main on each side of the pressure-reducing valve.

Pressure-reducing valve shall be extra heavy brass, operated by means of a special composition diaphragm and a spring. Diaphragm and spring must be arranged to act directly on the valve stem and the arrangement must be such that the delivered pressure will not vary more than 1 pound for each 10 pounds variation of the inlet pressure. All parts subject to wear must be readily renewable. The pressure-reducing valve must be provided with a separate, easily cleanable, strainer on the inlet side.

A pressure-reducing valve with integral strainer will not be accepted. Pressure-reducing valve shall be set for initial pressure of 40 pounds per square inch and a final pressure of 30 pounds per square inch.

3420. SIZES OF PIPING. In the event sizes of piping are not quoted on drawings, the specification is to govern, and cold water supply pipes to fixtures shall be as follows:

¾-inch diameter to rooms having one to three fixtures;
1- inch diameter to rooms having four to eight fixtures;
1¼- inch diameter to rooms having more than eight fixtures.

Hot-water supply pipes shall be ¾ inch diameter to toilet rooms containing two or more fixtures, unless otherwise shown on the drawings.

Cold-water branch supply shall be run to each plumbing fixture in the building and shall be ¾ inch to each urinal and each slop sink and ¾ inch to each other fixture. Hot water supply shall be run to each lavatory, shower bath and sink and shall be the same size as the cold water supply.

The above sizes apply to the roughing below the floor or in partitions; a reducing fitting is to be used to suit the size of fixture connection. Separate high pressure line shall be run to supply the lawn sprinkling system, specified in Section 40 of these specifications, and wall hydrants as shown on plans.

From each hot-water riser to fixture above first story a ½-inch diameter return circulating pipe shall be taken. Connection to risers shall be made at a point just below the highest hot-water connection thereto. The ½-inch return circulating pipes shall be run down to basement and joined with one ¾-inch pipe connected to the hot-water storage tank. The main circulating line at tank shall be provided with a gate valve, a check valve, and a union between gate valves and tank. Branch circulating lines shall be provided with gate valve corresponding to those on hot-water supply lines. Circulating pipes shall be run parallel with hot-water pipes back to tank unless otherwise shown on scale drawings.

3421. LOCATION OF WATER PIPE. No water pipe in toilet rooms will be permitted to be buried in the floor construction.

Unless otherwise indicated or noted on drawings, water supplies to fixtures in toilet rooms shall be run as follows:

a. **For Basement Toilet Rooms and Fixtures.** The main supplies shall be run near basement ceiling in question; and branches shall drop near end of fixture to below stops. All piping shall be exposed unless otherwise noted or specified.

b. **For Toilet Rooms and Fixtures Above Basement.** The main supplies shall be run exposed or in furred ceiling space below the toilet room in question in corresponding location to the soil or waste pipe and rise thru floor to the individual fixtures. Branches to slop sinks, shower bath and lavatories fitted with P trap on waste shall rise in partitions, and to water closets, urinals and lavatories fitted with a floor connected trap shall rise thru floor.

Risers or drops supplying toilet rooms shall be run in chases or furred spaces, as shown on drawings. A branch T for boiler supply shall be provided where indicated on basement plan.

The water supply pipes at points indicated on drawings shall be fitted with gate valves, placed in accessible positions. Stop cocks will not be permitted. No valves of any kind shall be placed in any furred or inaccessible space.

Each hot and cold water supply to each slop sink, and to Janitor's and Engineer's sink in basement shall be fitted with a gate valve, angle valve or compression stop placed in an accessible location close to the fixture. A gate valve shall be installed on connection to each wall hydrant, and each line to lawn sprinkler system as shown on drawings.

3422. SCHEDULE OF FIXTURES. Only standard fixtures of first-class quality by reputable manufacturers, and in accordance with the detail plans and these specifications, will be accepted.

(Architect will make out and insert in this place a complete schedule of plumbing fixtures for the entire building as follows:)

Room	Plumbing Fixture	Manufacturer	Name or Number of Catalog	Number of Item in Catalog.

3423. FLOOR, WALL, AND CEILING PLATES.

a. Where uncovered exposed pipes pass thru floors, finished walls, or finished ceilings, they shall be fitted with floor and ceiling plates not less than 3/32 inch thick. Plates on chromium-plated pipe shall be finished cast brass, chromium-plated; plates on iron pipe shall be cast-iron or steel. Wall and ceiling plates shall have round-head set screws. Floor, wall, and ceiling plates shall be one-piece pattern.

b. Where necessary to cover beads of fittings special cast-iron or cast-brass deep escutcheons shall be provided.

One-piece plates are preferred, but flat pattern hinged plates with set screw on those for wall and ceiling will be accepted.

3424. WATER CLOSETS. Furnish and install in toilet rooms where indicated water-closet outfits.

a. **Bowl.** Shall be vitreous ware, integral flushing rim, siphon jet, pedestal base, with trap molded in ware. Action of closet shall be practically instantaneous; water shall recede at practically the instant the lever of flushing device is pulled, and in no case shall water in bowl be increased materially. Bowl shall flush and refill properly with not more than 4 gallons of water. Bowl shall

weigh not less than 48 pounds; water area shall be not less than 10 by 12 inches, and shall be not more than 5 inches from top of the rim on bowl; depth of water seal shall be not less than 3 inches; the siphon trap way shall pass a 2 ½-inch diameter solid ball. Floor flange is part of the fixture.

b. **Vitreous Tank.** Shall be low tank approximately 5 by 16 inches deep, or equal volume. Front may be straight, concave, or convex. Lid shall be held securely in position so it will not slide off without lifting. Tank shall be secured to wall with two bolts thru back at top.

Flush pipe shall be No. 17 Brown & Sharpe gauge (0.045-inch) brass tubing, of size noted. Flush pipe and exposed connections between tank and bowl shall be chromium-plated. Connections shall be made so that no threads will remain exposed.

Supplies to and including compression stop on high tank and to wall or floor, as required on low-tank outfits, and to and including cut-off cock on flushing-valve outfits, are included as part of the fixtures.

c. **Seat** shall be without cover, of open front, saddle pattern, not less than 1-1/16 inches thick; of hard rubber composition, or so constructed that the covering or shell shall be of a good grade of hard rubber composition, not less than 3/16-inch thick, well polished, without joints, acid proof, and impervious and without openings or crevices. Color, ebony, unless mahogany or white is specifically called for in specifications. Seats shall be unqualifiedly guaranteed against splitting or cracking. Chromium-plated brass or polished white metal hinges shall be attached thru back of seat to cancealed metal inserts, with no exposed parts, top or bottom. Long rubber bumpers attached to bottom with concealed screws. Suitable stop shall be provided on the hinge to prevent the seat striking the wall or wainscot. Seat shall bear the name or the trade-mark of the manufacturer.

3425. **SLOP SINKS.** Furnish and install slop sink where indicated.

a. **Slop Sink.** Shall be one-piece cast-iron, at least 12 inches deep, with roll rim and integral back enameled inside and over rim and back with acid-resisting enamel. Shall have a chromium-plated brass strainer with cast-brass threaded shank; shall be supported on and secured to a trap standard.

b. **Trap Standard.** Shall be cast-iron, open pattern, enameled inside, 3-inch diameter, without vent, with brass screw clean-out plug, and with water seal not less than 2 inches in depth; shall be for floor or wall connection, as required for the work, and shall have tapped inlet to receive the threaded shank of the strainer. Trap standard for wall connection shall be tapped for 3-inch pipe and shall be adjustable as to height; trap standard for floor connection to cast-iron hub and spigot pipe shall be provided with spigot end at outlet below floor, and loose flange at base for caulking into hub of cast-iron pipe; trap standard for floor connection to screw pipe shall be provided with hub at outlet and a heavy brass floor flange tapped for 3-inch pipe, or a cast-iron floor flange shall be provided, with an asbestos molded gasket and bolts for fastening fixture.

c. **Supplies.** Each sink shall be provided with one hot and one cold water ¾-inch bibb. Cold-water bibb shall have a hose thread.

d. **Rim Guard.** Shall be constructed of ⅜-inch brass tubing of thickness not less than No. 14 Brown & Sharpe gauge (0.064) inch in thickness with cast-iron knobs on ends of rods and cast-brass spacing and holding bars. Holding bars shall have brass spring plates or thumbscrew attached for fastening guard to rim of sink. All parts of rim guard shall be chromium-plated.

3426. **SETTING OF FLANGES.** Particular attention is called to the fact that the outlet flanges for closets and slop sinks must be set with the proper distance from floor to make a first-class joint with the gasket and fixture used. No fixture will be set in place until the Architect has examined and approved such flange.

3427. **URINALS.** Furnish and install where shown on drawings urinal outfits.

a. **Stall.** Shall be one-piece vitreous ware, set singly or in battery, as called for on plans for the work. Urinals set in battery shall be of uniform heights set at least 6 inches from each other or from side wall or any other fixture. Lips of stall shall be set ¾ inch below finished floor, except in cases where structural conditions will not permit, then lips shall be set ¾ inch above finished floor.

b. **Tank.** Vitreous tanks shall be approximately 14 by 8 by 10 inches deep. Flush pipe shall be No. 17 Brown & Sharpe gauge (0.045 inch) brass-tubing, of size noted. Flush pipe and exposed connections between tank and stall shall be chromium-plated. Connections shall be made so that no threads will remain exposed. Each tank shall be secured to wall with two bolts, thru back of tank near top and supported by cast-brass chromium-plated angles. Spreader shall be finished cast-brass adjustable fan spreader of suitable design to thoroly flush the stall without spraying the floor.

Supplies to and including compression stop on tank outfits, and to and including a shut-off cock on flushing-valves outfits, are included as part of the fixture.

Where marble wainscost is provided the urinals shall be set with the ground backs against the marble wainscot.

Each urinal waste shall be fitted with a 3-inch diameter cast-iron P trap having a water seal not less than 2½ inches in depth. Traps for basement urinals shall have hubs for caulked-joint connections and traps for urinals above basement shall have recessed screw-jointed connections.

3428. **LAVATORIES.** In toilet rooms, furnish and install where indicated rectangular lavatory outfits.

a. **Lavatories.** Shall be one-piece vitreous ware, with apron, oval bowl, open integral overflow, and rim with bowl approximately 12 by 15 inches. Rim may be roll or flat; apron and back may be flush or may have roll or flat rim.

Overflow shall have a cross-sectional area of not less than 1½ square inches at every point.

b. **Supports.** Each lavatory shall have pedestal base or leg support and cast-brass pieces

not less than 1½ inches by 3/16 inch thick. Leg shall be of suitable design doweled to the floor and provision made at the top to prevent lateral movement. Variation from the design of leg support shown will be permitted.

c. **Waste Supplies, Etc.** Unless otherwise specified, each lavatory shall be provided with waste complete with lavatory plug, P or S trap as required; chain stay, hot and cold water supplies with compression faucets and stops, supplies and waste connections to wall or floor, as required.

Supplies and waste for lavatories shall be made to wall as indicated on drawings. Wall connected lavatories shall have P traps on waste. All faucets shall be automatically self-closing.

3429. **KITCHEN SINK.** Furnish and install sink outfit where indicated in kitchenette and work room.

a. **Kitchen Sinks.** Shall be one-piece cast-iron, approximately 6 inches deep, with roll rim and integral back. Sink shall have integral drain board.

Sinks shall be enameled on inside, over rim, back, and drainboard, with acid-resisting enamel.

b. **Supports.** Sinks shall be supported on a one-piece cast-iron concealed hanger of suitable design.

c. **Waste, Supplies, Etc.** Each sink shall be provided with sink plug and P trap with connection to wall or S trap with connection to floor as required, also one hot and one cold water ½-inch bibb. Cold water bibb shall have hose thread.

The connections from the bibbs to the supply lines of the building shall be as called for in the specification for the work and are not parts of the fixtures.

3430. **SHOWER FIXTURES.** Furnish and install in shower enclosure where indicated, shower fixture with mixing valve and floor drain outfit.

Outfit shall consist of a shower fixture complete for installation in a shower bath inclosure, as shown on plans. Shower fixture shall consist of a combination compression valve fixture with ½-inch union valve connections and ½-inch supply to shower heads with supports as shown. The supply piping from the union valves to the supply mains of the building are not part of the fixture, and shall be as specified in paragraph 3413 of this specification.

Shower head shall be cast-brass body and face. Face shall be threaded and removable, approximately 4 inches in diameter, with round perforations not smaller than No. 58 drill (0.042 inch diameter) delivering a rain shower. All exposed parts shall be chromium-plated brass.

Shower fixtures shall be provided with drain with trap omitted and with 2-inch bottom outlet. Drain must be all brass and shall be soldered to the lead pan. Enclosure and lead pan is included in Section 24, "Marble Work."

Shower fixture shall be installed on the partition between shower and dressing room enclosure, as shown on detail plans.

3431. **ACCESSORIES.** Furnish and install the following accessories:

Near each water-closet install a paper-holder, and a coat hook. Near each lavatory install a towel rack. Install in the shower-bath inclosure a soap cup and in the dressing room two coat hooks, a towel rack and a corner seat. All metal of accessories shall be brass, chromium-plated. Paper holder shall be provided with spring to prevent removal of roll. Towel rack to be glass rod, one inch in diameter, 24 inches long, with metal end supports. Cover seat to be of oak or maple, filled and two coats of varnish rubbed.

Accessories in shower-bath inclosure and dressing room shall be installed in locations indicated on drawings.

3432. **EXTRA WASHERS, ETC.** Furnish and deliver to the Owner one dozen complete sets of washers. Each set shall consist of one washer of each size used in faucets, bibbs, ball cocks, closet tanks, flushing valves, mixing valves, wall hydrants, etc. This extra equipment is to be inclosed in a wood or metal box with hinged cover. Box to have compartment of ample size for the different sizes and kinds of washers. If low tank closets are used, in addition to the above sets of washers, Contractor shall furnish and deliver to the Owner six tank balls. Each tank ball to be supplied in a suitable carton.

3433. **WATER HEATERS AND STORAGE TANK.** Furnish and install in basement where indicated on floor plans, one copper coil water heater and one hot water storage tank.

The copper coil water-heater shall consist of a copper heating coil surrounded by a cast-iron housing, the water in the coil being heated by a gas burner of type approved by the American Gas Association. Coil shall be connected to the hot water storage tank.

The heater shall have the manufacturer's guaranteed capacity to raise the temperature of not less than 120 gallons of water 100 degrees F. in three hours.

The hot water storage tank shall be 24 inches diameter by 60 inches long of galvanized steel, riveted or welded and constructed for a working pressure of 150 pounds per square inch, and set vertically.

The tank shall be provided with one 4x6-inch hand-hole, fitted with plate, yoke and gasket, and located about 6 inches from the bottom end. Handhole must be accessible after the tank is set. The tank shall be stenciled with its classification "Extra heavy," working pressure, (150 pounds) and name and address of the manufacturer.

The thermometer, control and relief valves and unions shall be installed as indicated on drawings. Thermometer shall be best grade hot-water mercury, angle-pattern thermometer gradu-

ated from 40 degrees to 340 degrees F.

A thermostat for controlling the operation of the gas burner of the water heater will be provided under this specification.

Relief valve shall be a ¾-inch diameter spring-loaded brass water relief valve, set 25 pounds above high water pressure, except fire pressure.

3434. **ELECTRIC WATER COOLERS.** Furnish and install where indicated, a self-contained automatic electric water cooler, complete with all accessories as hereinafter specified. Equipment furnished shall be of the highest grade, with all parts accessible for inspection and adjustment. Water cooler shall be installed in a neat metal cabinet finished either porcelain enamel or lacquer, in the color as directed by the Architect. Water cooling compartment shall be heavily insulated with cork board, rock cork or other equally approved material. Water coils shall be copper or brass heavily coated with tin. Water compartment shall be of porcelain enamel finish and without seams or crevices where dirt might lodge. Provision shall be made for completely draining or flushing out same thru plugs in the cooler.

Each cooler shall be current model of the manufacturer and be equipped with an approved angle jet drinking fountain.

The bowl of the fountain shall be constructed of best grade vitreous china, glazed over all exposed surfaces.

The bowl shall be free from corners which would be difficult to clean and shall be designed to prevent unnecessary splashing at the point where water falls from the jet.

The jet shall issue from a nozzle at an angle from the vertical and jet must be suitable for direct drinking or for filling a glass. The nozzle may be separated or integral with the bowl. The nozzle and every other opening in the supply to the nozzle shall be above the edge of the bowl, so that such nozzle or opening will not be flooded in case of a stoppage in the waste. The nozzle shall be protected by guards which will prevent persons drinking from fountain from coming in contact with the nozzle. The jet of water from nozzle shall not touch the guard. A loose key jet regulator and a self-closing stop shall be provided on supply to the jet. The waste from bowl shall be provided with a strainer.

All parts of nozzle, guards and strainer not integral with bowl shall be of non-oxidizing, impervious metal, chromium-plated.

The unit shall have the capacity to cool not less than five (5) gallons of water per hour 30 degrees from an inlet temperature of 80 degrees F. to 50 degrees F. where the air surrounding the cooler is 90 degrees F.

The refrigerating machinery for each water cooler shall be installed integral with the cabinet and shall be air or water cooled, compression type, utilizing a suitable medium as a refrigerant.

The compressor shall be operated by an electric motor of the 40 degrees C rise type, designed for the current available at the building. All necessary control devices shall be provided and shall insure the maintenance of drinking water temperatures not to exceed 50 degrees F. A service and repair manual shall be furnished with the equipment.

All necessary electrical, water, waste connections, etc., to the water coolers shall be provided. Electrical work shall conform to the requirements of the National Electrical Code. Each water cooler shall be provided with a thru push button cord switch. Water supply to each water cooler shall have a thermometer well for use in testing the cooling capacity of the equipment. Waste from cooler shall be fitted with a 1¼-inch cast-brass P trap with cleanout. All pipe connections shall have brass wall or floor flanges as required.

After completion of the installation an operating test will be made to determine compliance with contract requirements.

3435. **NON-CONDUCTING COVERING.** All cold water (including lawn sprinkler mains) and all hot water supply and hot water circulating pipes, in the building, after being tested shall be cleaned and covered. This includes all risers in wall chases, and piping in toilet rooms, except the finished brass pipe. Furnish and install mineral felt moulded pipe covering approximately 1 inch thick with a suitable core and canvas jacket. Bands to be brass-lacquered, tin plate, No. 36 B & S gauge, (0.005 inch thickness) ¾ inch wide, spaced not over 18 inches apart. No unions of any kind are to be covered, and covering shall be neatly terminated on each end of such unions with plastic material.

In toilet and office rooms where the fixture supplies drop from mains or branches overhead, the covering shall stop on vertical pipes 6 feet above the floor and supplies from this point to floor shall not be covered. Drops to basement sinks and supplies above floor to sink in janitors' closets which are not chromium-plated shall not be covered. Aceiling plate shall be installed at point where covering stops.

The copper coil water heater and hot water storage tank shall be cleaned and covered after being tested.

Samples of covering are to be submitted to the Architect. Such samples must bear the label of the manufacturer. The label of the jobber or Contractor will not fufill this requirement.

3436. **PAINTING.** All piping run in or thru concrete, floor fill or tile floors shall be given one coat of acid-resisting paint having a bitumastic base. This includes brass pipe in concrete floor fill. All exposed threads on galvanized pipe thruout the building shall be given one coat of same acid-resisting paint.

After specified tests (except smoke test) have been made, all exposed iron work, including piping (except that to be covered) shall be given two coats of lead and oil paint. Galvanized pipe shall be varnished before being painted. Unfinished brass pipe is to be painted same as iron work.

All non-conducting covering shall be given two coats of cold water paint, white or light colored. Pipe covering bands shall be placed after paint is dry.

Finishing tints shall be as directed by the Architect. Various colors to designate the different services (hot, cold, circulating, etc.) will be required.

3437. **TESTS OF PLUMBING AND DRAINAGE SYSTEM.** The entire system of soil, waste, drain, and vent piping, must be tested with water or air, as hereinafter described, and proved tight to the satisfaction of the Architect before the immediate connection is made to city sewer, trenches back filled or fixtures connected. Testing instruments must be furnished by the Contractor.

Tests must be made with water, except when there is danger from freezing, when the test must be made with air. Wooden plugs are not to be used in making the tests. The connections between the building and the city sewer and the drainage system below the basement floor are to be tested separately.

3438. **WATER TESTS.** The connection from building to the city sewer and the drainage system below basement floor are each to be filled with water to top of a vertical section of pipe 10 feet high, temporarily connected to the highest point on the lines to be tested, and the water allowed to stand at least 30 minutes for inspection, after which, if the lines prove tight, the water is to be drawn off, immediate connection made with city sewer, and trenches back filled.

The soil, waste, drain, and vent piping, must have the openings plugged where necessary and the piping system above basement floor filled with water to the top of vent pipes and allowed to stand at least 30 minutes for inspection, after which, if the lines prove tight, the water is to be drawn off and the fixtures connected. Each vertical stack above basement floor with its branch waste and vent pipes may be tested separately by inserting plugs in the cleanouts at base of vertical in lieu of filling entire system in building with water.

3439. **SMOKE TESTS.** After all fixtures have been permanently connected, a smoke test must be applied to the sanitary system, and the entire system proved tight, to the satisfaction of the Architect, when filled with smoke under pressure equal to 1 inch of water. The smoke must not be produced by chemical mixtures.

3440. **TEST OF WATER SUPPLY SYSTEM.** At the completion of the work, the water supply system must be tested to a hydrostatic pressure of 100 pounds to the square inch. Any water piping run underground or in chases in walls or in any way concealed by a structural work must be tested to above pressure and proved tight before the trenches are back filled or pipes are concealed.

3441. **COST OF TESTS AND CERTIFICATE.** Cost of tests to be borne by the Contractor, who must furnish the Owner with a certificate that the required tests have been satisfactorily made. Certificate must be countersigned by the Architect who will forward same to the Owner.

SECTION 35.

HEATING AND AIR-CONDITIONING

Index.

Paragraph	Subject	Paragraph	Subject
3501.	Work Not Included.	3511.	Blower.
3502.	Scope of the Work.	3512.	Motor.
3503.	Equipment.	3513.	Vent Pipe.
3504.	Shop Drawings.	3514.	Ducts.
3505.	Air Washer.	3515.	Non-Conducting Covering.
3506.	Refrigerating Chamber.	3516.	Registers, Grilles and Ceiling Vents.
3507.	Furnace.	3517.	Painting.
3508.	Gas Furnace.	3518.	Co-operation.
3509.	Oil-burning Furnace.	3519.	Testing.
3510.	Coal-burning Furnace.	3520.	Guarantee.

3501. **WORK NOT INCLUDED.**

a. Electric connection to motors, which is specified under "Electrical Work," Section 36 of these specifications.

b. All painting of apparatus or parts, (except as herein specified), which is included in "Painting and Finishing," Section 31 of these specifications.

c. All heat ducts and vents of concrete, brick or vitrified tile beneath concrete floors on earth fill, shown on plans, are included in the respective sections for this work.

3502. **SCOPE OF THE WORK.** This specification shall include all labor, materials, equipment, tools and appliances required to complete all of the work indicated on the drawings and/or herein specified, consisting of air-washer, refrigerating chamber, furnace, blower, motors, ducts, grilles, registers, controls and all miscellaneous equipment necessary for the successful operation of the heating and air-conditioning plant.

3503. **EQUIPMENT.** The equipment furnished shall be of the best standard quality and grade, approved by the Architect, and manufactured or supplied within the regional vicinity by reputable manufacturers having installed satisfactorily-operating equipment of the proposed respective classes for a period of not less than two years prior to the commencement of work on the building under this contract.

Within sixty days after receipt of notice to proceed the Contractor shall submit for approval of the Architect a complete list of the equipment he proposes to install in the work—(no consideration will be given to partial lists submitted from time to time)—giving the name and address of manufacturer, size or capacity and, when required for proper identification, the trade name or catalog number, as follows:

Equipment	Manufacturer	Address	Size or Capacity	Catalog No. or Trade Name
Air Washer				
Refrigerator Coils				
Furnace				
Blower				
Motor				
Mechanical Stoker				
(If indicated on plans)				
Water Heater				
Water Storage Tank				

Should the Contractor fail to submit for approval within sixty days after receipt of notice to proceed, the list of equipment above set forth, or should the Contractor name equipment not of the quality and grade, or not strictly in accordance with these specifications, the Architect shall reject the unapproved equipment and shall select a full line of equipment of the required quality and grade. Such selection shall be final and binding, and such equipment selected by the Architect shall be used in the work.

3504. **SHOP DRAWINGS.** Before proceeding with the installation of the above named equipment, this Contractor shall submit for the approval of the Architect shop drawings in triplicate for Air-Washer, Refrigerating Coils, and Furnace, and Mechanical Stoker if included in plans. The installation of this equipment shall be in strict accordance with the approved manufacturers' shop drawings and with the specifications.

3505. **AIR WASHER.** The Air Washer shall be of the horizontal spray-head type, of capacity thoroughly to clean a complete change of air equal to the cubic contents of the building every twenty minutes. All piping to be of copper or of brass, standard iron-pipe sizes. Spray heads shall be of brass. Top, sides and baffles of washer chamber shall be of hard sheet copper weighing not less

than 20 ounces per square foot, reinforced with one-inch flanges or angles of the same material. Fastenings shall be copper rivets of the standard size for the material used. Where sheet copper joins sheet iron, the surface of the copper shall be separated from contact with the sheet iron by the interposition of a strip of sheet lead weighing 6 pounds per square foot. In the rear of the spray heads in each section provide a ¼-inch thick plate glass window 12 inches high, 30 inches wide.

Bottom of washer chamber shall be semi-cylindrical in shape, of reinforced concrete, with smooth-troweled surface. Provide with electric motor and pump all of sufficient capacity to circulate the water in the washing system at a pressure of not less than 40 pounds per square inch. Provide connection to the city water supply, with automatic inlet valve to replace as needed the water lost through absorption by the air currents passing through the washer. Provide 3-inch pipe connection, complete with gate valve and trap, to sewer for cleaning.

3506. **REFRIGERATING CHAMBER.** Refrigerating chamber shall be of capacity sufficient to cool a complete change of air equal to the cubic contents of the building from a temperature of 75 degrees to 30 degrees Fahrenheit every twenty minutes. *Provide refrigeration coils with positive-acting controls such that the "dew-point" or temperature of the air being conditioned may be varied from 40 degrees F. maximum to 30 degrees minimum.*

Refrigerant shall be ammonia gas, ethyl chloride or other effectively-acting material proposed by the manufacturer and approved by the Architect. Cooling chamber shall be provided with basin and all piping, valves, etc., necessary to collect the excess moisture precipitated from the conditioned air and to return to the washing chamber.

3507. **FURNACE.** Install where shown on plans, furnace of the type indicated, of capacity sufficient to heat a complete change of air equal to the cubic contents of the building from 30 degrees to 70 degrees Fahrenheit every twenty minutes. Furnace and burner shall be equipped with full automatic control consisting of a room thermostat with 8-day clock and safety devices required by the National Board of Fire Underwriters. Thermostat shall be located in the public reading room, clearly visible from the charging desk and not less than 5½ feet above the floor. A second thermostat, complete with automatic starting switch, shall be installed to control the action of the blower independently of the thermostatic control of the burners. All electrical connections shall be made complete, and all wiring run in conduit, by the Electrical Contractor.

Furnace shall be completely incased with a 4-inch hard burned common brick wall, laid in lime-cement mortar with joints neatly struck.

3508. **GAS FURNACE.** Gas furnace, if required, shall be constructed with 16-gauge pure ingot sheet iron fireboxes, and provided with burners approved by the American Gas Association, pilot light, mixers, valves and all miscellaneous parts and equipment necessary for successful operation.

From branch left by Plumbing Contractor make gas connection to furnace in such manner that burners may be removed without disturbing gas line.

3509. **OIL-BURNING FURNACE.** Furnish and install where shown, if required by plans, oil-burning furnace complete, with built-in oil burner and automatic control. Furnace and burner to be *designated to burn 28-degree to 32-degree Baume fuel oil; burner specially designed to be of the* mechanical draft atomizing type to burn the oil in suspension, and to give guaranteed overall efficiency of not less than 85 per cent.

Furnace shall be constructed of heavy-rust-resisting sheet steel, not less than ¼-inch in thickness, firebox lined with 4-inch firebrick laid in fireclay mortar.

Provide oil storage tank of size shown on drawing and located where shown on drawing. Shell of tank shall be of tank steel not less than 3/16-inch thick, heads to be ⅜-inch thick, riveted and caulked or welded. Tank to be painted one coat of red lead and oil at the factory and one heavy coat of tar or asphaltum paint at time of erection. Top of tank shall be not less than 6 inches below lowest point of basement floor. Provide with 6-inch filler pipe and test pipe, 2-inch vent pipe and ¾-inch suction pipe. Run vent pipe to building, and terminate with return bend and screen. Oil suction pipe from tank to burner shall be all brass with brass fittings. All filling and vent piping shall be extra heavy wrought iron or steel with cast iron fittings. Vent, gauge and filling pipe must be galvanized. All pipe openings in tank shall have heavy flanges riveted or welded to tank, tapped for screwed connections. Filling pipe shall be extended to grade and fitted with locking cap, water tight. Filling and gauge pipe, and tank end of suction pipe, shall extend to within 4 inches of the bottom of the tank. Burner end of suction pipe shall be provided with gate valve, non-siphon valve, and strainer on suction side of oil pump.

Provide tank with suitable gauging rod, graduated to indicate the number of barrels of oil in the tank.

3510. **COAL-BURNING FURNACE.** Furnish and install where shown, if required by plans, coal-burning furnace complete with automatic control. Furnace shall be constructed of heavy rust-resisting sheet steel not less than ¼-inch in thickness, or of heavy cast iron; firebox to be lined with 4-inch firebrick laid in fireclay mortar.

Provide mechanical stoker of the type approved by the Architect, paragraph 3503 of this specification, installed in strict accordance with manufacturer's shop drawings and directions.

3511. **BLOWER.** Furnish and install complete where shown on plans one multi-blade blower, belt driven, having a capacity of a complete change of air equal to the cubic contents of the building every twenty minutes, against ¾-inch static pressure. Blower shall be full housed, horizontal discharge, and connected with canvas bellows joints to intake and furnace connection. Blower shall be

set on 2-inch wood frame lag-bolted with expansion shields to floor, with 1-inch layer of cork between wood base and blower base. Lag bolt to wood base.

3512. **MOTOR.** Furnish and install where shown on plans 220-volt, A. C., single phase, 60-cycle motor, of manufacturer's rated capacity to operate the blower specified in the preceding paragraph. Connect to blower by one-ply endless tanned leather belt of proper width. Set motor on 2-inch wood base lag-bolted with expansion shields to floor, with 1-inch layer of cork between motor and wood base. Lag-bolt motor to wood base. Motor proper shall be set on adjustable sliding base so belt may be tightened if necessary.

3513. **VENT PIPE.** Furnish and install 18-gauge rust-resisting sheet steel vent pipe from furnace and make proper connection to flue.

3514. **DUCTS.** Drawings indicate runs and sizes of ducts but runs may be slightly changed to meet existing conditions and overcome obstacles. All changes of direction shall be made with long sweep turns.

Furnish and install sheet metal ducts as indicated of 26-gauge galvanized pure ingot sheet iron, rigidly supporting the same with sheet metal straps of the same material, and make proper connections to registers and grilles. Where ducts terminate in register boxes they shall be funnel shaped, with length equal to the largest dimension of the register box. Paint inside of ducts at terminals past the line of vision with two coats of dead black paint. Furnish and install galvanized dampers in ducts with operating quadrant on outside of duct so that flow of air may be regulated or cut off entirely if desired.

Fresh air intake housing, where end of size shown on drawings, shall be made of 22-gauge galvanized pure ingot sheet iron with ⅛-inch by 1-inch angle iron braces and stays, rigidly supported.

3515. **NON-CONDUCTIVE COVERING.** Cover all exposed metal top of furnace, vent pipe, and all exposed metal ducts with ¼-inch ail-cell asbestos, tightly cemented in place. Reinforce asbestos covering on vent pipe and exposed ducts with flat metal clamps or bands, spaced not over 15 inches apart.

3516. **REGISTERS, GRILLES AND CEILING VENTS.** Furnish and install registers, grilles, and ceiling vents where and of sizes indicated on plans. Supply and exhaust grilles in reading room and stack room shall be as detailed. Registers in Librarian's office, club room, rest room and work room shall be plain square lattice design equipped with operating wheel and handle. Faces of grilles and registers shall have priming coat of light color applied at factory. Louvers of registers shall be painted dead black. Ceiling vents, where required by plans, shall be provided with movable shutters as detailed to control rising currents of air.

3517. **PAINTING.** All piping run in or through concrete, floor fill or tile floors, including brass pipe in floor fill shall be given one coat of acid resisting paint having a bituminastic base. All exposed threads of galvanized pipe throughout the building shall be given one coat of the same acid resisting paint. After the installation is completed all exposed iron work including piping (except that which is to be covered) shall be given two coats of lead and oil paint. Unfinished brass pipe is to be painted same as iron work.

All non-conducting covering shall be given two coats of cold water paint, white or light colored. Bands shall be placed after the paint is thoroly dry. Finishing tints shall be as directed by the Architect; various colors being required to designate the different services.

3518. **CO-OPERATION.** This Contractor shall work in harmony with all other contractors, laying out chases, framing for ducts and registers, and installing heating and air-conditioning system so as not to delay the work of the other branches.

3519. **TESTING.** This Contractor shall make a thorough test of the entire plant to the satisfaction of the Architect before turning over the installation as complete.

3520. **GUARANTEE.** This Contractor shall furnish a written guarantee to the Board that the entire system as installed will properly condition and heat to the minimum temperature of 70 degrees Farenheit all air supplied to rooms having registers and grilles, and to keep the complete installation in repair and working condition for a period of one year from date of acceptance.

SECTION 36.

ELECTRICAL WORK.

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Paragraph	Subject	Paragraph	Subject
3601.	Scope of the Work.	3613.	Wall Switches and Plates.
3602.	Permits.	3614.	Base Receptacles and Plates.
3603.	Ordinances.	3615.	Cabinet and Panel Board.
3604	Materials and Workmanship.	3616.	Meter Board.
3605.	Excavating.	3617.	Externally Operated Switch.
3606.	Cutting and Repairing.	3618.	Public Telephone Conduit.
3607.	System.	3619.	Signaling System.
3608.	Service.	3620.	Electric Heating Control.
3609.	Conduit.	3621.	Electric Clock Outlets.
3610.	Wire.	3622.	Illuminated Lawn Signs.
3611.	Conduit and Wire Sizes.	3623.	Testing.
3612.	Outlet Boxes.	3624.	Guarantee.

3601. **SCOPE OF WORK.** The work under this specification shall include:

a. All electric light wiring and conduit for same but without lighting fixtures.
b. All electric power wiring and conduit for same.
c. Public telephone conduit including service conduit from pole to main terminal box, and conduit to the two telephone stations in the building.
d. Signaling system, *including bell ringing transformer, push buttons, call buzzers, and electric control* for basement furnace.
e. All miscellaneous equipment such as panel board, meter loop, conduits, outlet boxes, switches, base receptacles.

3602. **PERMITS.** The Contractor shall obtain at his own expense all necessary permits to carry on the work. Upon completion of the work he shall furnish the Architect with "Certificates of Inspection," stating that the work has been inspected and accepted.

3603. **ORDINANCES.** The Contractor shall comply with the rules of the State Industrial Accident Commission and all local electrical ordinances, anything herein or on the drawings to the contrary notwithstanding.

3604. **MATERIALS AND WORKMANSHIP** All materials used upon the work shall be new and free from defects and shall be in strict accordance with the latest standard specifications of the National Electrical Manufacturer's Association and guaranteed in writing for a period of one year from date of final acceptance of the work.

All work shall be performed by skilled mechanics only and any unsatisfactory work shall be corrected promptly and to the satisfaction of the Architect.

3605. **EXCAVATING.** The Contractor shall do all excavating necessary for the installation of his work ,and shall backfill and thoroughly settle all such excavations and shall dispose of the surplus earth where directed. He shall also repair, to the satisfaction of the City authorities, any damage to sidewalk or street surfaces caused by him in the installation of this work.

3606. **CUTTING AND REPAIRING.** The Contractor shall do all cutting and repairing of building construction required for the installation of his work and all cutting and repairing of building construction required for the installation of his work. All such cutting and repairing shall be done in accordance with the Architect's instructions.

3607. **SYSTEM.** For lighting and power, the system of distribution will be 220-110 volt, single phase, 3-wire, alternating current in the main service, feeders and branch circuits. The power wiring will be 220-volt, single phase, alternating current, 50-cycle or 60-cycle according to the cycle of the current furnished by the local electric power company.

3608. **SERVICE.** Service will be brought underground as shown on plot plan. For this service furnish and install galvanized wrought steel conduit of proper size to carry the electrical load of the building, to run from the position of the panel board under the floor and 2 feet below grade to the pole shown on plans, and up the pole to the bottom crossarm, ending in a Type FE conduit.

Pull into this three No. 4 R.C.D.E. copper strands making connection to service switch at panel and allowing 3 feet to project thru the conduit on the pole.

Insulate conduit where it is exposed up the pole, as required by City ordinance.

3609. **CONDUIT.** All wires shall be installed in rigid iron conduit, with outlets, located approximately as shown on the drawings. Conduit shall be carefully reamed at both ends of each length to insure a smooth wireway. Conduit run in the ground or under the building shall be assembled with

full red lead oints, made water-tight and shall receive an additional protective coat of asphalt.
All conduits shall be rigidly supported from the building construction and shall be run concealed.

3610. **WIRE.** All rubber covered wire shall be brought to the job in original packages, and shall be of the best grade.

No mechanical means shall be used in pulling in wire. Powdered soapstone must be the only lubricant used. Wires shall be tagged at outlet boxes and cabinets with linen tags with indelible markings for identifying the various circuits.

3611. **CONDUIT AND WIRE SIZES.** Furnish and install conduit and wire of sizes as indicated on the drawings and under the key to indications and abbreviations, shown on drawings.

3612. **OUTLET BOXES.** Outlet boxes for fixtures shall be galvanized 4-inch round or octagon type, equipped with plaster rings, fixture studs and covers where necessary. They shall be solidly supported in position apart from the conduit running to them. Galvanized outlet boxes shall be used in conjunction with all switch and receptacle outlets.

Approximate locations of outlets are marked on the drawings. Contractor, however, shall check the measurement and in case of doubt consult the Architect as to exact locations, particularly in regard to brack outlets.

3613. **WALL SWITCHES AND PLATES.** Approximate locations of wall switches are indicated on the drawings; exact location shall be designated by the Architect. Wall switches shall be of tumbler type. All switch plates shall be finished in statuary bronze factory finish.

3614. **BASE RECEPTACLES AND PLATES.** Approximate locations of base receptacles are indicated on the drawings. Exact locations and heights shall be designated by the Architect. One cap for each receptacle shall be furnished by this Contractor and turned over to the Owner on the completion of the job. Finish of plates shall be in statuary bronze.

3615. **CABINET AND PANEL BOARD.** Cabinet at the panel board shall contain one 3 P.S.T., 250-volt fused switch for service of sufficient amperage to allow for 25% overload, and one 30-ampere 2 P.S.T., 250-volt fused switch for the power circuit to the fan motor. These shall be mounted below the panel board in the cabinet. Cabinet shall be constructed in a rigid manner, set flush with the wall surface and securely fastened to the wall. Doors and trim shall be made of No. 10 gauge steel and shall be of the door-within-a-door type. The large door shall be equipped with combination catch and lock with keyhole in center of knob; small door shall have catch only. Provide two keys for the cabinet. Cabinet shall be finished in dead black lacquer. All branch switches in the panel shall be tumbler switches, of 30-ampere 250-volt S.P.

3616. **METER BOARD.** As shown on plans, furnish and install one 12 in. by 16 in. by 1½ in. O.P. meter board, painted with two coats of black enamel and solidly secured to the wall. Run meter loop from service switch and bring out thru bushed openings from the top gutter of the cabinet. Install in glass faced cupboard, readable from outdoors.

3617. **EXTERNALLY OPERATED SWITCH.** On the wall near the fan motor, as indicated on drawings, and 4 feet above the floor, furnish and install one 30-ampere, 220-volt, 2 P.S.T., fused safety switch. From the 30-ampere switch to the panel board cabinet run two No. 12 wires in ½ inch conduit to this safety switch and make connections complete. Also run conduit and wire from switch to motor and make connections complete and test out for proper rotation in co-operation with the Heating Contractor.

3618. **PUBLIC TELEPHONE CONDUIT.** On the basement wall, 6 feet above the floor level where indicated on drawings, furnish and install one steel cabinet, of No. 12 gauge, 6x12 inches by 4 inches deep, having a hinged door with a spring catch. From this main terminal run a 1-inch service conduit underground to the nearest telephone pole, clearing by at least 12 inches any electric service conduit. Run up pole approximately 12 feet, ending in a Type FE conduiet as directed by the Telephone Plant Engineer. From the main terminal run a ¾-inch conduit to the telephone outlet at the charging desk and from the main terminal run a ¾-inch conduit to the telephone outlet in the Librarian's office as indicated on drawings. From the main terminal run ¾-inch conduit to the nearest water main pipe; both terminals of this conduit to be accessible.

On completion of the building conduits shall be fished thru, dried out and No. 14 iron pull wire shall be left in conduit for pulling in telephone wires by the Telephone Company. This Contractor shall co-operate with the Telephone Company to make this installation satisfactory and complete in every respect.

3619. **SIGNALING SYSTEM.** Furnish and install in the basement, supported on the wall 5 feet above the floor where indicated on drawings, one 25-watt, bell ringing transformer connecting the primary circuit of the transformer to a circuit on the panel board thru two No. 14 wires in ½-inch conduit, and connecting the secondary circuit to the push buttons and buzzers herein specified. Furnish and install at the charging desk, as indicated on drawings and as directed by the Architect, one switch box plate with push buttons in switch box complete, and wired to control the buzzers shown on the plans. Furnish and install in the Librarians office, where indicated, one flush concealed buzzer in standard switch box complete, and in the basement and elsewhere as shown on plans, size No. 4 buzzers. Wire shall be No. 16 fixture wire run concealed. This installation shall be complete and satisfactory in every respect.

3620. **ELECTRIC HEATING CONTROL.** Furnish and install under the direction of the Heating Contractor, all necessary wiring for the installation of one Electric Heat Regulator, one 110-volt A.C. motor, and one "Mercoid" Furnace-stat.

3621. **ELECTRIC CLOCK OUTLETS.** Install, where shown on plans, outlets for electric clocks.

3622. **ILLUMINATED LAWN SIGN.** Where shown on plans, furnish and install one outlet located approximately as indicated on plot plan and do all wiring for the same. This outlet shall consist of 100-watt weatherproof protective cover and shall be controlled by switch at main switch panel. Outlet at outlet end shall be as detailed on plan. Pull-box to be located in foundation outside of building, if possible.

3623. **TESTING.** All wiring shall be thoroly tested upon completion and before installation of fixtures, for shorts or grounds. This Contractor shall furnish all necessary apparatus for testing and shall make good all defects. Tests shall be to the complete satisfaction of the Architect and shall be made in his presence. After testing, all terminal joints shall be joined together and soldered and made ready for installation of fixtures.

3624. **GUARANTEE.** A guarantee shall be furnished in writing by this Contractor for the work installed under this specification, agreeing to make good, repair or replace at his own cost and expense any defective work or material which may develop within one year from completion and approval of the work.

SECTION 37.

LIGHTING FIXTURES.

Index.

Paragraph	Subject	Paragraph	Subject
3701.	Scope of the Work.	3704.	Material, Workmanship and Finish.
3702.	General.	3705.	Light Bulbs.
3703.	Co-Operation of Contractors.	3706.	Testing.

3701. **SCOPE OF THE WORK.** The work to be performed shall include the designing, furnishing of all material, fabricating, installing, connecting and testing of a system of electric lighting fixtures, complete, in accordance with these specifications and with the drawings to be furnished by the lighting contractor and approved by the Board.

3702. **GENERAL.** Each bidder shall prepare and submit his design for the layout, and for the individual lighting fixtures proposed, for the library designated not to cost in excess of the limit fixed by the Library Board for the particular job. Lighting fixtures shall conform, in design and method of illumination, to the architecture and decoration of the building and interior in which they are to be used. No metal, gilding or other opaque obscuration below a horizontal plane thru filaments in semi-direct or direct type fixtures will be accepted or permitted.

Where the ceiling is of a type and character that will permit the use of indirect or semi-indirect illumination, fixtures may be designed and built to furnish this type of lighting.

Where ceilings are of wood and open truss construction and are lacking in necessary reflecting value, semi-direct fixtures are to be used. Care must be exercised to avoid all glare, contrasting brightness, and such other known defects, as will work against the eye comfort of the readers. High vaulted or barrelled ceilings, where indirect lighting is not economically possible, shall be equipped with semi-direct fixtures having enough upward light to dissipate shadows and dark spots on the ceiling. High intensities on side walls above book shelves must be avoided.

Care must be taken to avoid glare in lighting stacks. Where units are used for this purpose, shields must be provided to cut off all glare.

There must be no great contrast between the lighting fixtures and their surroundings, and surface brightness on any part must not exceed 3 candle-power per square inch.

The use of a few high candle-power lamps in public reading rooms and offices, is desired wherever possible rather than a large number of smaller lamps. Provide larger number of small-wattage fixtures in stacks.

3703. **CO-OPERATION OF CONTRACTORS.** This Contractor shall co-operate with other contractors on the job, and shall notify the Architect in writing of defective work on the part of other contractors to which the work of this Contractor shall be attached. Failure so to notify the Architect will be a presumption that the work of other contractors contains no defects.

3704. **MATERIAL, WORKMANSHIP AND FINISH.** Material used and workmanship thereon shall be the best of each kind possible to secure.

Finish shall be in harmony with the interior finish of the building.

3705. **LIGHT BULBS.** The Board will furnish to the Contractor all bulbs necessary to equip the building completely. For this purpose the Contractor will furnish the Architect well in advance of the completion of the work, a schedule showing the number and wattage of each kind of bulb required.

3706. **TESTING.** After installing, and before issuance of final payment, the entire work shall be tested by the Contractor installing the same and approved by the Architect. No fixture shall show, by means of test, an intensity of light less than 8-foot candle power at any point covered by the particular light, and at maximum distance from the light.

SECTION 38.

CORK CARPET AND LINOLEUM.

Index.

Paragraph	Subject	Paragraph	Subject
3801.	Scope of Work.	3806.	Base.
3802.	Floor Covering.	3807.	Cleaning.
3803.	Cement.	3808.	Payment.
3804.	Felt.	3809.	Guarantee.
3805.	Installation.		

3801. **SCOPE OF WORK.** The work shall consist of furnishing all material, cork carpet, or Battleship linoleum, all non-waterproof and waterproof cement, any laying the specified floor covering in the best possible and most workmanlike manner.

3802. **FLOOR COVERING.**

a. **Linoleum** floor covering shall be U. S. Government Standard Walton Process Battleship linoleum. Color shall be as stated in the notice inviting proposals. Thickness shall be standard ¼-inch, unless otherwise stated in the notice inviting proposals.

b. **Cork Carpet** shall be of the highest grade material selected only from approved samples to be submitted by the bidder and of the color and thickness stated in the notice inviting proposals.

Cork carpet shall be of American manufacture, made from new ground cork and cork shavings, without the admixture of bin sweepings, dirt, dust or other refuse, with a burlap backing of the best quality yarn, well pressed and keyed into the cork. The cork carpet shall weigh not less that 6½ lbs. per square yard. The burlap shall weigh not less than 8 oz. nor more than 11 ozs for 36 to 40 inches. The cork carpet shall be of new material and sufficiently elastic to bend around a 2-inch diameter without rupture or cracking. The cork carpet must be shipped to the job in the original crates, which are to be removed at the job, the wrappers removed and the rolls allowed to stand on end 24 hours before laying the carpet. The name of the manufacturer, the weight and the grade of the material must be stamped on the back of each roll.

The floor covering contractor shall submit with his proposal two samples of the floor covering on which his proposal is based. These shall bear both the contractor's and manufacturer's names. After having been approved in writing by the Owner, one sample shall be retained by the Contractor and one by the Owner for comparison with the material furnished and laid which shall be equal in every respect.

3803. **CEMENT.** The cement used in securing the floor covering to the floor shall be:

a. **Non-waterproof** for cementing felt to underfloor and body of linoleum to felt.

b. **Water-proof** for cementing seams and edges of linoleum or cork carpet.

The cement must be shipped to the job in manufacturer's original package and meet with the approval of the Architect.

3804. **FELT.** Felt used between all wood floors and the floor covering shall be 1½ lb. builder's deadening felt and shall be one of the following brands: Congo Lining, Bird's Felt, or approved equal. No felt will be used between floor covering and concrete floor.

3805. **INSTALLATION.** Only first quality material may be installed under these specifications. Material generally known to the trade as "Seconds" will not be accepted. No linoleum shall be installed until the sub-floors are clean and smooth. Before commencing the work the Contractor shall inspect the underfloor and assure himself that it is in every way satisfactory and in accordance with the specifications. In the event that the underfloor is not suitable in every respect, the floor covering contractor shall notify the Owner in writing, and shall not proceed with the installation of the floor covering until such defects have been remedied.

The floor covering contractor shall advise the Owner sufficiently in advance so that a temperature of at least 70 degress F. may be supplied and maintained in all rooms where floor coverings are to be installed and shall not proceed with this work unless this condition exists.

Felt shall be secured to wood underfloors with the approved non-water-proof cement. The cement shall be used under the entire surface of the felt. The felt shall be cut to fit accurately against the walls, pipes, floor outlet boxes and other permanent projections in the floor. The strips of felt shall be laid in the opposite direction to that of floor boards. All seams in the felt shall be carefully butted, not lapped. When the felt has been entirely cemented to the wood floor, it shall be thoroughly rolled with an iron roller to smooth out any air blisters and to secure proper adhesion. The roller shall be as described below for use in rolling the floor covering. After the felt has been cemented and rolled, no attempt shall be made to lay floor covering over it for at least twelve hours.

Concrete floors shall be damp-proofed as provided in Section 15 of these specifications, under a separate contract.

The floor covering shall be rolled out and cut into lengths allowing sufficient additional for trimming at the ends of each strip.

The floor covering shall be laid with the fewest possible number of seams. The use of small pieces, resulting in unnecessary seams, shall not be permitted.

All seams shall be lapped (not butted) approximately ½ inch.

The body of the floor covering shall then be secured with waterproof cement, to the felt to within four to six inches of the seams. Sufficient cement shall be applied to thoroughly key the burlap to the felt.

The floor covering shall then immediately be rolled thoroughly with a roller, to smooth out any air blisters and to secure proper adhesion. The roller shall be made of independently weighted sections, each section being not more than 12 inches long, and shall have sufficient weight to give not less than 10 lbs. pressure per lineal inch of the surface contact with the floor.

Where the floor covering has been lapped, seams shall be cut through both thicknesses on a straight even line with a sharp knife so as to make a tight and practically invisible joint. These edges must then be thoroughly cemented with waterproof cement and rolled with a roller of type specified, and weighted with sand bags, bricks or other appropriate weights, for twenty-four hours.

Floor coverings shall be laid under all wall shelving and under all other furniture, from wall to opposite wall, and cut to fit accurately and snugly against all walls, pipes, floor outlet boxes and other permanent projections in the floor. Floor covering shall not be cut around wall shelving or other furniture except where specifically directed by the Architect.

3806. **BASE.** Base shall be uniformly 4 inches high, of the same material, color and thickness as the specified linoleum or cork carpet for the job, unless otherwise definitely specified elsewhere in these specifications. Base shall be applied by this Contractor, as part of this contract, on all walls, except behind wall shelving, and on all furniture provided with base, shelving, etc. Where applied near edges of floor covering, the floor covering shall be beneath, and the base above. All base shall be finished off with a small, neat, wood cap mould, applied under a separate contract.

3807. **CLEANING.** Upon completion of the work, the linoleum or cork carpet contractor shall clean all paste spots and streaks from the floor covering, and the floors of all surplus material, and leave them ready for occupancy.

3808. **PAYMENT.** Payment will be made on the basis of the total number of square yards of floor covering and the total number of lineal feet of linoluem or cork carpet base installed, measured in place at the completion of the job.

3809. **GUARANTEE.** The linoleum or cork carpet contractor shall guarantee his work to the Owner against defects of material or workmanship for a period of three (3) years from date of acceptance and shall, upon receipt of written notice from the Owner, make at his own expense, any repairs that may be necessary from any cause other than ordinary wear and tear, and shall furnish a surety bond in the full amount of the contract covering the performance of this guarantee.

SECTION 39.

UNDERGROUND SPRINKLING SYSTEM.

Index.

Paragraph	Subject	Paragraph	Subject
3901.	Scope of the Work.	3904.	Method of Installation.
3902.	General.	3905.	Guarantee.
3903.	Materials		

3901. SCOPE OF THE WORK. The work shall include all necessary excavations and backfilling of trenches, the furnishing and laying of all piping, valves, sprinkler heads and any and all other necessary materials and parts, and all labor and equipment required to install the sprinkler system complete and ready for operation in accordance with these specifications and with the plan submitted by each bidder with his proposal.

3902. GENERAL. The bidder shall prepare and submit his design for the layout of his sprinkler system for the Public Library designed in the "Notice Inviting Proposals," showing the number, type and location of the sprinkler heads; varying sizes of pipe connecting the sprinkler heads with the meter; the size and location of the meter; the location of the cutoff valves for the different water lines, and all other such information as may be necessary for a thoro understanding of the location and operation of the various parts of this system.

The bidder shall include in his bid for this work all labor and materials necessary for the complete installation of the system as outlined from the layout submitted as provided in the preceding paragraph.

3903. MATERIALS. Sprinkler heads shall be of brass construction, of lock type to prevent removal by theft; sprinkler heads of any other material of equal durability and merit may be used if approved by the Owner before the contract is entered into. Sprinkler heads shall have a capacity of two and one-half to three and one-half gallons per minute at a water pressure of twenty pounds. Sprinkler heads must be supplied with not less than 3 inch nipples.

Main shut-off valves shall be Crane or Jenkins gate valve or equal; one shut-off valve to each separate line. Shut-off valves shall be protected by tile boxes.

3904. METHOD OF INSTALLATION. This Contractor shall exercise due precaution in the installation of pipes beneath walls and walks so as not to damage same. All excavation below walls and walks shall be promptly back-filled and puddled. Walks or driveways must not be taken up, disturbed or damaged in any way. If it becomes necessary to team or carry materials across the wall and walks, the same shall be properly protected from damage. Any damage to such walls and walks by this Contractor shall be made good as his expense.

The lawn sprinkler system shall be installed, complete by this Contractor, immediately after the rough grading of the lawn shall have been performed and before the seeding of the lawn.

All pipes shall be new, standard weight brass or copper pipe of iron pipe sizes, scale-free thruout and of the inside diameter on the plan submitted by the bidder. No run shall be less than ¾ inch. All fittings shall be heavy, rough, red brass. Reducing fittings shall be used wherever a reduction in pipe size occurs. Bushings will not be permitted in any fitting of this system.

All pipes shall be carefully reamed at the ends to remove the burrs due to cutting. Pipe and fittings are to be made up with cement applied only to the male threads.

Cement, however, is to be used sparingly as all threading and pipe work must be done in a first class and workmanlike manner.

As each section of piping is ready to be installed the pipe shall be up-ended and hammered free from dirt. As the pipe is installed in the ground the free ends shall be protected from being filled with dirt. Each section of pipe shall be thoroughly flushed out before installing valves. Each section of piping shall be flushed out after connecting to control valves at least five minutes before installing the sprinkler heads. All pipe to be tested for leaks with control valve in place before section piping is connected to the valve. All back-filling shall be properly tamped and puddled so that the grade of the lawn will be preserved. Where proper tamping and puddling is not carried out this Contractor shall be required to refill and reset these areas at his own expense.

Sprinkler heads in all cases shall be staggered, i. e. the heads in one line shall be spaced opposite the interval between heads in the line immediately adjacent on each side.

After the lawn has been planted and the ground thoroughly seeded, this Contractor shall as a part of his work under this agreement, make whatever adjustment of pipe valves or sprinkler heads necessary to bring this system to the proper lever of the permanent grade.

3905. GUARANTEE. This Contractor, as a part of this agreement, shall furnish a written guarantee against any defective materials or parts (except sprinkler heads which may be damaged by lawn mowers) and to make any adjustments; and shall guarantee the proper operation of the system installed, all for a period of two years after the acceptance of the work.

SECTION 40.

LANDSCAPING.

Index.

Paragraph	Subject	Paragraph	Subject
4001.	Scope of the Work.	4005.	Seeding Lawn.
4002.	General.	4006.	Instructions.
4003.	Co-Operation.	4007.	Guarantee.
4004.	Planting Shrubs and Trees.		

4001. **SCOPE OF WORK.** The work to be performed shall include the grading, rough and finished; leveling, raking, rolling and all other necessary preparation of those areas of the lot not occupied by building or sidewalk; the planting of shrubs and flowers as shown on the plan submitted by the builder, as required in the succeeding paragraph; the seeding of the lawn according to the specifications hereinafter set forth, and all other necessary work in connection therewith in order to secure a thoroughly satisfactory job of landscaping.

4002. **GENERAL.** The bidder shall prepare and submit his design for the layout of the landscaping system proposed, to cost not in excess of the limit fixed for the particular job.

4003. **CO-OPERATION OF CONTRACTORS.** This Contractor shall work with the contractor for the installation of the sprinkler system. The rough grading of the lawn shall be completed by the landscaping contractor. The sprinkler system shall then be installed complete by the sprinkler contractor. After the installation of the sprinkler system by the sprinkler contractor, then the grading, leveling, seeding of law and planting of shrubs and flowers shall be completed by the landscaping contractor.

4004. **PLANTING SHRUBS AND TREES.** All holes for shrubs, large bushes, and trees, shall be of a radius at least one foot greater than the radius of the roots of the trees or shrub, and of sufficient depth as to provide free room for the roots without packing, doubling, or crowding when planting. At the foot of each tree shall be imbedded vertically a glazed burned clay tile, not less than 24 inches long, with bell just below surface of lawn to prevent interference with lawn mower. The bell shall be closed with an iron or wooden cap to fit, preventing the tile from filling up with dirt or rubbish.

4005. **SEEDING LAWN.** Before seeding the lawn or planting the shrubbery and flowers a heavy coat of screened dairy fertilizer shall be applied. The lawn shall be seeded with a mixture of Kentucky Blue Grass and White Clover, half and half, sufficient to produce a heavy coat of grass on the lawn.

4006. **INSTRUCTIONS.** Proper instructions shall be given by the successful bidder to the Gardener of the Library upon completion of his work as to the proper care of the lawns, shrubs and flowers.

4007. **GUARANTEE.** The Contractor shall furnish the Library Board with a written guarantee to the effect that he will properly make good any defect or deficient areas discovered in his work within one year after the date of his final certificate caused by defective materials or workmanship furnished by him. This guarantee shall include the satisfactory replacement of all planting and lawns which are found to be dead or are not thriving by the end of the above described period.

SECTION 41.

AGREEMENT.

THIS AGREEMENT, entered into by and between the City of....., State of....., hereinafter called the "OWNER," represented by the duly constituted President and Secretary of its Library Board executing the Contract, and

....., hereinafter called the "CONTRACTOR,"

WITNESSETH: That for the consideration of.....Dollars, lawful money of the United States, the Contractor shall furnish all materials and labor and shall perform all work required for the construction of a Public Library Building, complete.

.....

in strict accordance with all drawings, specifications, General Conditions of the Contract and other necessary documents herein referred to, included and hereby made a part of this agreement. The work shall commence within ten (10) days after receipt of written notice to proceed, and shall be completed within.....calendar days after commencement of the work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement....., 19....., at ....., ...

(City) (State)

(SEAL) THE CITY OF....., STATE OF.....,

By..... By.....

President, Library Board. Secretary, Library Board.

In the presence of .....) (SEAL)

.....) .....) Contractor

(Witness) .....)

....

(Witness) (Business Address)

CERTIFICATE FOR CORPORATE CONTRACTOR.

I, ..., certify that I am the.....Secretary of the corporation named as Contractor herein; that....., who signed this contract on behalf of the Contractor, was then.....of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

(Corporate)
(Seal)

.....
Secretary.

APPENDIX E

STANDARD SPECIFICATIONS

FOR

PUBLIC LIBRARY EQUIPMENT

GENERAL INDEX

Section	Subject
1	Advertisement.
2	Proposal
3	List of Equipment
4	Collusion Affidavit
5	Bidder's Bond.
6	Performance Bond.
7	General Conditions.
8	Wood Equipment.
9	Steel Shelving and Book Stacks
10	Agreement.

SECTION 1.

ADVERTISEMENT.

SEALED PROPOSALS, addressed to the Secretary, Library Board,.....,
(Name of City)
....
(State)
Building," will be received until..... ....., ...M.,..... ., ..., 19....., and
(hour) (day of week) (date)

publicly opened at that place and time, for supplying all equipment and furniture, and furnishing all labor and material for installing the same, for a Public Library Building.

Plans, specifications and all necessary information may be secured from the above-named office upon deposit of a check in the amount of $5.00, payable to the order of the President, Library Board,

...., ..., which
(City) (State)
will be refunded upon the prompt return of plans and specifications in good condition.

.....
Secretary.

....., ...
(City) (State)
Date.....,19.....

SECTION 2.

PROPOSAL.

.....
(City) (State)

....., 19.....

The Honorable, The Library Board,

.....
(City) (State)

Gentlemen:

In compliance with your Advertisement dated....., 19....., the undersigned hereby proposes to supply all equipment and furniture, and to furnish all material and labor necessary to install the same for a Public Library Building, complete, ...

.....

.....

in strict accordance with the drawings, specifications, List of Equipment, General Conditions of the Agreement and all other necessary documents herein included, referred to and hereby made a part of this proposal, for the total sum of.....Dollars, ($).

The undersigned agrees, upon receipt of written notice of acceptance of this proposal within ten (10) days after the date of opening the proposals as set forth in the above-mentioned Advertisement, to execute the required form of Agreement, Section 10 hereof, in accordance with the terms of this proposal as accepted, and to furnish Performance Bond, (Section 6 hereof,) with good, sufficient and acceptable surety or sureties for the faithful performance of the Agreement, within ten (10) days after the prescribed forms are presented for signature, and to complete the work within .....calendar days after receipt of written notice to proceed.

.....

.....

.....

.....
(Business Address)

INSTRUCTIONS.

1. Read carefully "General Conditions," Section 7, before preparing proposal.
2. If bidder is a corporation, write state of incorporation under signature.
3. If bidder is a partnership, give full names of all partners.
4. This proposal will not be considered unless it is accompanied by "Bidder's Bond," (Section 5 hereof,) or Certified Check or Cashier's Check in amount not less than ten percent (10%) of the total amount of the above proposal.
5. All signatures in proposal, bidder's bond, etc., must agree exactly in every respect.

SECTION 3.

LIST OF EQUIPMENT.

Item No.	Par. No.	Description	Quantity	Price
		301. DELIVERY ROOM.		
1	812	Charging Desk	1	
2	806	Chairs, Swivel, 30 in., without Arms	3	
3	823	Glass Exhibit Case	1	
4	827	Card Catalog Cabinet, with Leg Basese	2	
5	821	Card Record Cabinet, with Leg Base	2	
6	825	Picture Collection Cabinet	1	
7	825	Pamphlet Filing Cabinet	1	
8	824	Magazine Indexes Table,	1	
9	820	Atlas and Dictionary Case	1	
10	830	Umbrella Rack	1	
11	811	Bulletin Board, 30 in. high, 4 ft. wide	1	
12	809	Book Trucks	2	
13	807	Call Slip Trays		
14	808	Sorting Tray	1	
		302. ADULT READING ROOM.		
15	813	Flat-top Desk, 34x55 in., 30 in. high	1	
16	806	Chair, Swivel, 18 in., without Arms	1	
17	810	Tables, ...ft. long, 30 in. high		
18	810	Tables, ...ft. long, 30 in. high		
19	806	Chairs, Windsor, 18 in.		
20	806	Chairs, Side, 18 in., without Arms		
21	819	Book Display Rack	1	
22	815	Bookcase with Glass Doors to Lock	1	
23	814	Wall Shelving, 6 ft.-10 in. high, 12 in. wide, 3-ft. Sections		
24	814	Wall Shelving, 6 ft.-10 in. high, 10 in. wide, 3-ft. Sections		
25	814	Wall Shelving, 6 ft.-10 in. high, 8 in. wide, 3-ft. Sections		
26	822	Newspaper Rack, with Holders	1	
27	826	Magazine Rack, with Bulletin Board	1	
28	811	Bulletin Board, 30 in. high, 5 ft. wide	1	
		303. JUVENILE ROOM.		
29	813	Flat-top Desk, 34x55 in., 30 in. high	1	
30	806	Chair, Swivel, 18 in., without Arms	1	
31	810	Tables, ...ft. long, 27 in. high		
32	810	Tables, Round, 4 ft.-6 in. diameter, 27 in. high		
33	817	Picture Book Table, ...ft. long	1	
34	806	Chairs, Windsor, 15 in. high		
35	806	Chairs, Side, 13 in. high, without Arms		
36	815	Book Case with Glass Doors to Lock	1	
37	819	Book Display Rack	1	
38	826	Magazine Rack, with Bulletin Board	1	
39	814	Wall Shelving, 5 ft. high, 10 in. wide, 3-ft. Sections		
40	814	Wall Shelving, 5 ft. high, 8 in. wide, 3-ft. Sections		
41	811	Bulletin Board, 27 in. high, 3 ft. 6 in. wide	1	
		304. STACK ROOM.		
42	904	Wall Shelving, 6 ft.-10 in. high, 12 in. wide, 3-ft. Sections		
43	904	Wall Shelving, 6 ft. 10 in. high, 10 in. wide, 3-ft. Sections		
44	904	Wall Shelving, 6 ft. 10 in. high, 8 in. wide, 3-ft. Sections		
45	904	Double-Faced Shelving, 6 ft. 10 in. high, 24 in. wide, 3-ft. Sections		
46	904	Double-Faced Shelving, 6 ft. 10 in. high, 20 in. wide, 3-ft. Sections		
47	904	Double-Faced Shelving, 6 ft. 10 in high, 16 in. wide, 3-ft. Sections		
		305. LIBRARIAN'S OFFICE.		
48	813	Flat-top Desk, 34x55 in., 30 in. high	1	
49	806	Chair, Swivel, 18 in., without Arms	1	
50	806	Chairs, Side, 18 in., without Arms		

Item No.	Par. No.	Description	Quantity	Price
51	829	Filing Cabinet, Office	1	
52	818	Typewriter Stand, Movable	1	
53	831	Wall Shelving, 5 ft. high, 10 in. deep, 3-ft. Sections		
54	831	Cupboard, 5 ft. high, 10 in. deep, 3-ft. Sections		
		306. WORK ROOM.		
55	810	Table, ... ft. long, 30 in. high, with 2 drawers, to lock	1	
56	806	Chairs, Side, 18 in., without Arms		
57	809	Book Trucks	2	
		307. CLUB ROOM.		
58	810	Table, ...ft. long, 30 in. high, with 2 drawers, to lock	1	
59	806	Chairs, Side, 18 in., without Arms		
60	816	Cupboards, 5 ft. high, 10 in. deep, 3-ft. Sections		
61	828	Hanging Map Case, with Rollers		

SECTION 4.

COLLUSION AFFIDAVIT.

401. AFFIDAVIT TO ACCOMPANY INDIVIDUAL OR FIRM BIDS.

STATE OF.....
COUNTY OF..... } ss.

..... and .....being

duly sworn, depose.....and say.....: that.....he.....the person.....whose name..... signed to the foregoing proposal, Section 2 hereof; that said proposal is genuine and that the same is not sham or collusive; that it is not made in the interest or in behalf of any person not therein named; that.....he.....ha.....not, directly or indirectly, induced or solicited any other bidder to put in a sham bid and ha.....not caused, induced or solicited any other person, firm or corporation to refrain from bidding; and that he.....ha.....not in any manner sought by collusion, to secure for .....msel.....an advantage over any other bidder.

Subscribed to and sworn before me this .....

.....day of....., 19.....

.....

Notary Public in and for the
County of.....
State of.....

Note: All members of a firm, or company, must execute the above affidavit.

402. AFFIDAVIT TO ACCOMPANY CORPORATION BIDS.

STATE OF.....
COUNTY OF..... } ss.

..... the .....
(Name of Officer) (Title)

of the corporation whose name is signed and whose seal is attached to the hereto annexed proposal, having first been duly sworn, deposes and says: That the said proposal is genuine and that the same is not sham or collusive; that it is not made in the interest or in behalf of any person not therein named; that ht said bidder has not, directly or indirectly, induced or solicited any other person, firm or corporation to refrain from bidding; and that it has not in any manner sought, by collusion, to secure for itself any advantage over any other bidder.

.....
(President, Secretary or other managing Officer)

of the .....
(Corporation)

Subscribed to and sworn before me this

.....day of....., 19.....

.....
Notary Public in and for the

County of.....

State of.....

Note: The above affidavit must be made by the President, Secretary, or other managing Officer of the corporation submitting the bid.

SECTION 5.

BIDDER'S BOND.

KNOW ALL MEN BY THESE PRESENTS, That we,.....as PRINCIPAL, and .....as SURETY, are held and firmly bound unto the City of....., State of....., hereinafter called the "OWNER," in the penal sum of.....Dollars, lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted to the Owner a proposal, dated....., 19....., hereunto attached, proposing to enter into contract to supply all equipment and furniture, and furnish all labor and material for installing the same, for a Public Library Building at....., for the
(Name of City) (State)
total lump sum of.....Dollars.

NOW THEREFORE, If said proposal is accepted by the Owner, and if the Principal shall faithfully enter into such proposed contract, and shall well and truly perform all the requirements, terms, conditions and covenants of the Advertisement, Collusion Affidavit, and General Conditions of the Contract preliminary and necessary to enter into such contract, and shall furnish Performance Bond adequate and acceptable unto said Owner, then this obligation shall be void; otherwise they remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals this.....day of....., 19....., the name and corporate seal of each corporate party being hereunto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of (SEAL)

(Attest) (Individual Principal)

(Address) (Address)

(SEAL)

(Attest) (Individual Principal)

(Address) (Address)

(SEAL)

(Attest) (Individual Principal)

(Address) (Address)

(Corporate Seal) (Corporate Seal)

(Corporate Principal) (Corporate Surety)

By By

(Name) (Title of Office) (Name) (Title of Office)

(Business Address)

Attest: Attest:

CERTIFICATE AS TO CORPORATE PRINCIPAL.

I,....., certify that I am the.....Secretary of the corporation, named as Principal in the abovebond; that ....., who signed the said bond on behalf of the Principal was then.....of said corporation; that I know his signature, and his signature thereto is genuine; that said bond was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing body.

(Corporate Seal)

.....
Secretary.

INSTRUCTIONS.

1. The date of the bond must not be prior to the date of the instrument for which it is given.

2. The signature of a witness, attesting the signature of each individual party to the bond, shall appear in the appropriate place.

3. If the Principal or the Surety is a corporation, the name of the state in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested under the corporate seal as indicated in the form. If the corporation has no corporate seal the fact shall be stated, in which case a scroll or adhesive seal shall appear in lieu thereof.

4. The official character and authority of the person or persons executing the bond for the Principal, if a corporation, shall be certified by the Secretary or Assistant Secretary, according to the form attached thereto. In lieu of such certificate there may be attached to the bond copies of so much of the records of the corporation as will show the official character and authority of the officer signing, duly certified by the Secretary or Assistant Secretary, under corporate seal, to be true copies.

5. All signatures in the bond shall be uniformly and exactly alike as the same signatures, respectively, in all other instruments for which the bond is given.

6. If the Principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, naming it, and all members of the firm shall execute the bond as individuals.

SECTION 6.

PERFORMANCE BOND.

KNOW ALL MEN BY THESE PRESENTS, That we, ...
..... as PRINCIPAL, and
.....
.....as SURETY, are held
and firmly bound unto the City of....., State of....., hereinafter called the "OWNER," in the penal sum of .....
.....Dollars,
lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That whereas the Principal entered into a certain contract, hereto attached, with the Owner, dated....., 19....., to supply all equipment and furniture and to furnish all labor and material for installing the same, complete, for a Public Library Building at....., ..., for the total lump sum of
(Name of City) (State)
.....Dollars.

NOW THEREFORE, If the Principal shall well and truly perform and fulfill all the undertakings, term, conditions, covenants and agreements during the original term of said contract and any extensions thereof that may be granted by the Owner, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, terms, conditions, covenants and agreements of any and all duly authorized modifications of said contract that may hereafter be made, and the aggregate value of which said modifications shall not exceed a total of twenty-five per centum of the value of the original contract; and shall promptly repair, restore, make good or replace any damage or defects arising or appearing in said contract due to defective workmanship or material for a period of two years after the final completion and acceptance of said contract, and any authorized extension or modification thereof, then this obligation shall be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals this.....day of....., 19....., the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representatives, pursuant to authority of its governing body.

In presence of

(SEAL)

(Attest)	(Individual Principal)
(Address)	(Address)
	(SEAL)
(Attest)	(Individual Principal)
(Address)	(Address)
	(SEAL)
(Attest)	(Individual Principal)
(Address)	(Address)

SECTION 7.

GENERAL CONDITIONS.

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Paragraph	Subject	Paragraph	Subject
701	Information for Bidders.	708	Alterations.
702	Definitions.	709	Infringement of Patent Rights.
703	Equipment Included.	710	Duties of Contractor.
704	Samples to be Submitted.	711	Fabrication.
705	Cuts or Sketches.	712	Delivery.
706	Price.	713	Guaranty.
707	Award of Contract.	714	Payment.

701. **INFORMATION FOR BIDDERS.** Proposal and List of Equipment in duplicate; Collusion Affidavit, and Bidder's Bond, shall be made upon forms herein, Sections 2, 3, 4 and 5 of these specifications. All blanks shall be completely filled out, and the Collusion Affidavit properly sworn to before a Notary Public or other officer legally authorized to administer oaths. These specifications, containing the original copy each of the Proposal, List of Equipment, Collusion Affidavit and Bidder's Bond, acceptable to the Board, in amount not less than ten (10) per cent of the amount of the proposal, as a guarantee that if the proposal is accepted the bidder will enter into contract, shall be inclosed in a sealed envelope, marked on the outside "Proposal for Equipment of Library Building," and name of the bidder, and delivered to the office of the Library Board,.....,
(City)
....., at or before the time set forth in the Advertisement.
(State)

The signature of the bidder occurring in all necessary accompanying documents shall correspond exactly with the signature of the bidder on the proposal form. The duplicate copy each of the Proposal Form and the List of Equipment shall be detached and retained by the bidder for his records. The bidder may substitute certified check, or cashier's check, in amount not less than ten (10) per cent of the amount of the proposal, in lieu of Bidder's Bond if he so desires.

702. **DEFINITIONS.** The term "**Owner**" in these specifications refers to the City of ....., State of.....

The term "**Library Board**" refers to the representative of the Owner, duly and lawfully authorized to enter into contract.

The term "**Contractor**" refers to each and every contractor engaged in any part of the work in these specifications.

703. **EQUIPMENT INCLUDED.** This specification is intended to include everything necessary to complete, according to the List of Equipment, Section 3 of these specifications, and the separate Floor Plan furnished by the Library Board, all fixed and movable equipment or other work called for or described herein.

704. **SAMPLES TO BE SUBMITTED.** Each bidder shall deliver with his proposal to the office of the Library Board one unit of wall book shelving, 7 shelves high, including one paneled and finished end and one intermediate upright, a sample piece or section of table top, a sample piece or section of table leg, a complete library table, a library reading room chair, a card catalogue cabinet and book truck, as called for in the specifications.

705. **CUTS OR SKETCHES.** Each bidder shall submit with his proposal cuts or sketches of such articles of furniture as are specifically called for in the List of Equipment or in the specifications, and which furniture is also shown on the floor plan furnished by the Library Board to each bidder. Sketches will be sufficiently definite to show design, character and detail proposed to be furnished, and if accepted, the sketches will remain on file with the Board. Bidders may, at their option, submit with their proposals cuts or sketches of any or all other articles of furniture for which bids are required by the Advertisement.

706. **PRICE.** Price is to be shown opposite each item on the duplicate List of Equipment, Section 3 of these specifications.

707. **AWARD OF CONTRACT.** In awarding this contract the general utility and appropriateness of design, the workmanship and materials observed in examining the samples, as well as the ability and experience of each bidder adequately to perform the work of the contract, will be considered in connection with the amount of the bid. Each bidder shall be a financially responsible individual, firm or corporation, having had not less than two years' actual, successful experience in manufacturing and furnishing library equipment equal or similar to that specified in these specifications, prior to the advertising and letting of this contract, unless otherwise specified herein. Each bidder shall submit with his proposal a list of libraries or other institutions for which he has recently con-

structed or supplied equipment of the character specified herein. Any bidder contemplating the subletting of any part of the work, if awarded the contract, shall include with his proposal the name or names of firms which are to furnish articles on sub-contract, and the articles to be supplied by each firm.

708. **ALTERATIONS.** The Owner reserves the right to make changes or to alter the dimensions and make such changes in the quantities of work or material as may by it be deemed advisable without notice to the surety or sureties on the bond given to secure compliance with the contract, by adding thereto or deducting therefrom at the prices set forth in the List of Equipment, Section 3 hereof; also to omit portions of the work shown on the floor plan, provided the estimated cost of such changes does not exceed twenty-five per cent (25%) of the total amount of the proposal. The Contractor will not be entitled to any payment or compensation for work thus omitted.

709. **INFRINGEMENT OF PATENT RIGHTS.** The Contractor shall protect and keep the Owner harmless from all actions, judgments and decrees involving the infringement of patent rights, arising from the installation by the Contractor, or his sub-contractors, and shall pay all costs, outlays and expenses, including attorneys' fees incurred by the Owner, in defense of any suits that may be brought for infringement of patents.

710. **DUTIES OF CONTRACTOR.** The Contractor shall, at his own cost—

a. Take all reasonable precautions to protect his work, and shall make good any damage caused to the building by his workmen, but he shall not be responsible for damage caused to his work by other workmen or contractors.

b. Lay out all work, and alone be responsible for the correctness of all dimensions, which must be carefully verified at the building.

c. Clear and remove from the premises all dirt and surplus material at the completion of his work.

711. **FABRICATION.** All work installed by this Contractor shall be fabricated, as nearly as possible, outside the building.

712. **DELIVERY.** The equipment covered by this specification, and shown on the floor plan, is to be delivered, installed, and completed ready for use, subject to the approval of the Library Board or its authorized representatives.

713. **GUARANTY.** The contractor must furnish satisfactory bond, on form provided in Section 6 of these specifications, in amount not less than twenty-five per cent (25%) of the total amount of this contract, guaranteeing all work for a period of two years after the acceptance of the contract. Any warping, splitting, coming apart of veneers, or any other defects of any nature whatsoever occurring in that period must be made good by the Contractor, without cost to the Library Board, unless such defect is due to some exceptional cause and is clearly not due to inferior material or inferior construction methods used in the manufacture of this equipment.

714. **PAYMENT.** Upon delivery and acceptance, by the Owner or the Owner's authorized representative, of the equipment included in this contract, seventy-five per cent (75%) of the contract price shall become due and payable immediately to the Contractor. The final payment, being the remaining twenty-five per cent (25%) of the contract price, shall be made thirty-five days after such delivery and acceptance.

SECTION 8.

WOOD EQUIPMENT.

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Paragraph	Subject
801	Materials.
802	Construction.
803	Sanding.
804	Finishing.
805	Hardware.
806	Chairs.
807	Call Slip Trays.
808	Sorting Tray.
809	Book Trucks.
810	Tables.
811	Bulletin Boards.
812	Charging Desk.
813	Flat-top Desks.
814.	Wall Shelving and Double-Faced Shelving.
815	Book Cases with Glass Doors to Lock.
816	Cupboards in Club Room.
817	Picture Book Tables in Juvenile Room.
818	Moveable Typewriter Stand for Office.
819	Book Display Racks.
820	Atlas and Dictionary Case.
821	Card Record Cabinets.
822	Newspaper Rack with Holders.
823	Glass Exhibit Case.
824	Magazine Indices Table.
825	Picture Collection and Pamphlet Filing Cabinets.
826	Magazine Racks with Bulletin Board.
827	Card Catalog Cabinets on Leg Bases.
828	Hanging Map Case with Rollers.
829	Office Filing Cabinet.
830	Umbrella Rack.
831	Cupboards and Wall Shelving in Librarian's Office.

801. MATERIALS. The Contractor shall provide for the above work woods of various kinds, selected from old, thoroly air-dried seasoned stock, free from all imperfections, and perfectly kiln dried to a moisture content not to exceed five per cent (5%) moisture. All such kiln dried material must be allowed to cool gradually before being cut and must be kept in a uniformly dry atmosphere during the entire progress of the work.

Each bidder is required to submit in writing aconcise description of the method used in drying all woods used. The Owner reserves the right to have all material tested for moisture content, at the kiln or in the shop, and all material not conforming to the specifications will be rejected.

All exterior finished surfaces shall be constructed of selected Eastern American quarter-sawn white oak, the grain selected for uniformity of color, texture and figure. All oak shall be selected Eastern American, altho such description may not appear, in describing every item. All oak veneers shall be sawn, no veneer being less than 1/20 inch, nor more than 1/16 inch, in thickness.

All unexposed woods used in the construction of the work shall be thoroly seasoned, kiln dried white pine, poplar, or white cedar, except as may be hereinafter specified.

The materials for finishing shall be the best of their respective kinds. Shellacs shall be cut or thinned with alcohol. Water stain shall be the Bridgeport Wood Finishing Company's or equal.

802. CONSTRUCTION. All cabinet work shall be framed and constructed in the most approved and substantial manner known to the cabinet maker's trade. All mouldings shall be sharply cut and perfectly mitred at the corners.

All large panels shall be built 3- or 5-ply construction with chestnut, white pine, butternut, birch or similar wood cores thoroly air-dried and seasoned, free from knots, shrinks, and checks, and put in with the best grade of glues. Framework shall have mortise and tenon joints perfectly glued. Mitres where necessary shall be doweled or splined and thoroly glued.

All panel work shall be blind mortised. All panels shall be grooved into stiles and rails, and have sufficient allowance for expansion.

All veneered work shall have laminated old soft wood cores, thoroly kiln dried, seasoned and put in with the best of glue. All veneering shall also be secured to the cores with best quality of glue. All joints between the pieces of veneering forming single panels or surfaces shall be perfect hair-line joints showing the lines of such jointure only by the grain of the wood. Exposed end wood will not be permissible on any of the table or desk tops.

803. SANDING. All material of every description shall be thoroly hand-smoothed and thoroly hand sandpapered to remove all traces of machine or mill marks. This work will be done so as not to destroy the sharp edges or mar the character of the detail in any particular. All flat surfaces shall be scraped and sandpapered with the grain of the wood to a perfectly even and smooth surface before finishing. Work showing cross-sanding will not be acceptable. If panels and flat members are run thru the sandpapering machine they shall afterwards be hand-scraped and hand-sandpapered before finishing.

804. FINISHING

a **Sample of Finish:** Sample of finish proposed to be used shall be furnished by this Contractor for approval by the Owner. When approved, the sample shall be cut in half, one half of the

approved sample being retained by this Contractor and the other by the Owner for comparison when the job is completed.

b. **Staining.** All exposed wood shall be stained a color desired by the Owner. Special color of finish required.

c. **Filling.** After the stain has been applied prepare the wood for filling by sanding down the grain thoroly and clean surface of all dust or dirt. All work shall be filled with the very best filler to obtain the shade or color desired by the Owner or its representatives. After the filler has dried sufficiently, it shall be thoroly rubbed into the wood to fill all pores and wiped off, care being taken to see that all corners and angles are wiped out perfectly clean. Any difference in color of the wood shall be corrected by carefully retouching.

The work after being filled will stand until the filler is thoroly hard, when it shall be given one coat of pure alcohol shellac, or the Grand Rapids Varnish Company's "Michalac," or equal. When this shellac is thoroly dry, all parts of the work shall be sandpapered to a perfectly smooth surface. Best grade varnish may be used in place of shellac.

d. **Varnishing.** All work shall be carefully dusted before the varnish is applied The varnish shall be applied, as far as possible, with woodwork in horizontal position. The first and second coats of varnish shall be rubbed to an even surface, thoroly smoothed, before applying the last coat, and each coat shall be given sufficient time to harden before the next is applied. Varnish shall be spar varnish or equal.

The finish coat shall be thoroly rubbed down with pumice stone and oil to an even, dull, flat egg-shell surface after which it shall be thoroly cleaned and wiped off, removing all traces of oil and pumice stone from the work. The final coat of varnish shall be allowed sufficient time to harden, so that the oil rubbing can be done without causing lumping or marking of varnish due to heating, and all rubbing will be uniform so that all parts shall have the same surface and transparency.

e. **Retouching.** After being set in place, the woodwork will be carefully gone over and cleaned and touched up at the joints and surface where necessary.

805. **HARDWARE.** The Contractor for this work shall furnish all the necessary hardware for the completion of his work. All hardware must be of the best of its kind of genuine cast bronze, finished to correspond with the hardware of the building, unless otherwise approved by the Board or its representatives. All hardware must be the best Yale and Towne or the Corbin make. All locks shall be furnished with the same key number thruout this contract, except for umbrella rack, paragraph 830.

806. **CHAIRS.** All chairs shall be of designs to harmonize with the general character of the other furniture of the Library, and finished the same as other furniture. All chairs shall be saddle seat design. All leg design chairs, except Windsor chairs shall be fitted with at least two cross rails underneath for hat rack. Adult Windsor chairs shall be Derby No. 6695 or approved equal. Children's chairs shall be specially made, and not adult chairs with legs sawed off.

Juvenile library chairs shall be of the same type and design as adult chairs, but must be of the correct respective size for children, as to height of back, depth and width of seat, width of back and height of seat from the floor corresponding to the different heights of the children's tables specified. Heights of chairs in Juvenile Room shall be as specified in Section 3, "List of Equipment." All chairs shall be made of selected Eastern American quarter-sawn white oak; all joints shall be properly framed, glued and screwed, legs to be substantially braced. All chair seats shall be supported on substantial full box frames made up of about ⅞x2-in. stock, thoroly screwed and glued together, with four corner blocks glued and screwed to the frame. All chairs of leg design shall be fitted with "Drake" metal and rubber glides, or equal, on bottom of chair legs, of diameter not less than the diameter of the bottom of the chair leg such that will not split the edges of legs. All swivel chairs shall be equipped with casters "Perfect" No. 50-D.

Each bidder shall submit with his bid a sample library chair showing design, construction, workmanship, and finish, that he proposes to furnish. All chairs furnished to be equal to sample submitted.

807. **CALL SLIP TRAYS.** Call slip trays shall be constructed of selected quarter-sawn white oak, capacity about 200 to 300 small slips, with felt on tray bottoms. (This item is not usually shown on floor plan.)

808. **SORTING TRAY.** Sorting tray shall be constructed of selected quarter-sawn white oak. Outside dimensions about 2⅝ inches high, 5½ inches wide, 8½ inches long, for cards 3 inches high by 5 inches wide, with four partitions crosswise, making five compartments, each about 1⅝ inches front to back. (This item is not usually shown on the floor plan.)

809. **BOOK TRUCKS.** Body of book trucks shall be 30 inches long, three shelves high and constructed of solid selected quarter-sawn white oak of design to harmonize with other furniture and constructed in a workmanlike manner. Wheels to be equipped with rubber tires or approved fibre or fabric tires. One swivel wheel shall be placed at each end of the truck and two fixed wheels in the center of truck; the two swivel wheels shall have ball-bearing swivels. All four wheels shall have ball-bearing or roller bearing axles and shall be about 5 inches in diameter. Submit samples of book truck with bid, if available; if not, a detailed drawing or a photograph of the book truck proposed to be supplied shall accompany the proposal.

810. **TABLES.** Tops of all library tables shall have cores built up in strips of old, air-dried and thoroly kiln-dried white pine, birch or best grade core chestnut. The top and all exposed surfaces of the tables shall be veneered with the most carefully selected quarter-sawn Eastern American white

oak veneer, selected for matching of the figure and grain. Tops shall be 5-ply. Each top shall be made from veneer of the same flitch to insure a perfect match of texture, figure and color. Edges of tables shall be of selected solid quarter-sawn white oak securely joined to the core and veneers. No exposed end wood or edge wood will be permissible in the table tops. The greatest care and skill known must be used in the construction and materials of all table tops.

Table tops of all tables shall be not less than 1-7/16-inch in thickness at any point. Tables in Adult Room shall be 30 inches high. Tables in Juvenile Room shall be of heights specified in Section 3, "List of Equipment."

Particular attention must be given to knee space between top of chairs for all children's tables, and underside of apron to which legs are fastened, to see that sufficient knee space has been provided. Legs shall be substantially attached to rails of tables. Aprons of rectangular tables shall be about ⅞-inch in thickness solid quarter-sawn oak.

Cast bronze sockets or feet shall be fitted over the ends of all table legs. The sockets shall be about 2 inches high from floor to top of socket. Sockets shall be designed so as not to make a depression in linoleum.

All legs of tables shall be built up on solid soft wood cores properly tapered, and constructed in the best manner possible, and show quarter-sawn Eastern American white oak faced on all four sides. All tops must be securely fastened to frame or legs of tables in a most approved manner.

Linoleum top on table in Work Room shall be not less than full ¼-inch in thickness and shall be treated to prevent absorption of dirt and ink stains. Provide two drawers with locks in Work Room and in table for Club Room.

Each bidder shall submit with his bid a full thickness, good-sized sample section or piece of table top he proposes to furnish, showing the oak veneer, and the construction of the core ends and sides of the table top; also a sample piece or section of table leg showing construction. In addition to sample piece or section of table top, each bidder shall submit with his bid a sample table, complete, upon which his bid is based.

811. **BULLETIN BOARD.** The wall bulletin boards shall have frames constructed of selected Eastern American quarter-sawn white oak, corners mortised and tenoned together, with butternut, white wood or other suitable wood back securely fastened to the oak frames. Panel shall be covered with light brown or tan cork linoleum ¼-inch in thickness, securely glued to the panels which must be carefully constructed so they will not warp.

812. **CHARGING DESK.** Charging desk front, sides and exposed ends of wings shall be paneled. All panels must be thoroly framed together with mortise and tenon joints, thoroly glued; frame work to be of perfectly matched and carefully selected Eastern American quarter-sawn white oak. All panels shall be 3-ply, with cores of chestnut, white pine, butternut, birch or other suitable wood, cross-banded with 1/20 inch veneer and faced on both sides with quarter-sawn white oak veneer. The front of the panel shall be carefully selected for beauty and uniformity of color and texture. The back of the panel to be faced with quarter-sawn white oak veneer of same thickness as the face, but not necessarily of selected wood. The greatest care and skill known must be used in construction and material of charging desk top. All exposed work at back of desk to be of selected Eastern American quarter-sawn white oak, and to be finished in the same manner and as well as the front of the desk.

Furniture contractor shall provide and install a battleship linoleum base for mop board approximately 6 inches high, having an oak cap along the entire outside front, sides and across the two rear ends of desk. Battleship linoleum base shall be the same thickness and color as used for floor covering in this building.

Top of desk to have 12 slots approximately 6 inches wide by ¾-inch deep cut thru it so that book checks can be dropped into drawers below. Linoleum top to be neatly fitted around holes.

Charging desk shall be 39 inches high from floor to top of desk. The 3 front wings shall be 24 inches deep front to back across the top. The two rear wings shall be 21 inches deep front to back across the top. Clear space inside desk to be 13 ft.-3 in. deep by 6 ft. deep.

Top of charging desk shall have cores built up in strips of old, air-dried and thoroly kiln-dried white pine, birch or best grade chestnut 5-ply construction. Core strips shall be tongue grooved and glued together, allowed to stand until thoroly dried and shall then be straightened and placed until perfectly true and even in thickness. All edge joints or butt joints, where such joints are necessary, shall be closely doweled or tongue grooved together. Top of desk shall be covered with battleship linoleum of a color to be selected, 3/16-inch thickness. The top surface of the battleship linoleum shall be specially treated to prevent absorption of dirt and ink stains. The battleship linoleum top shall be securely glued to the top of the charging desk. All edges of desk top shall be banded with selected quarter-sawn white oak strips not less than ¾-inch in thickness. The battleship linoleum top shall be set in flush with the edge of oak banding. Charging desk top shall be not less than 1¼ inches in thickness at any point.

When behind the charging desk facing front, the left rear wing to have one box drawer approximately 5½ inches high by 19½ inches wide by 16 inches deep inside measurement, fitted with Yale lock. Below to be an open shelf compartment, approximately 20 inches wide, 25¾ inches high, and full dept of desk, front to back. Fitted with one adjustable and one base shelf. The shelf shall be adjustable every inch in height. Toe space below. To the right, directly under desk top, put in one supplies drawer, on roller bearing extension slides, having sides 4 inches high, with crosswise and lengthwise removable partitions making 15 compartments each 5¾ inches high, 3¼ inches wide by 3 inches deep. Drawer to be approximately 13¼ inches wide by 15½ inches deep, inside measurement. Directly to the right of the supplies drawer, and directly under the desk top, shall be a plain box

drawer approximately 5¾ inches high, 21 inches wide by 15½ inches deep, inside measurement, to contain 2 removable trays for cards 3 inches wide by 5 inches high and two removable trays for cards 5 inches wide by 3 inches high, each tray fitted with hand holes and followers. Beneath the above two drawers shall be an open shelf compartment approximately 34 inches wide by 24 inches high, and full depth of desk front to back. This compartment to have one shelf adjustable every inch in height,, and one base shelf. Toe space below base shelf.

The left front corner of desk to consist of open shelf compartment approximately 18 inches wide, 32½ inches high by full depth of counter front to back, fitted with one shelf on adjustable 1-inch centers. Base shelf cut out for waste basket. Toe space below. Right front corner same as left front corner.

To the right of left front corner directly beneath the desk top put in one drawer approximately 16 inches wide by 5¾ inches high by 21¼ inches deep inside. One side of drawer to be fitted with removable partitions to make 6 compartments 7 inches wide by 5¾ inches high by 2½ deep, clear. These compartments located beneath slots in counter top and to take book checks dropped thru slots; balance of drawer for storage space.

Below this drawer provide 5 openings 3⅝ inches high by 3 ⅜ inches wide, four openings 5 inches deep, one opening 10 inches deep. Below openings one open compartment containing one adjustable shelf.

To the right of the book check drawer, below top provide one pencil drawer full width of opening, drawer 3 inches high in clear and full depth. Fit with pencil trays. Knee space compartment below to have one adjustable knee space shelf 10 inches deep and one adjustable foor rest rubber covered.

To the right of knee space beneath top draw put in one cash drawer approximately 17 inches wide, 4⅛ inches high by 21¼ inches deep inside on roller bearing slides, fitted with 6 coin bowls at front and two compartments for currency placed end to end directly back of coin bowls and a removable partition 4 inches from back of drawer. In the same compartment and to right of cash drawer, provide 1 book check drawer same as in previous compartment except only 8 inches inside. Below to be open compartment fitted with 1 adjustable shelf and base shelf. Toe space below.

Right wing to contain open shelf compartment approximately 20 inches wide by 32 inches high and full depth of counter with 2 adjustable shelves and base shelf, toe space below. End section in right wing to be made with top cut out providing typewriter space 9 inches high and full width and depth. Below this one box drawer approximately 3 inches high by 31 inches wide, by full depth of counter. Space below open for knee space.

Special steel charging truck required to hold the charging trays for use at the..... ..... - ....Public Library.

This truck to be made with posts of 1 inch round tube reinforced both ways, mounted on 5 inch swivel ball bearing casters with rubber tired wheels, steel top, fitted with stops to hold twelve sloping tin trays divided into 12 compartments in depth, for cards 2 inches wide by 5 inches high. Steel base to be provided with steel sliding shelf on left hand side projecting 16 inches when full extended. Base to be adjustable in height.

Steel base to be finished olive green of approved shade.

Bidders shall submit a sketch of charging desk showing front and interior details with proposal. Sketch showing all details of charging desk shall be approved by Librarian before being manufactured.

813. **FLAT TOP DESKS.** Flat top desks approximately 34 inches x 55 inches for attendant in Adult Reading Room, Juvenile Room, and Librarian's office shall be constructed of selected Eastern American quarter-sawn white oak. Tops shall be of 5-ply construction showing quarter-sawn oak on all edges and of design, construction, workmanship and finish to harmonize with the other library furniture, with quarter-sawn oak showing on all four sides of each leg. Desks shall be fitted with three drawers on one side of knee space, one pen tray drawer above knee space; other side of knee space shall have one drawer at top and one vertical legal drawer below.

Desks shall be provided with locks.

Bronze sockets on end of desk legs shall match the general hardware.

All desks shall have back panels closing the backs.

814. **WALL SHELVING AND DOUBLE-FACED SHELVING.** All high and low back shelving shall be built to accurate measurements taken at the building by this Contractor. It must be built to fit perfectly, where it connects with walls and columns, and at all window and door openings. Depth of shelves shall be in accordance with floor plan or list of items. The wall shelving in the Adult Reading Room, all wall and double-faced shelving in Stack Room, and wall shelving in Work Room, shall be approximately 6 feet 10 inches high. The high wall shelving is to have six adjustable shelves and one base shelf, making seven shelves high in all. The wall shelving in the Juvenile Room shall be approximately 5 feet high, and have four adjustable shelves and one base shelf, making five shelves high in all. One unit of 12-inch shelving in Adult Reading Room, as and if indicated on plan, for Bound Music laid flat, shall have sixteen adjustable and one base shelf, making 17 shelves in all.

Corner fillers shall have tops of same material as tops of adjacent shelving and finished same as shelving.

All exposed parts of the wall and double-faced shelving shall be constructed of selected Eastern American quarter-sawn oak. All intermediate uprights shall be of white oak not less that 13/16 inch in thickness. The several exposed ends of wall and double-faced shelving shall be selected quarter-sawn white oak approximately 1-3/16 inches in thickness, and constructed with simple moulded panels. All shelving shall be built on a "knock down" principle, in sections or units, each approximately 3 feet wide on centers between uprights. Tops of shelving shall have a flat front surface, high enough

to allow for case labels if same are desired. All shelves shall be oak faced, constructed of white pine, poplar, white cedar or similar wood, and to be not less than 13/16 inch in thickness. Shelves shall be recessed for metal pins and self adjustment. Device or pin used for shelf adjustment shall be submitted to the Librarian for approval, before being installed. All tops and bases must be securely fastened to uprights at top and bottom. The tops of all high shelving approximately 6 feet 10 inches high shall be of oak and finished on the under side, and the tops of all low shelving approximately 5 feet high shall be quarter-sawn oak and finished on the top side. All uprights shall be bored and fitted with pins for 1 inch vertical adjustment of shelves Holes in uprights must not be bored more than ⅝-inch in depth, the holes on opposite sides of the inner uprights being offset at least ½-inch.

Front or face of all bases of wall and double-faced book shelving shall be of the same height as the base of the building, constructed of soft wood, to which will be attached linoleum or similar base by another contractor. All uprights of shelving and glass door bookcases shall have bases cut flush with face for attaching linoleum or base for mop board and oak moulding by another contractor.

This Contractor shall provide openings in face of bases of book shelving where indicated on floor plan to receive louvres for heating and air conditioning systems, installed by the heating contractor. Approximate louvres shown on floor plan should be checked for exact locations by this Contractor, to insure that satisfactory provision has been made in bases of shelving to receive louvres. See paragraph 704 regarding sample required to be submitted.

815. **BOOKCASES WITH GLASS DOORS TO LOCK.** Bookcases with clear glass doors to lock will be provided, if and where shown on floor plans, keyed, and constructed similar to wall shelving except to have substantial wood backs, the inside of which shall be finished to match the oak. Bookcase approximately 5 feet high in Juvenile Room to have 4 adjustable and 1 base shelf, making 5 shelves in all. Tops to be constructed of oak and finished.

Bookcase approximately 6 feet 10 inches in Adult Reading Room shall have 6 adjustable shelves, and 1 base shelf, making 7 shelves high in all. Bases of bookcases shall be made similar to wall shelving bases to receive linoleum base and cap moulding, both to be furnished and installed by another contractor.

Bookcases shall be approximately 12 inches deep outside front to back and approximately 10 inches deep inside front to back.

816. **CUPBOARDS IN CLUB ROOM.** Provide paneled double door cupboards to lock in Club Room if and as shown on floor plan. Cupboards shall be constructed similar to wall book shelving. Cupboards to be approximately 5 feet high by 10 inches deep outside front to back. Provide 4 shelves adjustable every inch in height and 1 base shelf, making 5 shelves high in all with finished oak top and exposed end paneled and finished. Cupboard doors shall be paneled and constructed as specified under "Construction" paragraph 802 of this specification. Fasten cupboards securely to wall.

817. **PICTURE BOOK TABLES IN JUVENILE ROOM.** Sloping top picture book tables for Juvenile Room shall be constructed same as specified for other work. Sloping top shall be approximately 14 inches high by 6 feet 6 inches wide by 24 inches high from floor to lowest ends of table top. Tops of 5-ply construction, same as specified for library tables, and approximately ¾ inch in thickness. Provide raised strip along lower edge about 1 inch high to prevent books from sliding off tables. These tables shall have solid pedestal ends approximately 1¼-inch in thickness, 5-ply built-up construction same as specified for library table tops.

818. **MOVEABLE TYPEWRITER STAND FOR OFFICE.** Moveable typewriter stand for use in Office shall have top adjustable as to height with iron stand on wheel base and oak top approximately 15 inches square finished to match other furniture. Top shall have one pull out sliding and one drop shelf. Stand shall be easily wheeled about the building.

Typewriter stand shall be the No. 2 Ext. "Satellite" made by the Adjustable Table Company, Grand Rapids, Michigan, or equal.

819. **BOOK DISPLAY RACKS.** Book display racks shall be of suitable design and construction to harmonize with the other equipment.

Pedestal ends of racks shall be 5-ply construction, same as specified for table tops and shall be approximately 1-¼ inch in thickness. Base member of horizontal grain.

The rack in Juvenile Room shall be arranged with one sloping shelf or trough for books, shelf to be pitched at an angle so that the titles on the backs of the books will be readily seen. Light brown or tan cork linoleum bulletin surface ¼ inch in thickness shall be approximately 4 inches high by 30 inches wide at top. Provide an extra full width horizontal shelf 30 inches from floor. This shelf shall be 8 inches deep front to back. Each shall be approximately 45 inches high.

The rack in Adult Reading Room approximately 5 feet high by 4 feet wide shall be constructed same as specified for rack in Juvenile Room except that that there shall be two troughs for books and the cork linoleum bulletin board shall be approximately 12 inches high and 44 inches wide. Omit 8-inch horizontal shelf 30 inches from floor.

Submit sketch of both display racks with bid.

820. **ATLAS AND DICTIONARY CASE.** Atlas and dictionary case shall be constructed of selected Eastern American quarter-sawn white oak, finished on all sides, to have sloping top and stand about 43 inches high from floor at back and about 39 inches high at front. Six sliding or pull out shelves evenly spaced underneath. Each shelf shall be about 3 inches in clear between shelves, lowest shelf about 15 inches above floor, and cast bronze handle on the front endge of each pull out shelf. Top

of stand to be 30 inches wide, by 27 inches deep. Ends of case shall be solidly built up 5-ply, same as specified for table tops, with base member of horizontal grain. Ends shall be not less than 1-⅛ inch in thickness.

821. **CARD RECORD CABINET.** All exposed parts of the card record cabinets shall be constructed of selected quarter-sawn white oak, with selected oak finished backs, all framing mortised and glued in the same manner as heretofore specified for other work. All ends or large panels shall be built up on white pine, butternut or other suitable cores and veneered with the best selected veneer. All tray sides and bottoms shall be made of selected cherry, birch, or other similar wood. All trays must be blind dovetailed to the front, dovetailed at back, and put together and glued in the most substantial manner and shall be interchangable one with the other. Trays shall be made for reception of the regular standard size registration cards. Trays shall be approximately 17 inches deep outside front to back. All trays shall be fitted with sliding or adjustable compressors. Each tray of one of the 15-tray units shall be fitted with a screw thread rod to pass thru holes in lower margin of record cards. No rods in the other 15-tray unit. Hardware shall be solid cast bronse or brass finished to match general hardware of the building.

Each of the two card record cabinets shall be unit or sectional construction and each shall contain 15 trays, preferably arranged three trays high by five trays wide with each leg base approximately 24 inches high having bronze feet same as specified for library tables and with tops removable.

Each card record cabinet to be of same height as charging desk, viz. 39 inches.

822. **NEWSPAPER RACK WITH HOLDER.** Newspaper rack shall consist of 1 unit or section of 10 inch depth wall book shelving approximately 6 feet 10 inches high into which shall be fitted the pair of newspaper racks. Capacity of rack to be 8 newspaper files or holders, which are to be furnished by this Contractor. Two horizontal book shelves approximately 10 inches high in clear at top shall be provided. Each file or holder be approximately 3 feet long and made to accommodate six newspapers or issues to each file. Handle shall be provided on one end of each file. Holder shall be arranged in rack to display as much of the title of newspaper as possible.

823. **GLASS EXHIBIT CASE.** Glass exhibit case shall be substantially constructed to withstand moving about from room to room and elsewhere on truck as occasion demands. Exhibits in case shall be easily accessible. Frames shall be constructed of metal or wood and metal and finished to harmonize with the other furniture. Leg bases shall be constructed same as specified for legs of library tables showing quarter-sawn oak on all four sides of each leg and bronze feet. Bases shall be strongly constructed to withstand the extra weight of glass, metal frames and exhibits.

Exhibit case shall be insect, moisture and dust proof.

Exhibit case shall have plate glass ¼ inch in thickness on all four sides and top

Decks or bottoms of exhibit case shall be constructed of 5-ply wood or of approved non-warping material and finished.

Top exhibit case shall have a lid or cover hinged with a continuous or piano type hinge along one side to enable entire cover to be raised for frequent changes in exhibits. Provide substantial supports to hold cover in a raised position when changing exhibits.

Lid or cover shall be fitted with a Yale lock or equal, having inconspicious lock inset in the metal frame, keyed to same number as all other locks in this contract. Exhibit case shall be approximately 28 inches by 60 inches by 12 inches high on leg base 28 inches high, fixed with cast bronze sockets similar to those specified for "Tables," paragraph 810 of these specifications.

824. **MAGAZINE INDEXES TABLE.** The magazine indexes table size 2 feet by 3 feet by 30 inches high shall have table top not less than 1-⅛ inch in thickness, and shall be constructed same as specified for library tables except with book rail, with cast bronze sockets or feet on ends of table legs, as specified for library tables.

825. **PICTURE COLLECTION AND PAMPHLET FILING CABINETS** Picture collection and pamphlet filing cabinets shall be constructed of selected Eastern American quarter-sawn white oak, finished all sides, and designed to harmonize with other furniture. Cabinet shall have three legal size drawers one above the other, each approximately 10½ inches high, 15½ inches wide, by 24 inches deep inside front to back with sliding or adjustable compressor or follower in each drawer. All drawers shall be mounted on ball bearing or roller bearing extension steel slides to insure that heavily loaded drawers will move easily in and out of the cabinet. Provide one pair of detachable paneled sides or ends for each range of cabinets in order to add other units, as growth requires Backs of cabinets shall be oak paneled and finished as backs are exposed to public. Cabinets shall be mounted on leg bases about 5½ inches high with bronze sockets or feet on end of leg bases, as specified for legs of library tables, or solid glass leg bases 5½ inches high.

826. **MAGAZINE RACKS WITH BULLETIN BOARD.** Magazine rack in Adult Room shall be constructed of selected Eastern American quarter sawn white oak. Magazine rack shall be approximately 5 feet high, 4 feet wide, and 23 inches deep front to back, having eight solid oak partitions forming pockets or compartments graduated in height. Ends shall be approximately 1-⅛ inch thickness, solid 5-ply construction similar to construction specified for library table tops. Magazine rack in Juvenile Room shall be constructed of selected Eastern American quarter-sawn white oak, with five pockets or compartments graduated in height with slat oak partitions arranged to display as much of the covers of magazines as possible. Rack shall be approximately 3 feet 6 inches high, 24 inches wide by 13 inches deep front to back with solid oak base and ends. Provide wall bulletin board over magazine rack in Juvenile Room, approximately 1 foot 6-½ inches high.

827. **CARD CATALOG CABINETS ON LEG BASES.** All exposed parts of the sectional card catalog cabinets shall be selected quarter-sawn white oak, with selected oak finished backs with all framing mortised and glued in the same manner as heretofore specified for other work. All ends or large panels shall be built up on white pine, butternut, or other suitable cores and veneered with the best selected figured veneer. All tray fronts of selected quarter-sawn white oak shall match other work. All tray sides and bottoms shall be made of selected cherry, birch or other similar wood. All trays must be blind dovetailed to the front, dovetailed at back, and put together and glued in the most substantial manner. Card catalog cabinets shall be constructed same as specified for Card Record Cabinets back of Charging Desk. Trays shall be made for the reception of the regular standard size catalog cards. Every tray shall be fitted with a round screw-thread rod to pass thru holes in lower margin of catalog cards. Provide a combination label holder and pull on outside of each tray front.

Hardware shall be solid cast bronze finished to match the general hardware.

Each card catalog cabinet shall be unit or sectional construction mounted on leg base with removable top. Leg base shall be approximately 24 inches to 26 inches high from floor to top of base. Each unit of the card catalog cabinets shall contain 15 trays arranged three trays high by five trays wide.

Leg Bases for catalog cabinets shall be fitted with bronze sockets or feet of cup design as specified for legs of library tables. Submit sample card catalog cabinet with bid.

828. **HANGING MAP CASE WITH ROLLERS.** The hanging map case or hood with six rollers shall be constructed of selected Eastern American quarter-sawn white oak and to be securely fastened to wall. Provide six Hartshorn spring map rollers or equal to be fitted into the case. Case shall accomodate maps 7 feet in length inside. Oak ends of case or hood to be about ⅞ inch thickness; inside back of case shall be 3-ply oak and finished. Closed top. Case shall have simple moulded cornice. Submit sketch with bid, showing end view of rollers in case.

829. **OFFICE FILING CABINET.** The office filing cabinet shall be constructed of selected Eastern American quarter-sawn white oak, finished all sides and designed to harmonize with other furniture, with four legal size drawers one above the other, each approximately 10½ inches high, 15¼ inches wide, by 24 inches deep inside front to back. Sliding or adjustable compressor or follower shall be provided with each drawer. All drawers shall be mounted on ball bearing or roller bearing extension steel slides to insure that heavily loaded drawers will move easily in and out of the cabinet. Provide a pair of detachable paneled sides of ends so that other units may be added as growth requires. Back of cabinet shall be paneled and finished. Cabinet shall be mounted on leg bases about 5½ inches high with bronze sockets or feet on ends of leg bases, as specified for legs of library tables, or solid glass leg bases 5½ inches high.

830. **UMBRELLA RACK.** Oak umbrella rack approximately 29 inches high shall contain 12 compartments. Size of rack approximately 13 inches by 36 inches. Provide copper drip pan for rack. For each compartment provide locking device with3 keys for each lock. Keys removable from lock only when umbrella is in the compartment and the latter is locked. All locks keyed separately.

831. **CUPBOARDS AND WALL SHELVING IN LIBRARIAN'S OFFICE.** Sections of cupboards, and wall shelving in Librarian's office shall each have one adjustable shelf and one fixed shelf at top and below to have a double door cupboard with paneled doors containing two adjustable shelves and one base shelf. Construction shall be as specified for "Wall Shelving and Double-Faced Shelving" paragraph 811 of this specification. Provide base to receive linoleum base and oak cap moulding to be installed by another contractor.

SECTION 9.

STEEL SHELVING AND BOOK STACKS.

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901. **SCOPE OF WORK.** The work shall include all material and labor to complete the installation of steel shelving and book stacks, all as shown on drawings and described in these specifications.

All steel columns shall be of sufficient strength to carry safely one additional tier to be added at a later date. All tiers shall be 7 feet 6 inches high from floor to floor of tiers. All shelves shall be 8 inches deep, except where otherwise shown on drawings or specified in these specifications.

Electrical work is not included in this contract. Provisions must be made however for laying conduits prior to pouring the concrete floors, where such floors are shown on plans.

Before submitting proposal each bidder shall carefully examine all drawings relating to the work and shall become fully informed of its extent and character, and its relation to other work in the building. No consideration will be granted for any alleged misunderstanding of materials to be furnished or work to be done, it being understood that the submission of a proposal is an agreement to all items and conditions referred to herein, or indicated on the accompanying drawings.

902. **QUALIFICATION OF BIDDERS.** Each bidder shall be a financially responsible individual, firm or corporation, having had not less than ten years' actual, successful experience in manufacturing and installing steel shelving and book stacks equal or similar to those specified in these specifications, prior to the advertising and letting of this contract. Each bidder shall submit with his proposal a list of libraries or other institutions for which he has supplied equipment, and/or installed the same, of the character specified herein, during the past two years.

903. **SHOP DRAWINGS.** Prior to the installation of any of the steel shelving and books stacks specified herein the contractor shall furnish to the Architect, in duplicate, for his approval and correction, such shop drawings as may be required for the proper completion of the work. The contractor shall make such corrections as may be necessary, and then submit revised prints until final approval of the shop drawings is made by the Architect.

904. **ALTERNATES.** Bidders may submit with their proposals alternate specifications and drawings, in detal, for consideration and checking when the proposals are opened. Such alternate specifications and drawings shall comply in every respect with the requirements of these specifications as to strength and other details.

905. **GUARANTY.** This contractor shall guarantee his work for a period of two years after completion and acceptance thereof, and must furnish satisfactory bond on form provided in Section 6 hereof, in amount not less than twenty-five (25%) of the total amount of this contract, all as set forth in Paragraph 713 of these specifications.

906. **MATERIALS.** All materials shall be of the best quality obtainable. Sheet steel forming the various parts of the work shall be of the quality known as "Metallic Furniture" stock, American Open Hearth, cold rolled, re-annealed and full pickled, or equivalent. All gauges shall be U. S. Standard.

All structural steel members shall conform to the standard Specifications of the American Society for Testing Materials for Structural Steel for Buildings.

907. **WORKMANSHIP.** The workmanship shall be of the best quality thruout. All fitting, welding, flanging and riveting operations shall be done in a neat, workmanlike manner. Framing members must be straight, and all parts securely aligned and bolted. Ends of connection angles shall have rounded or hexagonal heads, and hexagonal nuts. An ordinary structural steel job will not be accepted. Exposed portions of uprights, shelves, etc., coming in contact with books shall have smooth surfaces to prevent abrasion of the backs.

908. **FINISH.** The finish of the steel work shall be of the very highest grade, standard olive green in color unless otherwise specified on plan. Each part shall be thoroly cleaned in a chemical bath to remove all grease, oil and dirt. The steel shall be wiped dry, and all rust and dirt removed. Parts then shall be given a coat of enamel of the proper color, which shall then be baked at a temperature of 300 degrees Fahrenheit not less than one hour. Paneled surfaces shall then be sanded, and any scratches or minor defects in the surface shall be covered with a heavy coat of paste filler, rubbed in and scraped off flush with the surface of the work. A second coat of enamel shall then be applied and baked on as before. In all cases the finish produced must withstand rigid hammer test without flaking.

909. **WALL SHELVING AND DOUBLE-FACED SHELVING.** All high and low book shelving shall be built to accurate measurements taken at the building by this contractor. It must be made to fit perfectly where it connects with walls and columns, and at all window and door openings. Depth of shelves shall be in accordance with floor plans or "List of Equipment." Wall shelving in the Adult Reading Room and in the Work Room shall be approximately 6 feet 10 inches high. High wall shelving shall have six adjustable shelves and one base shelf, making seven shelves high in all. Wall shelving in the Juvenile Room shall be approximately 5 feet high, and have four adjustable shelves and one base shelf, making five shelves high in all. One unit of 12-inch shelving in Adult Reading Room, as and if indicated on plan, for Bound Music laid flat, shall have 16 adjustable and 1 base shelf, making 17 shelves in all.

Front or face of all bases of wall and double-face book shelving shall be of the same height as the base of the building. The finish of the base shall be as for the remainder of the shelving, no provision being made for shelving base of linoleum, cork carpet or other similar material.

Where indicated on floor plan this contractor shall provide openings in the face of bases of book shelving to receive louvers for heating, air-conditioning and ventilation, installed by the heating contractor. Approximate locations of louvers shown on floor plan shall be checked for exact position by this contractor, who shall confer with the Owner or the Architect, and with the heating and air-conditioning contractor, to insure that satisfactory provision has been made in the bases to receive louvers.

Submit samples of shelving with proposals as required in Paragraph 704.

910. **ROUND-FRONT SHELVING.** Uprights shall be 18-gauge, with front and formed into a ¾-inch diameter bead, flanged on rear edge. Holes for shelf adjustment shall be pierced on 1-inch casters. End uprights to have No. 24 holes for self-tapping screws. Intermediate uprights shall have 9/32-inch diameter clearance holes for bolts. Provide uprights with 16-gauge clips, extending from front to back, offset to engage end flanges on bottom shelf.

Panel ends shall be 18-gauge, formed into a channel shape on front edge ⅞-inch thick and flanged on top, bottom and rear edges. Panel ends to be fastened to uprights by means of two 18-gauge vertical Z-bars spot-welded at front and rear edges of panel ends, each having 4 holes for self-tapping screws.

Base front shall be 18-gauge, top edge formed with an offset bend to engage front edge of bottom shelf. Ends shall be flanged and have 2 oblong holes pierced in each flange for fastening to uprights. Bottom edge shall be flanged for stiffness.

Continuous top shall be 18-gauge, formed into 2-inch thick channel shape on front and sides and flanged on rear edge. Tops shall be provided with 18-gauge angles extending from front to back, having 2 holes for fastening to the uprights.

Cornice shall be 18-gauge rolled steel section, provided with holes in bottom flange for bolting to continuous top.

Back shall be 20-gauge, made in 2 sections, an upper and a lower, each section to be flanged on 3 sides. Side flanges shall have 4 oblong holes in each for fastening to uprights. Upper section shall overlap lower section 1 inch.

Sway braces of ⅛ x ⅞-inch round-edge strip steel, with hole pierced at each end for fastening to the rear flange on uprights, may be used in lieu of 20-gauge sheet steel backs.

Shelves shall be 18-gauge, front edge to be formed into channel shape ⅞-inch deep. Ends shall be flanged downward and shall have 2 oblong holes pierced in each flange for fastening to uprights. Rear edge shall be bent upward forming a stop for books.

911. **SLOTTED-TYPE SHELVING.** End uprights shall be 18-gauge, with front edge formed in channel shape 9/32-inch thick and offset 1 inch back from front edge 5/16-inch high. Front of upright shall be tapered slightly to the offset permitting easy adjustment of the shelves. Provide with 18-gauge Z-angle extending full height to engage panel ends. Rear edge shall be flanged and reinforced with a 12-gauge angle extending full height. Flange bottom edge for stiffness. Uprights shall be slotted on 1-inch centers for shelf adjustment.

Intermediate uprights shall be 18-gauge, and shall be similar to end uprights except provide with double wall 1¼ inches thick formed in one piece. Reinforce rear edge with a 12-gauge plate extending full height and spot-welded to the rear flanges. All uprights to have a 16-gauge offset clip extending from front to back, to engage the end flanges of bottom shelves.

Panel end shall be 18-gauge, formed in channel shape on front and rear edges. Front face 1 inch thick, rear face 1⅛-inch thick. Flange top and bottom edges for stiffness. Provide rear edge with 18-gauge Z-angle extending full height of panel to engage angle on rear edge of upright.

Base front shall be 16-gauge, flanged on all edges. Provide with 2 holes in side flanges for fastening to uprights.

Provide continuous top and cornice same as for Round-front Shelving, paragraph 910.

Back shall be 20-gauge, flanged on bottom edge. Provide with holes at sides for fastening to uprights, and at top to line up with holes in top shelf.

Top shelf shall be 18-gauge, with front edge formed same as the adjustable shelves. Flange side and rear edges and provide with holes for fastening to the uprights and back sheet.

Bottom half shall be 18-gauge, with front edge formed in channel shape ¾-inch thick. Flange sides to engage clip on upright. Flange rear edge for stiffness.

Adjustable shelves shall be 18-gauge, front and rear edges formed in channel shape ¾-inch thick and bent up at back edge to eliminate sharp edges. Nick shelf at each side near front to engage notch in slots and prevent accidental removal of shelves.

912. **CONCRETE STACK FLOORS.** Stack floors where so indicated on plans shall be of reinforced concrete slab construction 3 inches thick, with flush ceilings, extending continuously over each level. Slabs shall be reinforced both ways, and designed to carry dead load and 50 pounds live load per square foot. Slabs shall be poured on smooth wood forms, made of ⅝-inch 3-ply slash grain Oregon pine, or other material such as to leave the ceiling perfectly smooth and without form markings. Slab shall contain all conduit and outlet boxes for lighting system. Outlet boxes shall be set flush with the ceiling. Conduit and outlet boxes will be furnished and installed by the electrical contractor, and will not form any part of this contract. Metal forms, approved by the Architect, may be used instead of the 5-ply wood forms specified in this paragraph. Construction thru concrete floors, type of reinforcing used, method of connecting reinforcing to building walls, stairs, etc., are shown on drawings.

913. **CONCRETE PROPORTIONS.** All concrete shall be composed of 1 part Portland cement, 2 parts of fine aggregate and 4 parts coarse aggregate. A sack of cement weighing 94 pounds shall be considered as having a volume of one cubic foot. All materials shall conform to the requirements of specifications of the American Society for Testing Materials for the respective materials.

The floor topping shall consist of 1 part Portland cement and 1½ parts of washed pea gravel especially approved by the Architect for hardness and wearing qualities. Topping shall be colored and hardened with cement hardener designated and approved by the Architect, mixed and applied in strict accordance with the manufacturer's directions and subject to supervision by them.

914. **MIXING AND PLACING.** The concrete shall be proportioned as set forth in the preceding paragraph. It shall be mixed in a revolving batch mixer, not to exceed 3¾ cubic feet capacity. The dry cement and aggregates shall be mixed together until thoroly and uniformly commingled. Water shall be carefully gauged, and added until just sufficient to make a mixture of a consistency which will flow slowly, and not segregate Each batch shall be mixed not less than one-half minute after the water is added.

Concrete shall be placed immediately after mixing, and struck off to the desired thickness, allowing for settlement from tamping. Tamping shall be done by vibrating the form at every part thereof by means of an electric hammer, Black and Decker No. 4, or similar vibrator, until the concrete has settled solidly in the form and air bubbles cease to rise in the mixture. Concrete containing an excessive area or proportion of honey-comb or porosity when stripped, must be removed and replaced with new concrete of proper density, at no cost to the Owner. Trowel to a smooth, even surface.

915. **BED PLATES.** Bed plates shall be designed for a unit bearing stress on the concrete structure at the ground floor level of not more than 500 pounds per square inch. Bed plates shall be set in accurate alignment and leveled by means of steel shims the same size as the base plate, or by use of grout in mixture of 1 part cement to 2 parts sand. Bed plates shall be securely anchored in place by means of dowels so that no shifting will be possible in the erection. Bed plates shall have 4 projecting lugs for interlocking with the base plates of the uprights.

916. **STACK UPRIGHTS.** The stack uprights shall be adapted to the particular requirements of the installation. In general, they shall be 4½x3½ inches over all and shall be made of formed and flat pieces of steel electrically welded securely together.

Stack uprights shall have 2 rows of spot welds on each side of the channel section. Spacing of welds shall not exceed 20 times the minimum gauge of material used in the upright.

There shall be 2 formed channel sections of 16-gauge steel, perforated with vertical rows of rectangular holes spaced 1 inch apart on centers. These slots shall be 1.4x⅝ inches, and shall receive the notched lugs on shelf brackets, thereby allowing convenient adjustment for the shelves.

At the bottom of each upright there shall be a 10-gauge plate 6 inches square with holes perforated for setting over and interlocking with the projecting lugs on the bed plate, or with the cap plate on intermediate floor levels. These bottom plates shall have lugs turned up to project inside the hollow section of upright and shall be electrically spot-welded to the upright.

At the top of each upright and joining to the upright above there shall be a 10-gauge plate 6 inches square with lugs pierced and formed upright to interlock with the bottom plate of the upright above. Both bottom and top plate shall be welded in a fixture, assuring accurate location perpendicular to the axis of the upright and square bearing surface on the end of the same.

During the course of erection the bottom plate of the upright shall be placed over the projecting lugs either of the bed plate or top plate of upright, respectively, to give an accurate vertical bearing. The projecting lugs will then be bent with a hammer forming a definite interlocking of the uprights.

917. **STACK SHELVING.** Shelves shall be made from 1 plate of 18-gauge steel formed up at both front and back with three 90-degree bends, making a hollow square in section and having the

edges slightly rounded. Ends of shelves shall be turned down at 90 degrees to form proper connection with the end brackets, giving maximum strength without excess weight and without unduly thick appearance. The front face of the shelf shall be 11/16-inch thick. Shelves shall be designed to carry a uniformly distributed load of 40 pounds per square foot without deflection in excess of 3/16-inch. Shelves shall be designated as 8-inch, 10-inch and 12-inch, but shall be actually 7-inch, 9-inch and 11-inches deep, respectively, the extra depth being taken up in distance from center line of upright to back of shelf.

Plate brackets for ends of book shelves shall be of 16-gauge steel with neatly rounded front edge, and with out-turned flange on exposed edges. Brackets shall be 7-3/16 inches high and the full depth of the shelf. Brackets shall be properly and securely fastened to the shelves by interlocking lugs, 3 to each bracket. Back edge of the brackets shall have a notched hook and lug, the hook to engage a perforation of stack upright and support the shelf, and the lug to engage a lower perforation and prevent the unintentional lifting of the shelf. The hook and lug shall be blistered to sufficient depth to fill the perforation in the upright and thus prevent lateral movement of the shelf. The out-turned flange of the bracket gives the appearance of thickness and prevents knifing of the books when placed on the shelves.

918. **NEWSPAPER SHELVING.** Newspaper shelving, as shown on drawings, shall be 28 inches wide on centers, 18 inches deep, with shelves arranged 15 high in each section. Shelves shall be made of 16-gauge steel, reinforced by an 18-gauge steel channel securely welded to the underside and running from end to end of shelf.

Plate brackets for 18-inch newspaper shelves shall be of 11-gauge steel, fastened to the shelves by means of stove bolts. Back edge of bracket shall have a notched hook and notched lug to engage perforations in the stack upright and to support the shelf.

919. **CARRELLS.** Carrells or partitions shall be supported on continuous standard uprights reaching from floor to floor. Partition shall extend from a point 6 inches above the finished floor to a point approximately 6 inches below the finished ceiling. Partitions shall be made of a single 18-gauge steel sheet with an 18-gauge binding strip spot-welded on 4 sides. Each carrell shall be fitted on 1 face with a linoleum-covered, steel-bound, 18-inch deep reference shelf, located 30 inches above the floor and supported on inverted steel brackets attached to the uprights. Above the reference shelf and approximately 48 inches above the floor shall be located 2 shelves attached to uprights by means of plate brackets. Brackets shall extend above the shelves 6⅜ inches and shall have flanged edges to prevent knifing of books.

920. **CARRELL SHELVING.** At the side of each carrell there shall be placed a section of book shelving 2 feet, 6 inches long, 3 feet, 6 inches high, and 12 inches deep, fitted with 1 shelf adjustable on 1-inch centers. These cases shall have solid ends and tops, and shall be fitted with metal backs. Base shall be approximately 4 inches high, top 1 inch high with corners rounded.

921. **RANGE FINDERS.** Range finders, located at all exposed end uprights, shall be made of 18-gauge steel and formed up in "V" shape with provision for labels on either side.

922. **STACK BRACING.** Stacks shall be fitted with sufficient diagonal sway rods to keep the uprights in a vertical position and to prevent any lateral sway. Tie channels shall be provided for the stacks to insure proper spacing and tying of the stack uprights together at the top. Top of stack shall be braced by suitable strut channels extending across the top of the stack at right angles to the front of the shelves and bolted to the tie channels over the top of the uprights.

923. **HARDWARE.** ALL hardware shall be of polished bronze, cast, not stamped, and with projecting studs and concealed fastenings. Bronze castings shall be free from sand holes, pit marks and other imperfections. Final finish of hardware shall be a heavy coat of an approved lacquer.

924. **STAIRS.** Stairs, as shown on drawings, shall be supported on 3-inch square seamless tubing at all 4 corners. Treads and risers shall be formed up of 1 piece of 12-gauge steel so as to interlock one with the other. The interlocking shall form a pan 1 inch deep with turned-over flange acting as a nosing. The sheet steel treads and risers are attached to 10-gauge steel stringers by means of angles. Fill treads on the job with concrete consisting of 1 part Portland cement and 2 parts fine aggregate, finished as specified for stack floor, paragraph 914 above.

925. **RAILINGS.** All exposed edges of stairway, stair wells or balconies shall have railing built of ⅝-inch square balusters, spaced not over 5 inches on centers. Balusters shall be of wrought iron, securely fastened at the bottom to a 1¼x⅛-inch bar, and at the top to a 1x⅜x⅛-inch channel. A shaped wood or bronze tube hand-rail shall be securely fastened from below thru the top channel,

SECTION 10.

AGREEMENT.

This AGREEMENT, entered into by and between the City of....., State of....., hereinafter called the "OWNER," represented by the duly constituted President and Secretary of its Library Board executing this Contract, and

.....

hereinafter called the "Contractor,"

WITNESSETH: That for the consideration of ....Dollars, lawful money of the United States, the Contractor shall supply all equipment and furniture, and furnish all labor and equipment for installing the same, in strict accordance with the plans, specifications, "List of Equipment," and all other necessary documents herein included, referred to and hereby made a part of this agreement. The work shall commence within ten (10) days after receipt of written notice to proceed, and shall be completed within.....calendar days after commencement of the work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement ....., 19....., at....., ...

(City) (State)

By By

.....

President, Library Board. Secretary, Library Board.

In the presence of—

.....) (SEAL)

)

.....) Contractor

(Witness))

.....

(Witness)

.....

(Business Address)

CERTIFICATE.

I, ..., certifythat I am the.....Secretary of the corporation named as Contractor herein; that ....., who signed this contract on behalf of the Contractor, was then..... of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

(Corporate)
(Seal)

.....

(Secretary.

APPENDIX F.

REGULATIONS FOR OPERATION

OF

PUBLIC LIBRARY BUILDINGS.

Section.	Subject.
1	Administration.
2	Building and Grounds.
3	Electrical and Plumbing Installation.
4	Heating and Air-Conditioning.
5	Motor Vehicles.
6	Equipment and Supplies.
7	Miscellaneous.

SECTION 1.

ADMINISTRATION.

Index.

Paragraph	Subject	Paragraph	Subject
101.	Responsibility of Librarian.	108.	Special Services.
102.	Personnel.	109.	Daily Time Schedule.
103.	Duties.	110.	Daily Time Report.
104.	Classification of Duties.	111.	Appearance and Conduct of Operating Employees.
105.	Daily Duties.	112.	Plans, Specifications and Regulations.
106.	Weekly Duties.	113.	Mechanical Plan.
107.	Occasional Duties.		

101. **RESPONSIBILITY OF LIBRARIAN.** The Librarian shall be in executive charge of the activities of the operating force, and shall be responsible for:

(a) Supervision of the proper and adequate cleaning, maintenance and operation of the physical property—building, grounds and mechanical equipment—of the Library by the operating force.

(b) Preparation of a detailed schedule of duties, dividing the work justly, fairly and equitably among the operating force.

(c) Thoro instruction of Library assistants in the fundamentals of operating the lighting system, and starting, operating and stopping the heating and air-conditioning equipment, in cases of emergency or absence of the operating force.

(d) Proper marking, preferably by painting with red enamel paint, the master control valves of gas lines and/or oil lines leading to the burners of the heating system, to forestall possibility of confusion in operation and of accident thru explosion or conflagration.

102. **PERSONNEL.** The personnel of the operating force shall be as follows:

1 Engineer, in direct charge, under the Librarian, of the operating force.
1 Janitor.
1 Chauffeur.
1 Gardener.

103. **DUTIES.** The Engineer shall be responsible for, direct and assist in the efficient and proper performance of all work of the operating force; all cleaning, dusting, and mopping of the corridors, hallways, offices, reading rooms, lavatories, stairways, and all other parts of the building; all necessary exterior painting, stuccoing and varnishing, and interior painting, calcimining and other decorative work; maintenance and preservation of floors and floor covering — staining, shellacking, painting and waxing; opening and unpacking of shipments of books and other freight; minor repairs to furniture; upkeep, repair, maintenance and operation of all mechanical installation — electrical, heating and air-conditioning, and motor vehicles; maintenance of landscaping; sweeping, washing and cleaning of all sidewalks and driveway approaches, cleaning out papers and trash from the areaways and shrubbery, and of lawns, sprinkling, cutting, weeding, and fertilizing the lawn and re-seeding where necessary, trimming and spraying trees and shrubs, planting and spraying flowers; requisitioning, accounting for and issuing operating supplies and equipment; and all other duties of similar nature which may be assigned by the Librarian.

104. **CLASSIFICATION OF DUTIES.** The duties of the operating force shall be classified as —(1) Daily; (2) Weekly; (3) Occasional; and (4) Special.

105. **DAILY DUTIES.**

a. Hoist and lower the United States Flag.
b. Open all outside windows and thoroly air all rooms of the building.
c. Start the heating and air-conditioning plant.
d. Clean front steps, sidewalks and approach driveways with broom or hose.
e. Bring in the morning newspapers.
f. Sweep the entire floor space of the building.
g. Dust every room in the building.
h. Wash glass top of charging desk.
i. Clean all glass and polished metal work on entrance doors.
j. Empty all waste paper baskets.
k. Open main entrance doors at the time stated in the schedule on the sign in front of the building.
l. Lower awnings.
m. Clean with non-corrosive cleanser all wash bowls, toilet bowls, sinks and lavatories.

WARNING: Do not use acid or strong alkali preparations on enameled iron fixtures. The enamel will be eaten or corroded away!

n. Keep containers for paper towels and toilet paper filled.
o. Sprinkle the lawn. (Except on rainy days).
p. Wipe off windows wet from sprinkling.
q. Keep the lawn entirely free from weeds.
r. Raise awnings, at night and during rainy and windy weather.

106. WEEKLY DUTIES.
a. Mop all bare floors—marble, terrazzo, burned clay tile, rubber tile, cement finish, unfinished wood, etc., weekly or oftener.
b. Clean linoleum, cork carpet, cork tile and wood block floor coverings as set forth in paragraphs 207 and 208.
c. Touch up dull or worn spots in floor covering with wax.
d. Clean and dust lamp bulbs, reflectors and globes.
e. Collect soiled towels and distribute clean towels on day of weekly delivery by towel laundry service.
f. Make requisition to Librarian for equipment and supplies needed.
g. Mow the lawn regularly on a certain designated day each week. (Omit from November to March.)
h. Oil bearings of mechanical stoker, blower and moving parts of air-conditioning equipment once each week, or oftener if necessary.
i. Disinfect telephone mouthpiece and diaphragm, by wiping with a cloth moistened with formaldehyde.

107. OCCASIONAL DUTIES.
a. Trim hedges once each month.
b. Trim, prune, spray and fertilize lawn, shrubs, trees and hedges as needed to keep in flourishing condition.
c. Cultivate at least once a month around all trees, plants and shrubs.
d. Wipe off all books thoroly once a month.
e. Wipe off all shelves and tops of bookcases with wet cloth, then with a polishing rag.
f. Wash all windows monthly, preferably the first day of the month.
g. Brush down walls, high ledges, curtains, pictures, etc., with a woolen duster.
h. Clean off all spots, finger marks, etc., on walls with art gum or soft stale bread.
i. Wax linoleum, cork carpet, cork tile, hardwood, wood block, and rubber tile floors and floor coverings as needed.
j. Clean all polished marble as needed.
k. Clean furniture and varnished surfaces as needed; wax and clean all waxed wood surfaces.
l. Wash all lamp bulbs, globes and reflectors once each month.
m. Clean all interior and exterior bronze work as needed.
n. Clean and polish all brass, nickel and chromium-plated work as necessary.
o. Wash all painted walls and woodwork as they become dirty.
p. Clean all roof drains, gutters and downspouts from accumulations of leaves, dust, trash, and all other debris whenever necessary.
q. Take down and store awnings, door and window screens at end of summer season.
r Keep close guard against termites beneath building or on premises.
s. Keep close watch against wood borers in furniture.
t. Keep all door hinges and all bearings of machinery well oiled.
u. Keep all locks well lubricated with powdered graphite.
v. Oil bearings of electric motor lightly once each month.

108. SPECIAL DUTIES.
a. Perform such overtime services as may be required by the organizations using the Club Room—putting up decorations, arranging chairs, and any special cleaning at the meetings.
b. Close and lock the doors and windows immediately at the termination of the meetings.
c. Schedules of these meetings shall be prepared by the Librarian, showing what work is to be done in preparation for the meetings, and in cleaning up afterwards.
d. Organizations shall be required to par at the rate of 55 cents per hour for all overtime service so rendered by the Janitor.

109. DAILY TIME SCHEDULE. The dailytime schedule of employees in the operating force of the Library shall be as follows:

7:00 A. M. to 11:00 A. M., Saturdays included.
12:00 M. to 5:00 P. M., week days except Saturday.
(44 hours per week with Saturday afternoon off.)

The foregoing schedule for each employee shall be modified by the Librarian as the needs of the Library may require. Overtime service will be required of the Janitor on evenings when the Club Room is in use by different organizations.

110. DAILY TIME REPORT. Each employee of the operating force shall fill out daily, on a card furnished by the Librarian for the special purpose, the time of reporting for duty at the building in the morning; time of leaving for lunch; time of returning from lunch; and time of leaving at the end of the daily tour of duty. The card shall also show the number of hours and fractions of hours of duty for the day, and hours and fractions of hours for overtime duty, if any. This record may be kept by time clock if available in the Library.

111. **APPEARANCE AND CONDUCT OF OPERATING EMPLOYEES.** Members of the operating force, except those whose duties require continuous service in the fire or engine rooms, shall maintain at all times a neat personal appearance. Employees shall be civil and courteous on all occasions to the public and to other employees of the Library. Discord will not be tolerated. Gossiping shall be avoided. Complaints shall be taken up with the Librarian. Habitual users of intoxicating liquors or narcotics to excess will not be allowed to remain in the employ of the Library. Members of the operating force shall pay all just debts incurred by them for necessaries of life while in the service; and employees against whom claims are frequently submitted for the non-payment of just debts will not be retained; nor will the Library retain in its employ persons who habitually borrow or lend money at excessive rates of interest. Payment of loans for which usurious interest is charged will not be enforced against any employee.

Members of the operating force are prohibited from engaging others to do their work or to assist therein; or to engage in other employment in addition to their duties at the Library where such employment would cause an interruption in the hours of assignment or interfere in any manner with the efficiency of their work for which employed by the Library.

112. **PLANS, SPECIFICATIONS, AND REGULATOINS.** Plans and specifications for the building, with all revisions and changes made during construction noted thereon in complete detail, and regulation for the maintenance and operation thereof, shall be filed where readily available and accessible. Plans shall be kept clean and free of dust, and shall be filed flat, in a filing drawer or case similar to poster case, in order to lessen the danger of damage and injury by tearing.

113. **MECHANICAL PLAN.** The Librarian shall secure from the Architect for the use of the operating force a mechanical plan, correct as of the final completion of the building, showing the proper location of all water supply lines; all plumbing fixtures, drains, soil pipes, waste pipes and vent pipes; all gas or oil lines; all service valves; all back pressure valves; all cleanout covers; all electrical circuits, panels, fuses and switches; and all mechanical equipment and installation for the building.

The operating force shall be thoroly familiar with the entire mechanical installation, and shall know the proper location of tools to operate the same in cases of emergency. Failure to know these requirements will subject the negligent employee to summary discipline.

SECTION 2.

BUILDING AND GROUNDS.

Index.

Paragraph	Subject	Paragraph	Subject
201.	Display of Flag.	217.	Plumbing Fixtures.
202.	Grounds and Approaches.	218.	Disinfectants.
203.	Sweeping.	219.	Towels and Laundry Service.
204.	Dusting.	220.	Washing Painted Walls.
205.	Charging Desk.	221.	Roof.
206.	Glass.	222.	Locks.
207.	Linoleum, Cork Carpet and Cork Tile.	223.	Keys.
208.	Floors.	224.	"Private" Doors.
209.	Wood Base.	225.	Awnings.
210.	Polished Marble.	226.	Fire Hose Equipment.
211.	Cleaning Furniture and Polished Surfaces.	227.	Chemical Fire Extinguishers.
212.	Wax Finish on Woodwork.	228.	Desk Fans.
213.	Furniture.	229.	Janitors' Implements.
214.	Electric Lamps and Shades.	230.	Garden Hose.
215.	Bronze.	231.	Ashes and Rubbish.
216.	Polished Metal Work.	232.	Window and Door Screens.

201. **DISPLAY OF FLAG.** The United States flag shall be displayed at full staff from the Library flag-staff during the hours of business on working days and on all legal holidays except Sunday, but not after sunset of such days. It should, however, be displayed on "Mothers' Day," the second Sunday in May. As soon after sunrise as possible the flag should be hoisted briskly to the peak of the staff. At sunset it should be lowered slowly, and, without permitting it to touch the ground, it should be carefully folded and stored where it will not be soiled or torn. If wet when taken down, the flag should be carefully spread out and thoroly dried before folding and storing.

On "Memorial Day," May 30, the flag should be displayed at half-staff from sunrise or the hour at which it is usually raised until noon, then raised to the peak of the staff, where it will be flown until sunset.

When half-staffing the flag it should always be hoisted quickly to the peak then slowly lowered to the half-staff. If at half-staff at the end of the day, it should be quickly raised to the peak and then lowered slowly to be folded and stored.

Whenever displayed at half-staff for a period of mourning because of the death of some prominent national or local official, the flag should also be displayed on all Sundays included in such period.

Whenever more than one flag is displayed from the staff, the national ensign should be at the peak of the staff.

When stormy weather or high winds prevent the flying of the large flag, the small storm flag should be hoisted, unless the velocity of the wind is such that it is considered inadvisable to do so. When flags show signs of wear and tear, they should be neatly repaired. When they become so worn and whipped out as to be beyond repair and no longer serviceable, they must be burned, either in the furnace of the building or some other available place on the premises.

202. **GROUNDS AND APPROACHES.** Entrance steps, sidewalks and approach driveways shall be kept free from dirt, snow and ice. They should be swept or washed down with hose every day when the weather permits. The washing should be done as early in the morning as possible.

If not possible owing to weather conditions to remove snow and ice promptly from the walks and steps, then they should be sprinkled with sand and salt in order to prevent persons from injuring themselves on Library property. Walks, steps and approaches should, however, be cleaned of all ice and snow as soon as possible.

Lawn and areaways of the building shall be kept clean and free from dirt, trash, and waste paper. Area drains shall be kept open and clear from clogging. Lawn shall be kept well mowed, and free from weeds. Lawn shall be kept sprinkled sufficiently to maintain a good growth of grass. Start the sprinklers early and change as necessary during the period the cleaning is being done inside and outside the building. From the latter part of November to the first of March no mowing should be done, allowing a good growth of grass to develop, covering and protecting the roots during the winter months.

Hedges shall be well cared for, and properly trimmed, once a month. Trees and shrubs shall be sprayed when necessary to combat insect pests and molds, and shall be trimmed and pruned, preferably in December. Flowers shall be planted, and sprayed, as directed by the Librarian.

Cultivate at least once each month around all trees, plants and shrubs. Keep a cultivated circular border about 6 feet in diameter around each tree. Set a 4-inch vitrified clay tile inside the border, vertically, about 18 inches deep, with galvanized metal or wood cover, with 1-inch hole in cover thru which hose may be inserted for watering.

Lawns, trees and shrubbery shall be thoroly fertilized at least once a year, preferably in October.

Fertilizer shall be in amount and kind as best adapted to meet local conditions.

203. SWEEPING. The entire floor space of the building, (except storerooms,) shall be swept daily. Hardwood floors, wood block and all waxed surfaces shall be sprinkled sparingly with "Cedar-sweep" or other lightly oiled sawdust compound, to keep down the dust. All other classes of floors and floor coverings shall be sprinkled sparingly with sawdust slightly dampened with water. The sweeping compound may be used twice or three times before throwing away. **Do not use oiled sawdust compound on marble, it will stain. Any bituminous mastic floor covering on which oiled compound is used will soften and deteriorate very quickly. Sawdust dampened with water used on hardwood or wood block floors will cause them to warp, buckle, loosen from the cement slab and become very rough.**

204. DUSTING. All parts of the building, and all furniture and books, shall be kept free from accumulations of dust. Give special attention to tops of molding, cases, handrails, balustrades, grilles, lighting fixtures, glassware and all other equipment likely to gather dust.

Care shall be observed to avoid soiling the walls above baseboards, chair rails, picture molding and wainscoting. Place a pasteboard or other suitable shield against the wall for its protection when dusting these features.

The use of feather dusters is prohibited. Make satisfactory dusting cloth by dipping a piece of cheesecloth in hot soapsuds; then dry out the cloth,and dip in kerosene oil; and hang so as to allow to dry without wringing out the cloth.

Dusters shall be kept clean by frequent washing. Staining of wood and plaster work by the use of dirty dusters will not be tolerated.

Walls shall be dusted frequently by the use of approved wall dusters.

205. CHARGING DESK. Glass top of the charging desk shall be washed daily. Raise the glass frequently, and brush out the dirt which works in around the edges and under the glass. Keep desk free from ink stains.

Clean and refill ink wells on charging desk as necessary. Remove soiled and worn blotters, and replace with new blotters. Replace wornout pens with new pen points whenever needed.

206. GLASS. All glass of windows, doors, and skylights shall be kept clean. Take special care to keep glass in main entrance doors free from hand marks. If necessary, wipe this glass twice a day.

Wash glass in a lukewarm solution of 1 tablespoonful of ammonia in one gallon of water. Take special care not to come in contact with woodwork and remove the paint or finish therefrom.

207. LINOLEUM, CORK CARPET AND CORK TILE. Battleship linoleum, cork carpet and cork tile, shall be given a light coat of floor wax immediately after it is laid, and again waxed occasionally whenever needed; ordinarily three or four times a year is sufficient. Apply paste wax by placing a small quantity within the folds of a piece of cheesecloth folded several times, and rubbed evenly over the surface of the floor covering. Apply liquid wax with a cloth moistened in the liquid wax. Allow to stand for twenty to thirty minutes. Rub thoroly and polish with a weighted brush, or a hand or electric polishing machine.

Clean the waxed floor covering by going over once a day with a dry mop. In rainy weather, wipe up with a damp cloth, any mud or dirt tracked over the floor.

When a thoro cleaning is necessary, before applying a coat of wax, the surface shall first be cleaned with cleaning solvent, to remove the old wax, and shall then be washed with luke-warm suds made with a mild soap. The use of strong alkali soap or any soap containing abrasive substances, or scouring powder, is forbidden. A small area of the surface shall be washed at one time and the entire surface shall not at any time be flooded with water. Rinse with clean water, then thoroly dry the surface. Water shall not be allowed to stand along the edges of seams of the floor covering.

208. FLOORS. Lobby, corridor and toilet floors, of terrazzo, burned clay tile or plain cement finish shall be thoroly scrubbed at least once a week, and as much oftener as necessary to keep them thoroly clean. Mopping alone is insufficient, as the travel over the floor grinds the dirt into the surface and it can be removed only by thoro scrubbing with a brush or scrubbing mop. For best results, a scouring powder, containing about 75 per cent of fine sand, should be spread over the floor by a shaker or sprinkler, or by sifting thru a cheesecloth bag. Scrub the floor with warm water, taking care to clean under and back of all furniture, in the corners, and keep the wall base from becoming stained. After scrubbing, **wash the floor thoroly with clean water and plenty of clean soap.**

Unpolished or unvarnished wood floors shall be swept and scrubbed with a solution of scrub soap, and warm water and the floor surface then thoroly dried. Care should be observed not to permit the water to remain long thereon. By cleaning small sections and drying them quickly floors of this class will not become saturated with water, causing them to buckle and ridge.

Polished hardwood floors, wood block floors, and rubber tile do not need to be cleaned with scrubbing materials of any character. These floors shall be wiped daily with dustless mops. When necessary to wash them this shall be done with a solution of about 1½ tablespoonfuls of household ammonia to 2 gallons of water. Wash a small section at a time with a cloth wet in this solution. Rinse immediately with a cloth wet in clear water. Wipe with dry cloth, or mop, until thoroly dry. Polished hardwood floors, wood block, cork carpet, cork tile and linoleum floor cover, and burned clay tile, where not exposed to too heavy traffic, shall be kept waxed with any good grade of floor wax. For rubber tile use "Rubber Var," or "Vesta Gloss," made by the Vesta Chemical Company of St. Louis, Mo.

209. **WOOD BASE.** Special care shall be taken when scrubbing floors to avoid the removal of finish from wood wall base and bases of furniture.

210. **POLISHED MARBLE.** **Scouring powder shall not be used on polished marble.** It is seldom necessary to wash polished marble. The best results come from dry cleaning, rubbing it down frequently with a dry, soft cloth. When necessary to wash it, warm water shall be used, only in small quantity and frequently changed in order to keep it clean. When the use of a detergent is unavoidable, select a pure, white soap; soften the water before dissolving the soap in it; dampen the marble surface with soft water before applying the soap solution; wash the surface lightly but carefully with the soap solution; and rinse thoroly with plenty of pure, soft water.

Remove all stains from polished marble, except those from rust, creosote or oil, with Javelle water, procurable at any drug store. See paragraph 710 for instructions for its preparation. Remove stains of long standing by repeated applications of this bleaching solution. When impossible to remove stain by rubbing the marble with a cloth saturated with this solution, spread a small quantity of Javelle water over the stained surface and allow to stand for some time, after which the spot shall be rubbed with a cloth saturated in the solution. If the stain is on a vertical slab, saturate a piece of white blotting paper with the solution and place it on the marble.

Remove oil stains with benzine, or pure gasoline free from kerosene and oil, to prevent spreading of the stain and discoloration of a large area. Saturate cotton waste or white blotting paper and press firmly against the marble, allowing if necessary to remain several days, wetting frequently with the benzine or gasoline. Or mix a paste of fuller's earth with water to the consistency of library paste, and spread thickly over the oil stain. Allow to dry; then saturate with benzine or pure, oil-free gasoline, and keep wet with this cleanser for several days. When removed the fuller's earth can be re-crushed to a powder and used again until it becomes too badly discolored for further use.

WARNING! Do not light matches or fires of any kind in the vicinity of gasoline or benzine! The invisible gas constantly evaporating from these fluids is extremely explosive and dangerous!

211. **CLEANING FURNITURE AND VARNISHED SURFACES.** Varnished surfaces shall be washed with a solution of 1 tablespoonful of ammonia to 2 gallons of luke-warm water. Rinse thoroly and wipe dry. Apply a coat of furniture polish, and rub vigorously with a dry, soft cloth until the polish is dry. At other times when furniture is polished, apply sufficient polish to cover the surface moderately, and rub until dry. Damp cloths shall not be used on furniture or varnished surfaces except when washing the same, which should be necessary very seldom.

Keep the fronts of desks, arms of chairs, and other varnished surfaces free from accumulations of grease, dirt from the hands, etc., by rubbing with furniture polish, or with a soft cloth with a small quantity of Javelle water, then rinse, wipe dry, and apply furniture polish. **The use of common soap and water in an attempt to remove ink and grease stains from desks and other varnished surfaces is prohibited.**

Keep the varnished wood trim, wall base, window facings, chair rails, picture molds, etc., in the building in good condition by rubbing down frequently with a dry cloth. Rub occasionally with a cloth dampened with furniture polish, then wipe dry until a polish is obtained.

212. **WAX FINISH ON WOODWORK.** Wax-finished woodwork shall be dusted off with a soft, dry, clean cloth. The application of furniture polish to waxed surfaces is forbidden. Rub down occasionally with a light application of finishing wax, of very thick consistency, obtainable at hardware stores. Stains shall be washed off in lukewarm water containing a small amount of ammonia, rinsed, and the surface re-covered with a light coat of wax and polished. Flat surfaces should be polished with a small piece of carpet; grooved surfaces, where the carpet can not be made to reach all parts, should be polished by using a small, soft brush.

213. **FURNITURE.** Unused furniture shall be thoroly cleaned and stored; neatly arranged, to prevent breakage and damage, and covered with canvas or Manila paper to protect from the dust.

Broken furniture in the reading rooms or the offices shall not be allowed to remain in use. Minor repairs if practicable shall be made by the operating force. If this is not possible, the broken furniture should be stored and replaced by surplus furniture in storage, or sent out to a skilled cabinet maker for repair.

Broken or worn casters on revolving chairs and other furniture, before causing damage to the floors or floor coverings, shall be removed and replaced by new casters. Use gliders, or "Domes of Silence," on leg chairs.

214. **ELECTRIC LAMPS AND SHADES.** Lamp bulbs, reflectors and globes shall be dusted carefully once each week. Remove from lighting fixtures and wash with soap and warm water once each month. Rinse in clean warm water and wipe dry. Clean Holophane glassware with a stiff brush, following the direction of the prisms.

215. **BRONZE.** Interior and exterior bronze work, lighting fixtures, etc., shall be frequently wiped with a soft, dry cloth. Occasionally the cloth should be moistened with a preparation consisting of equal parts of crude oil, turpentine and oil of citronella. Keep the preparation in airtight containers of tin or glass.

If the bronze has been permitted to stand for a considerable time neglected without any special care, as in the case of outside lamp standards and brackets, it shall first be washed with clean water containing a small quantity of ammonia, applied lightly with a soft cloth or sponge. Rinse thoroly with clear water. Scrubbing, or the application of acid, soap or abrasive preparations on the bronze are prohibited, as they will remove the lacquer.

216. **POLISHED METAL WORK.** Brass, nickel and chromium-plated work-railings, door fittings, and plumbing fixtures—shall be kept clean and well polished at all times. Cleaning and polishing the brass work of public entrance doors shall be performed in the early morning when traffic is lightest in order not to inconvenience the public.

Special care must be observed not to smear and stain wood, stone or terra cotta to which polished metal may be fastened. Accomplish this by the use of a shield of thin, tough cardboard cut to fit the polished metal and laid over the material to be protected. Keep well-polished brass, nickel and chromium-plate in good condition by frequent wiping with a soft, dry cloth.

217. **PLUMBING FIXTURES.** Plumbing fixtures in toilets, kitchenette, work room and office—bowls, lavatories, drinking fountains, slop sinks, shower baths, wainscoting and stall partitions—shall be maintained in a scrupulously clean and thoroly sanitary condition. Dirt or filth shall not be permitted to accumulate closet bowls or any other place.

Clean closet and urinal bowls on the inside by flushing with boiling hot water, then scrubbing with "Old Dutch" cleanser or "Bon Ami" powder, using a long-handled brush to clean the neck of the bowl. Remove stains, caused by sedimentary deposits, with "Sani-Flush," according to manufacturer's directions with a solution of one part muriatic acid to six parts clean water; rinse thoroly at once with clean water to prevent corrosion of the fixture.

WARNING! Do not use acids or strong alkali preparations on enameled iron fixtures. If you do, the enamel will be corroded and eaten off!

218. **DISINFECTANTS.** If all plumbing fixtures are maintained in a properly and efficiently clean and sanitary condition at all times, by the liberal employment of soap and scouring powder, the use of disinfectants should not be required. Should such disinfectants be considered necessary, in the judgment of the Librarian, for the greater safety and protection of the library patrons in the public lavatories and toilets, they will be used by the operating force where and as directed by the Librarian.

219. **TOWELS AND LAUNDRY SERVICE.** For the patrons of the Library, paper towels will be supplied for use in the public toilets. Standard cotton towels, 17 by 32 inches, not to exceed two per week, shall be issued to each employee of the Library.

Towel laundry service shall be weekly. The Engineer shall be responsible for the changing of towels at the time set therefor by the Librarian. The Engineer shall also be responsible for checking and counting the soiled towels sent out and the clean towels received, at the time of delivery and collection by the laundry company.

220. **WASHING PAINTED WALLS.** Painted walls and wood work shall be washed from time to time as they become dirty. Use a cleaning solution prepared from a mild soap, free from uncombined alkali, to avoid streaking the walls and dissolving the paint. Change the water frequently as it becomes dirty. Apply with coarse scrub cloths and rub vigorously until clean. Rinse and wipe off thoroly with cloth or sponge.

221. **ROOF.** All roof drains, gutters and downspouts shall be kept free from accumulations of leaves, dust, trash, snow and ice, and all other debris to avoid stopping up and overflowing and leakage into the building. All gutter outlets to downspouts shall be provided with heavy ¼-inch mesh copper or galvanized wire basket strainers.

Sheet iron or tin roofs and gutters shall be kept well painted to insure their preservation. Frequent inspection of the roof shall be made by the Engineer, and when small patches of bare metal are discovered they shall be brightened and cleaned of all rust and corrosion, and painted immediately. Minor leaks in sheet metal roofs may be repaired temporarily by giving the same a very heavy coat of approved roof paint; saturate a piece of canton flannel by dipping in the paint and squeezing out the surplus. Cover the leak with the canton flannel, nap side down. Smooth to lay solid and even on the roof, cover with heavy coating of paint. Cover large openings with two thicknesses of the flannel. Repaint every two years to insure preservation.

222. **LOCKS.** Locks shall be lubricated by the use of finely powdered graphite, blown thru a small tube or quill thru the key hole. The use of oil for this purpose is prohibited, as it will become gummy and the keys will not operate.

Before polishing the metal parts of locks, place keys in the lock plugs to prevent the metal polish from coming in contact with the working parts of the locks.

Remove cylinder by loosening set screw on the edge of the door, insert key, part way only, and turn cylinder out to the left. The use of pipe wrench, pliers or chisel is forbidden, as this will ruin cylinder.

When re-installing cylinder turn the same inplace to the right until the lock operates satisfactorily. Adjust cylinder so that key will be straight up and down, and tighten set screw in edge of door.

223. **KEYS.** The Engineer shall keep an accurate record of all keys on hand for doors to the building, and of all keys issued to employees of the Library, with room number, manufacturer's number, etc. Master keys shall not be supplied to members of the staff except upon the express direction and authority of the Librarian. Unauthorized keys shall be promptly taken up and placed in an inaccessible location. Issue to employees only such keys as are needed by them—front entrance doors, employees' entrance, etc.

224. **"PRIVATE" DOORS.** Doors intended for use of the Library staff only, marked "Private,"

shall be kept closed at all times. Employees passing thru "Private" doors shall see that these doors are carefully closed after them.

225. **AWNINGS.** Awnings shall be raised each evening, and during stormy and windy weather. They are to be taken down by the operating force, where practicable, immediately after the summer season, properly labeled, and stored in a dry place. Immediately after being taken down they shall be carefully examined, and any necessary repairs made to place them in proper condition for the following summer season, either by the operating force, or by an outside repair service.

Before original installation, and before replacing for each summer season, awnings shall be thoroly treated with a waterproofing, mold-resistant preparation.

226. **FIRE HOSE EQUIPMENT.** Fire hose and standpipes shall be kept in serviceable condition at all times.

Unlined fire hose shall be tested at full pressure at least once a year. Sections found defective shall be replaced by new hose. When dry linen hose is placed under pressure the water will be forced thru the meshes to a considerable extent until the fabric becomes wet and swells up; this condition shall not be considered a defect. Test shall be made in the basement, or outdoors where no possible damage may occur thru the hose bursting under pressure.

After the hose has been tested it shall be thoroly drained and dried. Draining may be done by suspending by the middle of a section out of attic windows, or from the roof, with nozzle removed and the ends off the ground, for five or six hours. Then stretch out in basement in a dry place, or in the attic, and dry for one week before returning to the rack or reels, to prevent damage from rot caused by dampness. Test hose on the different racks at different times, to have some in place available in case of fires. Attach to each hose, by a string, a card indicating the date it was last tested.

227. **CHEMICAL FIRE EXTINGUISHERS.** Chemical fire extinguishers shall be recharged once every year. The necessary chemicals, (sulphuric acid and bicarbonate of soda,) for recharging may be purchased from fire extinguisher dealers or hardware stores; the work of recharging shall be done by the operating force.

Pyrene fire extinguishers do not lose their fire-protection efficiency, and should be refilled only when necessary to replenish the charge.

Attach to each extinguisher, other than Pyrene, a card indicating the date when last charged.

228. **DESK FANS.** At the close of the summer season all portable desk fans shall be removed from the rooms and offices, properly tagged to indicate where they belong, cleaned and repaired, covered with Manila paper to protect them from dust, and stored in a dry place. If it is not practicable for the operating force to repair the fans, the work shall be done by an outside agency.

229. **JANITOR'S IMPLEMENTS.** Janitor's tools, implements and supplies in connection with the care of the building, when not in use, shall be stored in the storeroom or in Janitor's closets. These shall not be left standing about in rooms, offices or on the grounds.

230. **GARDEN HOSE.** Garden hose should not be left on the ground or exposed to the weather when not in use, but should be thoroly drained, placed on a reel and stored under cover. Hose that becomes slightly defective should not be discarded, but if practicable should be repaired with hose menders. Good sections of the hose in this manner may be utilized and again made serviceable.

231. **ASHES AND RUBBISH.** Ashes and rubbish shall be removed regularly and frequently by rubbish contractors or by the city, and shall not be allowed to accumulate in the building or on the premises. Where removed by contract, the cubic contents of each can or container shall be computed and marked plainly thereon. The Engineer shall be responsible for maintaining an accurate record of the number of cans of ashes and rubbish removed, and the dates of removal.

232. **WINDOW AND DOOR SCREENS.** All window and door screens not permanently fixed in the building shall be removed at the close of the summer season, properly marked each with the opening where it belongs; thoroly cleaned and dried, and stored in a dry place.

SECTION 3.

ELECTRICAL AND PLUMBING INSTALLATION.

Paragraph	Subject	Paragraph	Subject
301.	Responsibility.	306.	Directory in Cabinets.
302.	Use of Lights.	307.	Extra Plumbing and Electrical Parts.
303.	*Inspections.*	*308.*	*Plumbing Installation.*
304.	Purchase and Issue of Electric Bulbs.	309.	Pressure Reducer.
305.	Electrical Alterations.		

301. **RESPONSIBILITY.** The Engineer is directly responsible, under the Librarian, for the upkeep, maintenance, and efficient operation of all electrical, plumbing, heating and air-conditioning installation of the Library.

302. **USE OF LIGHTS.** The Engineer is directly responsible for the economical use of all lights in the Library; EXCEPT, in reading rooms, work rooms and offices, this responsibility shall be upon the Librarian and assistants in charge of the respective rooms.

303. **INSPECTIONS.** It is the specific duty of the Engineer to make a preliminary inspection upon first arriving at the building at the beginning of each day's tour of duty, to see that no unnecessary lights have been left burning; and it is the specific duty of the member of the operating force on duty at the end of each day, the last thing before leaving the building, to make a final tour and see that no lights are left burning where no light is needed.

The Engineer shall make at frequent intervals such inspections of motors, electrical and plumbing equipment of the Library as necessary to assure himself that all such equipment is operating smoothly and with maximum efficiency.

304. **PURCHASE AND ISSUE OF ELECTRIC BULBS.** Electric light bulbs of different sizes and kinds, and all other electrical supplies and equipment for the Library, are purchased only on requisition by the Engineer-Janitor. When received, these supplies shall be securely locked in a place accessible only to the Engineer. A complete record, on the proper form, shall be kept, showing the date of receipt, number and wattage of each size received, date, number and wattage of each size issued, to whom issued, and number of each size left on hand. Bulbs will be issued only in exchange for burned-out or broken bulbs turned in. Accumulations of burned-out and broken bulbs will be sold at intervals for junk.

306. **DIRECTORY IN CABINETS.** Each electrical distributing and panel thruout the building shall be provided with a directory, indicating clearly the lights controlled by each switch in the cabinet.

307. **EXTRA PLUMBING AND ELECTRICAL PARTS.** The Engineer shall be responsible for the maintenance of a proper and adequate supply of electric fuses for all different circuits in the building; washers and plugs for all lavatory spigots and tank ball cocks; and tools for the installation of the same.

308. **PLUMBING INSTALLATION.** Traps of plumbing installation shall not be allowed to evaporate and become dry, permitting the access of poisonous sewer gases into the building. Plumbing fixtures not in frequent and regular use shall be flushed by the operating force regularly at least twice a week, to maintain the seal in traps and to wash out the larvae of mosquitoes breeding in such seals.

Remove covers on all cleanouts, check valves, etc., at least every two months and clean out all rags, paper and other debris which may have been caught there, to prevent clogging of the drain and flooding of the building.

309. **PRESSURE REDUCER.** Dials of pressure reducer installed on the water-supply system shall be inspected regularly at least every three months, to determine whether it is operating properly. When valve seats become cut or worn, or the rubber cups become defective, the dial on the house side will register a pressure practically equal to that on the street side. When this occurs the pressure reducer shall be repaired and properly adjusted immediately, in order to prevent the high pressure forcing the cocks on the plumbing fixtures and wasting the water.

SECTION 4.

HEATING AND AIR-CONDITIONING.

Index.

Paragraph	Subject	Paragraph	Subject
401.	Responsibility.	405.	Economy of Operation.
402.	Operating the Equipment.	406.	Closing Down at Night.
403.	Temperature.	407.	Oiling.
404.	Trouble Calls.		

401. **RESPONSIBILITY** The Librarian is specifically charged with the responsibility for making certain that each member of the operating force, and each page and library assistant having to do with the operation of the heating and air-conditioning plant, and closing the same down at night, shall read carefully and understand thoroly the provisions of these regulations.

402. **OPERATING AND EQUIPMENT.** The heating and air-conditioning equipment shall be started, controlled and operated strictly in accordance with the printed instructions of the manufacturer, furnished with each installation.

If gas-burning furnace is used, and if the pilot light is not burning, see that the red-painted master valve on the gas line to the burners, and the valves leading to the pilot light, are tightly closed. If not closed, (1) Close the same and **wait thirty minutes** until the escape up the flue of any unignited gas lurking in the firebox; (2) **Turn on and light** the pilot light in each firebox. (If pilot lights are already burning, it is not necessary to shut valves off and relight them.) (3) **Open** the red-painted master valve on the fuel line leading to the furnaces.

If oil-burning furnace is used, see that the red-painted master valve on the fuel line to the burners is closed; if open, see that there is no leakage of unconsumed oil in the firebox. Start in strict accordance with manufacturer's directions.

403. **TEMPERATURE.** Where thermostatic control is installed, the temperature shall be regulated to 71 degrees Fahrenheit, and there maintained so long as the heating plant is operating.

404. **TROUBLE CALLS.** In case trouble of any kind develops in the heating system, the Engineer will be notified **immediately.**

405. **ECONOMY OF OPERATION.** The operating force shall guard watchfully and carefully against all waste of fuel thru improper adjustment of burners, improper proportioning of air, excessive consumption of fuel and all other causes. The operating force shall keep all radiating surfaces of the heating plant clean and free from accumulations of soot, ashes and all other material which interferes with the rapid and efficient radiation of heat from the firebox.

406. **CLOSING DOWN AT NIGHT.** When closing the Library at night, the red-painted master valves for gas furnaces or oil-burning furnaces, **and these only!** will be closed tightly. **No other valves on fuel lines will be touched or changed in any way!** Open electric switches controlling the automatic operation of burners, **but not that for blower!**

For coal burning furnaces, the mechanical stoker will be stopped, and all dampers to the firebox tightly closed.

407. **OILING.** Bearings of the mechanical stoker, if used, and bearings of the blower, and moving parts of the air-conditioning equipment, shall be lightly oiled regularly once a week with a good grade of light cylinder oil. Bearings on electric motors will be oiled, very lightly, regularly once a month.

SECTION 5.

MOTOR VEHICLES.

Paragraph	Subject	Paragraph	Subject
501.	Observance of Regulations.	506.	Oil in Crank Case.
502.	Safety Precautions.	507.	Maintenance of Tires.
503.	Operation and Maintenance.	508.	Maintenance of Batteries
504.	Schedule of Operation.	509.	Monthly Reports.
505.	Issuance of Gas and Oil.		

501. **OBSERVANCE OF REGULATIONS.** Strict observance of the following regulations covering the inspection, operation, maintenance and repair of the Library motor vehicles is enjoined upon all Library employees using or caring for such vehicles, and others who may be affected thereby. **Violations of these regulations will be the occasion for dismissal or summary disciplinary action by the Librarian against the offending employee or other person.**

502. **SAFETY PRECAUTIONS.** Smoking, striking matches or starting fires in any manner, by any employee of the Library or any other person whomsoever, is strictly forbidden in or around the garage at any time. While filling the tank of any motor vehicle with gasoline the motor shall be shut off and the ignition cut off from the motor.

503. **OPERATION AND MAINTENANCE.** The Chauffeur is responsible, under the direction of the Engineer at all times for the inspection, operation, maintenance and repair of all Library motor vehicles. Regular periodical inspections will be made. Trouble of any kind developing in any motor vehicle will be repaired at once by the Chauffeur, if practicable; if impossible, the trouble will be reported to the Librarian, who will authorize its repair at a commercial garage.

Collisions or other accidental damages occurring in any manner whatsoever to any Library motor vehicle will be reported **immediately** to the Librarian by the person driving the vehicle at the time of the accident. These reports will be made out on a special form furnished by the Librarian.**Any driver of a Library vehicle failing to make such report will be held personally responsible for the damage resulting from the accident, whether responsible for the actual accident or not!**

504. **SCHEDULE OF OPERATIONS.** All motor vehicles belonging to the Library will be operated on schedules, to be issued by the Librarian from time to time as occasion arises for making necessary changes in existing schedules.

505. **ISSUANCE OF GAS AND OIL.** Gas and oil for Library motor vehicles will be stored in tanks in the garage yard, and will be issued and measured out by the Engineer. After each removal of gas from the tank, the hose **will be thoroly drained!** in order to prevent undue deterioration from rotting caused by excess gasoline standing in the hose; also to prevent waste from spilled gasoline the next time the hose is lowered for further removal of gasoline from the tank.

506. **OIL IN CRANK CASE.** The Chauffeur shall be held strictly responsible that the proper level of oil is maintained at all times in the crank case of the vehicle driven by him. Crank case shall be completely cleaned after having run not to exceed one thousand miles, and the oil replaced with fresh oil of the proper quality and consistency. Spent oil removed from the crank case will be conserved in a drum and disposed of by sale or otherwise.

507. **MAINTENANCE OF TIRES.** The Chauffeur, before starting on any trip, will see that all tires on his vehicle, including the spare, are filled with air, to the proper degree of pressure. Punctures, blowouts and other damages to tires will be repaired promptly by the Chauffeur upon his return to the Library, or if this be impossible, they shall be reported at once to the Librarian.

508. **MAINTENANCE OF BATTERIES.** At intervals not exceeding two weeks tests of batteries on motor vehicles shall be made by means of hydrometer. Batteries will be filled with distilled water at that time, bringing the electrolyte therein to the proper level. When tests by the hydrometer show the battery is becoming unnecessarily weak, the fact will be reported to the Librarian, who will order it to be recharged at a commercial garage.

509. **MONTHLY REPORTS.** The Engineer shall make a report to the Librarian on the last day of every month, containing a tabulation of all gasoline and oil received and issued during the month, and amount on hand at beginning and end of the month, as follows:

	Gasoline Gal.	Oil Qt.
On hand, ..., 19.....,	.....	.....
Received during the month of .....,	.....	.....
Issued during the month of .....,	.....	.....
Balance on hand ....., 19.....,	.....	.....

SECTION 6.

EQUIPMENT AND SUPPLIES.

Index.

Paragraph	Subject	Paragraph	Subject
601.	Requisition for Purchases	605.	Stock List.
602.	Approval of Invoices.	606.	Disposition of Equipment.
603.	Property Accountability	607.	Standard List of Operating Equipment.
604.	Issuance.	608.	Standard List of Operating Supplies.

601. **REQUISITION FOR PURCHASES.** The Engineer shall be responsible for ordering all necessary equipment, supplies and purchases for the operating force. Requisition, upon a form prepared for the purpose, will be submitted weekly to the Librarian.

602. **APPROVAL OF INVOICES.** Invoices from merchants for the purchase of equipment and supplies are received by the Librarian and forwarded to the Engineer. Upon receipt the latter will check very carefully the purchases received as to quality and quantity, and if found to be in accordance with the specificied requirements, will "O.K." the invoice, initial the same, and return immediately to the Librarian in order that the Library may take advantage of any discount allowed by dealers for payment of bills within a certain specified time after receipt of purchases.

603. **PROPERTY ACCOUNTABILITY.** For purposes of property-accounting all purchases for and used by the operating force shall be classified as follows:

a. **Equipment:** All property of a permanent nature, the character of which is not changed, and which is not destroyed or discarded after a single use, or incorporated with the building so as to become an integral part thereof, such as axes, saws, brooms, dusters, lawn mowers, hose, and all other purchases of similar nature.

b. **Supplies:** All items of property essentially temporary in nature and used only once then discarded or destroyed, or property incorporated into the building, such as paper, ink, pencils, twine, nails, screws, locks, paint, glue, etc.,

604. **ISSUANCE.** Property of the above two classifications will be issued as follows:

a. **Equipment:** Operating equipment will be as designated by the Librarian. It will be receipted for on a memorandum receipt, signed by the Engineer, who will be personally responsible for any loss, or any breakage or damage thereto other than that arising from ordinary wear and tear from usage.

b. **Supplies:** Operating supplies will be as designated by the Librarian. Upon acknowledgment of its receipt by the Engineer, by his approval of the invoice, it will be dropped from the stock cards, as issued, without further formality.

605. **STOCK LIST.** An accurate stock list of all equipment and supplies under his care will be kept by the Engineer on stock cards provided for the purpose. A card will be kept for each class of items issued to him, showing date and quantity eceived, date and quantity each issue as made, and balance on hand at time of each issue. The stock cards shall provide an accurate inventory of all equipment and supplies on hand at all times.

606. **DISPOSITION OF EQUIPMENT.** All equipment worn out or broken in use shall be turned in to the Librarian by the Engineer, and credit given on his memorandum receipt therefor. Such equipment shall be immediately sold for junk, or burned or broken up in order to prevent its restoration to the equipment regularly on hand.

607. **STANDARD LIST OF OPERATING EQUIPMENT.** The following equipment is the minimum required for efficient operation of the Library Building:

a. **Janitors' Equipment:**

1 Basket, Oak Splint, 3-bushel, for collecting waste paper.
¼ Dozen Brooms, Corn, 28 pounds per dozen.
2 Brushes, Hair Floor Sweeps.
2 Brooms, Whisk.
2 Brushes, Counter Duster, Bristle, with handle.
1 Brush, Hand, Scrub.
1 Brush, Paint, Flat, 4-inch.
1 Brush, Varnish, Flat, 2½-inch.
1 Brush, Wall, Wool, with extension handle.
1 Brush, Closet Cleaning.
1 Brush, Round Pointed, on wire core for grille work.
2 Dust Pans, with extension wire handles.
100 Feet Hose, Lawn, ¾-inch, with fittings.
1 Nozzle, Brass, for ¾-inch hose.
2 Mop Handles for 20-pound cotton mops.

1 Mop, dustless, for dry use, chemically treated.
1 Mop, Oil, for floors.
1 Pail, 12-quart, galvanized iron.
1 Pail, 16-quart, galvanized iron.
1 Mop-Wringer to fit 16-quart pail.
1 Lawn Mower, 18-inch, with canvas grass catcher.
1 Wheelbarrow, steel.
1 Pair Shears, Pruning.
1 Pair Shears, Hedge Clipping.
1 Step Ladder, 5-foot.
1 Step Ladder, 15-foot.
1 Shovel, Square-point, D-handle, No. 6.
1 Spade, D-handle, No. 2.
1 Rake, Garden, 12-inch, with handle.
1 Hoe, Garden, with handle.
1 Can, Ash.

b. **Furnace-Room Equipment:**

1 Axe, 4 pound.
1 Auger, Flexible, 6-foot, for cleaning water closets.
1 Bit, Auger, solid cast steel, square shank, ½-inch.
1 Bit, Auger, solid cast steel, square shank, ¾-inch.
1 Bit, Auger, solid cast steel, square shank, 1-inch
1 Bit, Drill, square shank, 3/16-inch.
1 Bit, Drill, square shank, ¼-inch.
1 Bit, Drill, square shank, 5/8-inch.
1 Bit, Brace, Ratchet, 10-inch sweep.
1 Chisel, Cold, ½ inch by 5¾ inches.
1 Chisel, Cold, ¾ inch by 7½ inches.
1 Chisel, Wood, Socket Firmer, with handle, ¼-inch.
1 Chisel, Wood, Socket Firmer, with handle, ½-inch.
1 Chisel, Wood, Socket Firmer, with handle, 1-inch.
1 File, Round, Second-cut, 8-inch.
1 File, Half-round, Second-cut, 10-inch.
1 File, Half-round, Bastard, 10-inch.
1 File, Flat, Second-cut, 10-inch.
1 File, Flat, Bastard, 10-inch.
1 File, Saw, Slim Taper, 6-inch.
1 Wood Rasp, Half-round, 10-inch.
1 Force Cup, Plumber's Friend.
1 Hack-saw Frame, extension, adjustable for blades 6 inches to 12 inches.
1 Hammer, Engineer's Cross pein, 2- pound.
1 Hammer, Claw, Bell-faced, 1-pound.
1 Hammer, Ball-pein, 1-pound.
1 Hatchet.
1 Knife, Putty, 2-inch.
1 Pair Pliers, Side-cutting, 8-inch.
1 Pair Pliers, Round-nose, 6-inch.
1 Pair Pliers, Gas, 6-inch.
1 Saw, Hand, Cross-cut, 26-inch, 12-point.
1 Saw Hand, Rip, 26-inch, 10-point.
1 Screwdriver, 4-inch.
1 Screwdriver, 4-inch.
1 Wrench, Monkey, 8-inch.
1 Wrench, Monkey, 12-inch.
1 Wrench, Stillson, 8-inch.
1 Wrench, Stillson, 14-inch.
1 Work-bench, 6-foot, equipped with two drawers.
1 Vise, Combination Bench and Pipe, 6-inch, reversible.
1 Tool Case, Wall, equipped with Yale lock, for above furnace room equipment.

608. **STANDARD LIST OF OPERATING SUPPLIES.** The following supplies are the minimum required for the efficient operation of the Library Building.

1 Case, Toilet Paper.
6 Chamois Skins, for polishing windows.
20 yards Cheesecloth, unbleached.
12 pieces Cloth, Scrub, about 28 inches square.
6 Mops, Cotton, 20 pound.
3 pounds Sponges, sheep's wool.
10 pounds, Waste, Cotton.
6 cans, Lye, concentrated.
1 dozen Bars Soap, Laundry.
1 dozen Bars Soap, Ivory, Toilet, (for staff only).

½ dozen Hack Saw Blades, 12-inch.
2 quarts Furniture Polish.
1 dozen cans Lighthouse Cleanser.
100 pounds Sawdust Sweeping Compound.
25 pounds Mermaid Washing Powder.
1 dozen cakes Bon Ami.
1 dozen cans Sani-Flush.
½ gallon "Coro-noleum" Disinfectant.

SECTION 7.

MISCELLANEOUS.

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Paragraph	Subject	Paragraph	Subject
701.	Rats and Mice.	707.	Borers.
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704.	Ants.	710.	Javelle Water.
705.	Aphis.	711.	Floor Wax.
706.	Termites.		

701. **RATS AND MICE.** Keep all food products in storage places inaccessible to rats and mice. Keep all garbage in tightly covered metal cans. Be sure that all holes and openings where these pests can enter are tightly closed. Where holes are gnawed in floors, baseboards and walls, push into the holes from half a pound to one pound of powdered lime hydrate or lime cloride; these materials adhere to their feet, burn them and make them avoid the vicinity where they are placed. Then fill the holes smoothly with plaster of Paris, mixed stiff, with water.

To poison, mix thoroly one tablespoonful of BARIUM CARBONATE, (obtainable at any drug store,) with four tablespoonfuls of melted mutton tallow, cool, and roll into balls, the size of a large pea or a small marble. Rats and mice are especially fond of chocolate and peanut butter, which may be used instead. Place on small squares of cardboard, in locations not over ten feet apart, where rats and mice are known to be; and they will eat the poisoned bait and leave the premises to die. If they are too sophisticated to eat the poisoned mutton tallow, or chocolate or peanut butter, try a variety of bait, (only one kind at a time) such as soft cheese, hamburger steak, beef tallow, etc. **Do not put the barium carbonate on the bait, but MIX IT INTO the bait, very thoroly!** Continue so long as the rodents will eat the bait. This poison is most effective if properly and persistently used.

Altho barium carbonate is practically non-poisonous to humans and larger animals, it is nevertheless very advisable to put it out in places inaccessible to children, dogs, cats, and fowls. In case of suspected poisoning from this cause, use the following:

ANTIDOTE: Give magnesium sulphate, (Epsom Salts,) or sodium sulphate, (Glauber's Salts,) and follow by washing out the stomach with milk and water. Call a physician or veterinarian as the case may require.

702. **GOPHERS.** To rid the lawn of gophers, mark out a two-foot square between two fresh mounds of dirt. Cut out the sod, and dig a square hole a foot or more in depth, until two horizontal holes are found, locating the gopher's tunnel. Then place a small steel trap in the bottom of the hole at the center, anchor securely with wire to prevent its being dragged away, and cover lightly with pulverized earth. Cover the two-foot square hole in the ground with a piece of straw-board or sheet metal, making the edges light-tight, and leaving a 2-inch hole in the cover directly over the trap. Seeing the light shining thru the hole in the cover, in his frantic endeavors to stop up this hole the gopher scrambles around and into the trap.

Or a small trap may be set at each of the uncovered openings of the horizontal tunnel, anchored, covered with pulverized earth as above-described, and the pan of the trap baited with a carnation stem, or a piece of carrot or sweet potato.

To poison, make a probe from an old shovel handle or 1-inch pipe, with a foot-rest about 12 inches from the sharpened lower end. Near a fresh mound of dirt probe the ground until the probe sinks into the tunnel. Cut carrots, parsnips, sweet potatoes, etc., into 1-inch cubes, and sprinkle with a small amount of powdered strychnine and sacharrine. Drop into tunnel and cover the probe hole tightly. Do not allow dirt to drop into the tunnel and cover the bait.

To suffocate with carbon bi-sulphide, level off all openings in the evening. Into the new openings the next morning insert a waste ball, saturated with about two ounces of carbon bi-sulphide, and close the opening tightly. Do not set fire to the carbon bi-sulphide. For effective treatment the ground must be damp; the gas will escape thru cracks and fissures in dry ground. For accidental poisoning administer the following:

ANTIDOTE: Give an emetic of mustard followed by large draughts of warm water. Give powdered charcoal. To relieve spasms let patient inhale pure chloroform or give chloral hydrate, (25 grains).

703. **COCKROACHES.** For cockroaches, mix thoroly, one teaspoonful of powdered breakfast cocoa and one teaspoonful of powdered borax. Divide into four parts, place on small squares of cardboard, and set out of sight near the haunt of the cockroaches. A commercial product known as "Black J", manufactured by the Jorgenson Company, 1310 Glendale Boulevard, Los Angeles, California, is also said to be quite effective.

704. **ANTS.** To prevent ants from entering the building, and from carrying fungus diseases and aphides from plant to plant, they should be exterminated. *Make a mixture of equal parts honey* and water, one cupful each. Add one level teaspoonful of Paris green. Mix and thoroly dissolve. Purchase a half-dozen or a dozen quarter-pint screw-top glass jars, having vertical grooves moulded

in the glass across and at right angles to the threads, permitting openings for the passage of the ants when the enameled metal top is on the jar; these jars can be bought at any ten cent store. Fill half-jar half-full of loose cotton waste, rag or excelsior; then pour about ¼ full of the honey-Paris green solution. Bury the jar in the ground near the ants' nest, leaving the top exposed. The ants will eat the poisoned solution, and go into their nest to die. The glass containers should be thoroly cleaned and refilled at least once each month during the summer season, or so long as ants are noticed.

To destroy colonies of the large red ant found in regions west of the Mississippi River, in the United States; excavate the nest, (made of small twigs and sticks,) to a depth of about six inches below the level of the adjacent ground. Place one heaping tablespoonful of Potassium Cyanide in the center of the excavation. Cover with dry earth—clay if obtainable—over an area of not less than five or six feet in diameter. Wet thoroly, forming cyanogen gas, which permeates the nest and kills all ant life therein. The blanket of wet clay confines the gas and prevents its escape.

WARNING! Potassium Cyanide is deadly to all animal life. Keep from children, from all fowls and from all animals.

For ants in the building, powdered borax sprinkled where they run is very effective. A new chemical called "Cryolite" is also good—irritating their feet, causing them to lick them and thus taking the poison cryolite into their stomachs.

705. APHIS. Aphis are spread from plant to plant by ants, who cultivate them for the sake of a sweet secretion, somewhat as people care for milk cows. The remedy is two-fold; first get rid of the ants which carry them about; then spray the affected plants with "Blackleaf 40", nicotine solution, soap spray, procurable at any drug store. Thoro washing with hose, throwing the water full force on the plants, also is very helpful in keeping the aphis.

706. TERMITES. The most effective prevention of termite damage is to take proper precaution in the design and construction of the building itself. But where termites infest an already-completed building it is necessary to adopt other measures, some of which are as follows:

1. Gather and burn all boards, blocks, sawdust, roots, stumps and wood material of EVERY kind from beneath the building and from the premises.
2. Paint all wooden facings, sills, siding and all other exposed wood parts of the building with a thick, heavy coat of paint, being especially careful to fill all joints and cracks with paint.
3. Provide adequate ventilation by removing all shrubs and plants from in front of any openings leading under the building.
4. Where termite tunnels are noticed on walls or on trees or shrubs, break open the tunnels down to the ground, and fill with Paris green or sodium fluosilicate. Spade or loosen up the ground all around the opening of the tunnel and wet thoroly with a solution of 4 pounds of zinc chloride, or copper sulphate, or borax in 5 gallons of water.

Where the termites discover the broken and plugged tunnel they immediately begin to eat out the poison plug, carrying the poison in their stomachs and adhering to the small hairs on their bodies down into the nests. Other termites grooming them off or eating the poisoned dead are themselves poisoned; and in this manner in a very short time the whole colony is exterminated.

5. Make careful and intelligent inspections at regular and frequent intervals.

By these means the possibility of damage to existing structures by termites is reduced to a minimum.

WARNING! When using Paris green as a powder, always keep a wet sponge over the mouth and nasal passages; and when finished, thoroly clean the body, especially the hands, and change clothes. If the Paris green gets into the eyes, treat immediately with a 5 per cent boric acid solution.

707. BORERS. The presence of these pests is indicated by little cones of fine powder on the floor or on the furniture, near a tiny hole in the infested furniture. They seem to have a preference for seasoned oak.

Fill the reservoir of a hypodermic needle with Carbon Bi-sulphide. Insert the needle into the hole as far as it will go. Push the plunger of the hypodermic needle, filling the hole with the Carbon Bi-sulphide.

WARNING! Do not use Carbon Bi-sulphide near an open flame, or strike a match near this highly inflammable material!

708. SILVER-TAIL MOTHS. These pests, otherwise known as "Silverfish," are especially destructive to the bindings of books, chewing them up to get at the paste which holds them together. To rid the premises of these moths requires a two-folds remedy: 1. Destroy those already on the shelves among the books; and 2. Destroy those breeding or hatching under the building.

For the first class mentioned above, simply scatter Buhach powder, obtainable at any drug store, generously over the shelves behind the books where these insects have been seen.

For those of the second class, mix one-fourth teaspoonful of Paris green thoroly into a heaping tablespoonful of Library Paste. Put a small quantity of this mixture on ten or twelve 4-inch squares of cardboard, dividing it equally among all the squares. Set out, evenly distributed, in the unimproved space beneath the building. The odor attacts the moths to the mixture, who eat it and die.

If Library Paste is not available, mix three parts of Wheat Flour with one part Glucose or Corn Syrup, add a very little water and boil until a thick creamy paste results, and the starch of the flour has been converted largely to dextrin. Cool, and add about one-eighth of its volume of Paris green. Mix thoroly and spread out beneath the building as directed in the preceding paragraph.

709. MOLD. Mold and mildew on the backs of books, bound magazines and bound newspapers are promoted by—

a. Moisture.
b. Warmth.
c. Darkness.
d. Lack of Ventilation.

The obvious method of ridding the Library of these funguous growths is to provide constant and thoro circulation of dry, cool air, and sunlight if possible, in those stacks and storage spaces where mold and wildew are giving trouble. Bypass that portion of the air for this portion of the building around the air-washing apparatus and around the heating system. If the climate is too cold, provide a separate heating unit, and use only raw, unconditioned air for this section.

As a germicide to kill the spores of mold and mildew floating in the air and settling on the backs of books, bound magazines and bound newspapers in storage, dissolve four 1:1000 tablets of Corrosive Sublimate, (Bi-Chloride of Mercury,) in one pint of Grain Alcohol, (Ethyl Alcohol.) Mix equal parts of this solution with Shellac used in book-binding, and paint the covers of the books, etc., quite heavily with the shellac mixture. This dries readily, leaving a film on the backs of books, etc., where used which destroys the spores as the settle on this film and prevents the growth of mold and mildew.

WARNING! Corrosive Sublimate is a deadly poison, both internally and externally! Handle it only when protected at all times with rubber gloves on the hands. After handling the Sublimate, wash the gloves thoroly, and scrub the hands with water and soap.

Do not use the mixture stronger than that indicated above; otherwise it is likely to corrode and rot the backs of the books, etc., upon which used, and cause ulcers upon the hands of persons using such books. If used according to the above directions the procedure is perfectly safe to all persons handling the books treated in this manner.

710. **JAVELLE WATER.** To make Javelle Water for removing stains from marble and other surfaces: Boil four pounds of Sal Soda, (Washing Soda, or Sodium Carbonate,) in one quart of water for ten minutes. Add one pound of Chloride of Lime, free from lumps, and stir thoroly. When cold, strain into a large bottle or jug, and keep tightly corked.

711. **FLOOR WAX.** To make Floor Wax, melt together four pounds of Carnaube Wax and four pounds of Ceresin, ("Beeswax;") Stir thoroly. Remove from vicinity of any fire, and add six pounds —(all proportions by weight)—of Turpentine. Mix until a uniform mixture or paste is produced. While still warm and fluid, add Cleaning Solvent or Gasoline until the desired consistency is produced. If a liquid wax is desired, use Solvent or Gasoline as necessary to produce the proper degree of liquidity.

WARNING! Do not use Turpentine, or Cleaning Solvent, or Gasoline, near a fire or a flame of any kind, or near a red-hot stove top! Their vapors are very highly inflammable, or explosive!

For melting the Carnauba Wax and Beeswax, use an electrical hot plate, entirely inclosed in a metal inclosure so no fumes of turpentine, gasoline or cleaning solvent can possibly come in contact with the red-hot electrical heating element.