BUILDING APPLICATION FORM.

WELLINGTON,

Date, 20 January 19 24.

To the City Engineer,
Wellington.

Sir,

I hereby apply for permission to erect two Banking Chambers

at Customhouse Place (House No. and Street.) for National Bank of New Zealand (Owner)

of Wellington (Address) according to Plans

and Specifications deposited herewith.

Particulars of land :—Lot No. 204 TOWN SECT ~~OR D.P.~~ 277

Frontage 45 By depth of 80 Area

Particulars of Building :—Foundations Concrete Walls Concrete

Roof Concrete Area of Ground Floor square feet

Area of Outbuildings sq. ft. Estimated Cost £ 27967

Yours faithfully

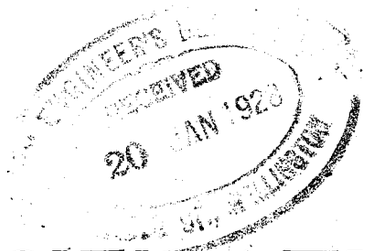
The Fletcher Construction Co Ltd Builder
per J Fletcher

Postal address Box 1746
Wellington

Drainage Plan
Section No. V 7A

SET 4

COPY FOR .....



SPECIFICATION.

CONTRACT FOR

NEW · PREMISES &

OFFICE · BLOCK

COURTENAY · PLACE · WELLINGTON

for

THE · NATIONAL · BANK · OF · NEW · ZEALAND LTD.

ATKINS & MITCHELL,
Architects,
WELLINGTON.

DATE · November · 1927

MEMORANDA.

Tenders Close.....

.....

.....

.....

Deposit with Tender .....

Date of Completion.....

.....

Penalty for Non-completion.....

Maintenance.....

PRIME COST.—The words prime cost or the initials P.C. in this specification mean the retail price in the district of.....
vide clause 16 of Conditions of Contract.

PROGRESS PAYMENTS.—No certificate shall be issued for less than £.....
vide clause 19 of Conditions of Contract.

NOTE.—The above is an extract of the general Conditions or Contract, but tenderers are advised to peruse the general Conditions to be seen at the Architects' Offices.

ATKINS & MITCHELL,
ARCHITECTS.

NATHAN'S BUILDINGS,
WELLINGTON, N.Z.

C. H. MITCHELL,
Assoc. Royal Institute of British Architects.
Assoc. New Zealand Institute of Architects.
Member Royal Sanitary Institute (London.)

October 1927

SPECIFICATION

of

Works required to be done and materials to be used in the erecting and completing

NEW BANKING PREMISES AND OFFICE BUILDING

COURTENAY PLACE, WELLINGTON

for

THE NATIONAL BANK OF NEW ZEALAND LTD

according to drawings prepared by, instructions to be given by and to the entire satisfaction of the Architects.

GENERAL CLAUSES.

(G.1) SITE. **The site is situate on the south side of Courtenay Place and is the site of the present Bank and adjoining Shop, having a frontage of 45'0".**

(G.2) DRAWINGS. The drawings forming part of this contract and herein referred to are as follows:-

Drawing No. 1 - Elevation & Roof Plan, scale 1/8" to 1 foot.
Drawing No. 2 - Plans, to a scale of 1/8"to 1 foot.
Drawing No. 3 - Sections, " " " "
Drawing No. 4 - Front Elevation (lower portion) scale 1/2" to 1 ft.
Drawing No. 5 - " " (upper portion) " " "
Drawing No. 6 - Part Ground Floor Plan, " " "
Drawing No. 7 - Section of Banking Chamber, " " "
Drawing No. 8 - " " " " Rear, " " "
Drawing No. 9 - Cross section of Banking Chamber " " "
Drawing No.10 - Plan & Section of Staircase, etc. " " "
Drawing No.11 - Plan of Fittings, etc. " " "
Drawing No.12 - Elevations of Fittings, " " "
Drawing No.13 - Elevations of Steel Sashes, " " "
Drawing No.14 - Plan of Beams, etc, " 1/8" "
Drawing No 15 - Typical Floor Beams, " 1/2" "
Drawing No.16 - Typical Floor Girders, " " "
Drawing No.17 - Details of Piers, etc. " " "
Drawing No.18 - Roof Beams., " " "
Drawing No.19 - Roof Girders, " " "

(G.3) TENDERS CLOSE. Tenders close at Noon on Monday Dec 12, 1927 and must be delivered by that time to the Architects' Offices, Wellington, and marked "TENDER" on outside. Telegraphic tenders will be received up to the above time provided they are confirmed in writing posted previous to time of closing.

(G.4) DEPOSIT CHEQUE. A deposit cheque of £250 : 0 : 0 made payable to the Architects must be forwarded with the tender.

(G.5) CONDITIONS. The General Conditions of Contract are those issued by the New Zealand Institute of Architects and a copy will form part of this contract.

(G.6) DATE OF COMPLETION. If any tender is accepted the site will be handed over on or before January 2, 1928 and the Contractor must be prepared to commence building operations immediately and complete the whole of the works within 65 weeks.

(G.7) CONTINGENCIES. The Contractor shall allow the lump sum of £ 250 0 : 0 for contingencies. This sum is to be expended only as the Architects may direct and will be deducted, if not required, in whole or part from the amount due to the Contractor on completion of the work.

(G.8) EXAMINE SITE. Tenderers are advised to visit the site as the ground line shewn on the drawings cannot be guaranteed, but is believed to be approximately correct.

(G.9) PERMITS. All work to be carried out in conformity with the local by-laws. All building, water, lighting, drainage, or other permit as required by the local or other authorities must be taken out and paid for by the Contractor, before each particular work is commenced.

(G.10) HOARDINGS. All hoardings complete as required by the local authorities shall be erected by the Contractor, who shall give the necessary notices and shall remove the hoardings when no longer required and make good any damage that may have been done.

(G.11) FOOTPATHS. The Contractor is to make good to the entire satisfaction of the local authorities and the Architects, any damage done to the footpaths or kerbing.

(G.12) MATERIALS AND LABOUR. The Contractor shall provide all materials and labour of every description except where otherwise specified, and other requisites whatsoever necessary for the proper and effectual carrying on, execution and completion of the whole of the works described in this specification.

He shall finish the work to the true intent and meaning of the drawings and specifications taken together, whether a portion of the same may or may not be particularly shewn on the drawings or described in this specification, provided the same is to be reasonably inferred therefrom.

(G.13) SETTING OUT. The Contractor is to do the setting out of all the works and is to be responsible for their accuracy and must amend any errors.

(G.14) FIGURED DIMENSIONS. The figured dimensions on the drawings are to be considered correct and must be adhered to and followed in preference to scaled ones.

(G.15) FOREMAN. A competent general foreman shall be constantly on the works, and any directions or explanations given by the Architects or their representative to such foreman, shall be held to have been given to the Contractor.

(G.16) CLERK OF WORKS. The Contractor shall provide a proper office for the clerk of works, of approved size, with opening window and door with approved fastenings. It is to have a desk, lock up draw and chair. Provide an oil or other approved suitable stove for warming when required.

(G.17) ATTENDANCE. The Contractor shall attend on, cut away for, and make good after all trades.

(G.18) CLEANING UP. The Contractor shall clean up the whole of the site and buildings at the completion of the contract and shall leave the whole, including windows, perfectly clean and fit for immediate occupation.

(G.19) ADJOINING PROPERTIES. The Contractor shall be responsible for the adjoining properties and shall make good at his own expense any damage that may be done to these buildings or contents during the progress of the work.

(G.20) LUMP SUM SUB-CONTRACTS. The Contractor shall include in his tender the undermentioned amounts as lump sums for special works as follows:—

For the whole of the Bank Fittings, Page 43,	£1500-0-0
For the whole of the Hot Water Heating, Page 63,	£ 750-0-0

Separate prices will be obtained for these special sub-contracts or works, all of which will be carried out in accordance with the attached specifications. The firms selected shall be deemed to be accepted by the Contractor as the Sub-contractors for these works. (The Contractor's attention is drawn to Clause of the General Conditions of Contract in which reference is made to "Lump Sums".)

All necessary facilities, together with the use of plant, staging, etc., shall be provided by the Contractor for these special tradesmen. He shall do all jobbing and other work required by these Sub-contractors for the carrying out of their work.

He shall be entirely responsible for any damage to goods provided by any special tradesmen or Sub-contractors after they have been delivered on the site.

In the event of any dispute arising between the Contractor and the Sub-contractors, the Architects' decision shall be final and binding to all parties.

Each tenderer to state the names of his other Sub-contractors when required to do so.

(G.21) ADDITIONAL SUB-CONTRACTS. The Contractor shall grant all facilities to any servant of the Owner or to any additional Sub-contractor not mentioned herein, so that any work such special men may be engaged upon may be proceeded with during

the progress of the contract ; and the Contractor shall not be entitled to be paid anything over and above his contract price to remunerate him for giving such facilities or for any inconvenience he may suffer by reason of any person being engaged upon the premises concurrently with himself, and any remuneration the Contractor may consider himself entitled to by reason of giving such facilities, or in connection with anything in this clause contained, shall be provided for by him in making up his contract price. The whole of this clause shall apply to this contract, notwithstanding anything contained or implied in the General Conditions of Contract annexed hereto.

The Contractor is to give ample notice to the servants of the Owner of his readiness for all pipes, fixings, etc., so that everything that is necessary to be bedded in any portion of the work shall be done as the work proceeds.

(G.22) PURCHASE OF SPECIAL GOODS. The Owners reserve the right to purchase all fittings, etc., for which p.c. prices or lump sums are specified from any firm they may desire, and from either stock or by indent. The p.c. prices quoted shall be the p.c. prices in Wellington and the Contractor will be entitled only to the usual trade discount. Where lump sums are specified such as for steel windows, heating, lifts, floor coverings, sanitary fittings, etc., the amounts allowed are nett, and the Contractors must add their own profit to such sums specified, as no discount will be allowed. These lump sums allowed are reasonably correct for the work to be done or for the purchase of the goods required, but should the cost be more or less than these amounts, the nett difference shall be added to or deducted from the contract price and the Contractor shall not be allowed any further profit.

(G.23) PROTECTION OF COMPLETED WORK. The Contractor must properly protect his work from injury until the final completion of the building and the acceptance by the Employer. The Contractor shall also be responsible for the protection of any work executed by the Sub-contractors or special tradesmen, and any damage done by the Contractor, his Sub-contractors, or his employees must be made good by the Contractor or at his expense.

(G.24) REMOVALS Immediately upon possession of the site being given to the Contractor he shall commence and proceed continuously with the pulling down of the whole of the existing building, viz. the existing Bank and the adjoining fruit shop, on the site 45'0" x 80'0". Every precaution must be taken by him to prevent injury or damage to adjoining properties or buildings or to any person or public property adjacent to the site, and the Contractor shall be held responsible for and shall make good as the Architects may direct, any such damage or injury.

Search for and remove all old drains, gulleys, etc. that may be upon the site and seal ends to approval.

The Contractor is not to allow for the removal of the present Strongroom door and Bank fittings (i.e. desks, counters, screens, etc.) as this will be provided for in transferring Bank premises.

~~A sum allowed for the temporary work and fittings.~~

(G.25) OLD MATERIALS The whole of the old materials taken from the buildings at present occupying the site shall become the property of the Contractor, who shall remove and cart away the whole from the site, except such materials as desks, fittings, Strongroom door, that are required by the Employer in fitting up temporary premises.

E X C A V A T O R.

(See also other trades and special clauses.)

(Ex.1) EXCAVATE Form the site to the required levels and excavate for all foundations, footings, drains and for basement, and remove all surplus soil and leave all clear and clean on completion.

The excavation for basement adjacent to any underpinning must be conducted in sections sufficient only to allow the umderpinning of the walls of the premises adjoining being executed in the surest and most approved manner.

The Contractor shall provide all shoring and needling required for supporting the ground on site and to ensure the safety of the adjoining properties and walls; also all planking, strutting and pumping (if necessary) required to the excavations.

All foundations and footings shall be carried down to a solid approved bed and stepped as necessary in an approved manner.

(Ex.2) UNDERPINNING Very carefully underpin in short approved lengths with brickwork in cement mortar on prepared concrete bed or in concrete, the walls of both the adjoining buildings where the new basement walls extend below them. The underpinning to extend down to the level of the underside of the footings of the new wall and to be of the full thickness of the old walls.

Allow the lump sum of £400 for the whole of the underpinning necessary.

(Ex.3) FILLING Fill up to level required under all concrete floors with approved brick rubbish or approved spoil well rammed, wetted and properly consolidated to approval.

(Ex.4) FOUNDATIONS All foundations and footings are to be commenced on a perfectly sound bed and nowhere less than 12" below the ground level as finished. After the foundations are above the ground level the excavated material is to be filled in round same and well rammed and consolidated. No portion of the foundations is to be covered up until it has been approved.

D R A I N L A Y E R.

(See also other trades and special clauses).

(D.1) ACCORDANCE WITH BY-LAWS. All drainage work is to be strictly in accordance with the local by-laws notwithstanding any omission herein and to the entire satisfaction of the Engineer and all instructions issued by him must be carried out.

All work included in this specification not being in contravention to the by-laws is to be carried out as specified.

(D.2) STONEWARE PIPES. All stoneware pipes are to be double glazed, well burnt, socket earthenware, true in shape and free from cracks and other defects, all to be approved.

(D.3) GULLIES AND TRAPS. All gullies, traps, manhole channels, and other drainage connections shall be of similar quality to the stoneware pipes and all to be approved.

(D.4) LAYING DRAINS. All drains shall be commenced at the point of outfall and worked back to the highest part with at least 12" of cover, all branches and other connections being put in as the work proceeds.

The whole of the drains shall be laid to a true and even gradient not flatter than one in forty for 4" pipes and one in sixty for 6" pipes.

All joints and connections must be carefully made, solidly bedded and jointed in neat cement with bold collar of same and finished perfectly smooth inside.

All branch drains shall have sharp dip down at finish to prevent wash from main drain and to have easy curve in length. Satisfactory arrangements are to be made so that each straight run shall be able to be conveniently inspected from either end.

An inspection pipe is to be placed just below each junction and also one every thirty feet in length and the position of each is to be permanently indicated on the ground.

Lay all waste and stormwater drains to the sizes and as shewn on plan complete and connect the former with the sewer in road and the latter to discharge into road gutter.

(D.5) VENTS AND TRAPS. The Contractor shall provide and fix all vents and traps as required by the local by-laws.

(D.6) DRAINS THROUGH BUILDING Both the soil and the storm-water drains through building shall be cast iron soil pipe properly jointed in lead and securely supported by means of iron brackets to wall.

(D.7) MANHOLES A manhole is to be built where shewn on drawings and of the sizes and depths required, to be of 9" brickwork laid in cement mortar on a 6" bed of concrete, projection 4" all round outside.

Channels shall be approved channel pipes properly bedded and jointed in Portland cement to an even gradient, with splayed benchings formed to same.

The top to be 3" below ground level and shall be formed of reinforced concrete slab ℔ 2" thick with lifting rings and fitting close on brick set-off.

C O N C R E T O R.

(See also other trades and special clauses.)

(Co.1) CEMENT. Cement to be kept under cover off the ground and properly protected from damp, to be so arranged as to be conveniently inspected for testing and identified to be of the best Portland of Colonial or British manufacture. The brand and quality to be approved by the Architects or their representative and proved equal to the Engineering Standard Committee's Specification for cement.

(Co.2) STONE. Stone to be approved perfectly clean, broken stone or angular gravel, nothing in the foundation larger than will pass through a 2½" ring and elsewhere through a 3/4" ring. The latter also screened through a 1/8" mesh.

(Co.3) SAND. Sand to be approved quality, sharp, clean, pit or river sand, free from all loamy or organic matter and must be well washed if so directed.

(Co.4) CONCRETE. The concrete of all foundations shall be composed of by measure six parts of stone and sand in approved proportions to one part of cement; all other concrete shall be composed of by measure four and one-half parts of stone and sand in approved proportions or gravel, to one part of cement.

(Co.5) MIXING CONCRETE. Concrete to be made on approved mixing boards not less than 10 (ten) feet square and with gauges of required sizes. The aggregate to be loosely thrown in and the gauge filled to level of top only (only one on a board at a time). The cement to be emptied on top and the whole to be turned twice dry and twice wet immediately after mixing and well rammed.

The wetting to be done by means of a sprinkler, care to be taken that no cement is lost and there is no excess of water.

The water to be quite fresh and clean and the resultant for reinforced work to be what is known as the wet mixture.

When required in smaller quantities it is to be as accurately measured.

The concrete shall be used immediately after mixing, and no concrete which has commenced to set shall be allowed in any part of the work.

The concrete for reinforced work shall be laid and

specially tamped in order to secure the most perfect compactness and homogenity throughout the work. The thickness of loose concrete that is to be punned shall not exceed 3" before punning, especially in the vicinity of reinforcing metal. Special care is to be taken to ensure perfect contact between the concrete and the reinforcement, and the punning to be continued until the concrete is thoroughly consolidated.

All concrete laying to be carried evenly round all walls and piers, care to be taken to ensure good connections at all junctions of walls and piers, beams, floors, ceilings, stairs, and wherever else required.

All floors or roofs and beams shall be put in at the same time and all batches for floors shall be put in so that the stops come at the centres of the spans, or where there is the least stress in the concrete. Each section of concrete to be as nearly as possible completed in one operation, and where two or more operations are necessary the work is to be overlapped or joined in the most approved manner.

When recommencing work on recently laid concrete, all foreign matter is to be removed and in case the surface is hardened it must be hacked off and covered with cement grout after the concrete and boxing have been thoroughly cleaned with a hose.

All concrete shall be kept well wetted to prevent too rapid drying as no visible jointings, cracks, or discolourations will be allowed in any part of the work.

When concrete mixers are used they shall be of an approved batch type. Continuous mixers will not be permitted on the job.

(Co.6) BOXING. Properly box where and as necessary, and effectually prevent the possibility of admixture of earth or other unsuitable matter with the concrete foundations.

All centering for reinforced work to form boxes and supports to be plumb, well braced without winding, of such dimensions and so constructed as to be of accurate size and to remain perfectly rigid and unyielding until they are removed, and also to effectually withstand all shocks and vibrations due to laying and tamping the concrete.

The supports to be on a perfectly rigid base prepared for them and set up on folding wedges. Wedges and wire ties

are suitable for securing and tightening up false work and for removing it without injury.

The form boxes and centering to be so arranged that the several portions may be conveniently removed in proper sequence without risk of jarring or otherwise injuring the concrete.

The mould boards of one face of each pillar are to be fixed in place only as the concrete is laid to allow of tamping thoroughly. Bevelled strips where required are to be fixed in the form boxes to finish edges of pillars and beams.

All joints to be made tight so as to prevent any leakage of the liquid mass.

All surfaces of form boxes adjoining concrete tc be first coated with material such as lime wash or soft soap so as to prevent any adhesion of concrete and before being reused to be perfectly cleaned.

Before commencing or continuing to lay any concrete, it is imperative that all sawdust, chips, and other foreign matters are to be removed, and the form boxes and concrete thoroughly cleaned and washed out.

The side moulds of beams and moulds of floor slabs up to five feet shall not be removed before fourteen days and the remaining moulds and supports before four weeks from the completion of the work, but no moulds shall be removed before directed, or until concrete will ring when struck with a hammer.

All concrete beams, piers, bands, lintels and floors are to be of the sizes mentioned in the schedule and those not specially mentioned are to be of the sizes shewn on drawings or specified elsewhere.

(Co.7) REINFORCING METAL. The whole of the metal used shall be of the best quality of Sieman's Martin Mild Steel, and subjected to the tensile and elongation tests prescribed in the British Standard Specification for Structural Steel.

It must be perfectly free from scale, loose rust, oil, or paint.

Each member to be in a single length between supports, no welding allowed.

All bending of members to be done cold and without jerking, and all accurately to templates carefully made from drawings.

All rods to be perfectly straightened and where shewn or desirable their ends are to be cogged.

Every member to be properly braced and wired with No. 6 wire every 2 feet or less, so that it shall be held firmly in the precise position designed for it, so that the placing of the concrete and tamping will not change it. The steel of each portion of the work shall be fixed complete and held securely in correct positions before the concreting of that portion is commenced. The greatest care to be taken to remove any temporary templates or blocks.

The reinforcement and size of beams to be as mentioned in the schedules of reinforcement and each rod alternately to have one end bent up, and each end of each bar to be hooked over and wired to the reinforcement of cross beam at outer end, and extending across beam crossing at inner end and hooked and wired.

The reinforcement of beams, bands, piers, floors, and stairs to be all hooked, well lapped, and wired; the horizontal members in walls to be neatly bent at angles in longest lengths possible. The several beams, bands, piers, floors and stairs, are to be reinforced with steel of the sizes mentioned in the schedule, and any not mentioned to be similar and in similar positions or as directed.

The shear members to beams shall be formed out of 1/2" dia. mild steel rods, ends split and clasped whilst hot round upper and lower rods, forming rigid frames therewith.

Rods in pillars to be truly vertical, removable wooden templates to be used to ensure correct spacing. The rods to extend down to the foundations and to the top members of the beams; the junctions to be lapped 10", each junction made as shewn. The rods to be fixed rigidly in position by C.I. frames properly wired on and also with twisted ties all as shewn.

The reinforcement of pillars, beams, bands and floors to be as specified or shewn, all hooked, well lapped and wired.

The members in bands in walls to be neatly and sharply bent at angles in longest lengths possible, butted joints cogged, wired to cogged pieces of same diameter 2 feet 6 inches long lapping each joint to ensure continuous strength. Great care is to be taken to effectually connect the members at the meeting of bands at different levels.

(Co.8) TIMBER FOR BOXING The timber for boxing to be such as will not stain the finishing plaster work. The Contractor will be held responsible for stains arising from this cause, and it is suggested that white pine boxing be used, particularly for the ceilings.

(Co.9) DEPOSITING CONCRETE Concrete shall be carefully deposited in position and not dumped in from above. It shall not rise in layers of more than 24 inches at a time, and it shall be carried along evenly right round the buildings wherever feasible. Where it is necessary to carry up one wall above the adjoining, then the concrete shall be carefully stepped down, and before the remaining portions are carried up the old work shall be well grouted with neat cement mixed up with water so as just to run freely into the concrete. Concrete must be carefully protected if laid in freezing weather; if any should be allowed to freeze it will have to be broken up and laid with fresh materials.

(Co.10) WORK All foundations, piers, walls, floors, roofs, etc. coloured purple on drawings or details are to be built of concrete to the thicknesses and sizes shewn, figured, herein specified or scheduled.

(Co.11) BUILDING IN Build in as the work proceeds, or when instructed, forming chases or pockets where required for lugs or fixings, all iron, steel, bronze or other work in grilles, panels, casements, railings, gates, etc. and run in with neat cement as directed.

Leave chases in concrete where directed necessary for electrical conduit, pipes, heating pipes where shewn, flashings, etc.

(Co.12) FOUNDATIONS All foundations are to be commenced on a perfectly solid bed and the whole shall be of concrete to the sizes and forms shewn on details.

(Co.13) BASEMENT The basement floor and the walls up to ground level are to be built in two thicknesses. After the excavation is completed and the foundation concrete in, the concrete walls are to enclose the site and a 8" concrete floor laid. The Neuchatel Asphalt dampcourse is then applied to the floor and wall surfaces. On completion of the dampcourse the remaining thickness of concrete to the floor is to be finished, and the vertical dampcourse protected by a brick veneer. The whole of this work must be carried out in such a manner that when completed the Basement shall be permanently watertight.

(Co.14) DAMPCOURSE The whole of the Basement floor and external walls surrounding site is to have Neuchatel or other approved mastic asphalt dampcourse laid within the thickness of the walls and floor. That on floor must be 1" thick and must be laid in two coats to break joint, and that on walls must be 3/4" thick laid vertically on the external enclosing walls to an average height of 6" above the finished ground level. These dampcourses must be carried out by approved experts, and the Contractor is to allow the sum of 14/- nett per square yard of dampcourse in the floor and 14/- nett per square yard for vertical dampcourse.

(Co.15) CONCRETE FLOORS AND ROOF All floors and roofs to be of concrete to the thicknesses, and reinforced with rods, all as set out in the Schedule of Reinforcement.

Leave sinking in concrete floor to size directed in Vestibule for mat.

The roof and reinforced beams to be put in at the same time and allmuns of flooring to be put in so that the stops come at the centres of the spans or where there is the least stress in the concrete. All roofs are to be laid to a fall of 1" in 10'0" and finished ready for receipt of asphalt covering.

Form rough gutters in concrete roof where shewn, laid to falls and prepared for asphalt.

(Co.16) GRADED FLOORS The floors of Lavatories, W.Cs. and the whole of the roofs shall be graded to falls and prepared as directed to receive the finishing material specified.

The thickness of concrete floor or roof given is the minimum in every case.

(Co.17) CONCRETE BANDS AND LINTELS A continuous band shall be carried round all w alls at levels and in positions shewn on drawings, and reinforced with three 3/4" rods.

All lintels over doors and windows where the continuous bands do not serve shall be formed and reinforced similar to bands with at least 9" of bearing at each support.

(Co.18) STAIRS The main stairs and stairs from Basement to Resident Clerk's Quarters shall be formed as shewn on drawings and each tread shall be reinforced with two 1/2" rods and the whole height with two 1" rods in each string, all being well tied to adjoining walls. The newels shall be 5" square formed of concrete reinforced with four 3/8" rods. The balustrade to main stair shall be formed with 3/4" square bars spaced about 5" apart fixed to 1½" bottom, intermediate and top bars and set into concrete treads at intervals at bottom. Horizontal bars shall be secured to newels. Drill top bar for fixing handrail. All to be carried out to detail and to the satisfaction of the Architect.

(Co.19) CONCRETE STEPS All outside steps are to be formed in concrete as shewn on drawings and are to be prepared for nosings

(Co.20) STEEL WINDOWS All windows are to be of the sizes shewn daylight of opening all all to detail. The whole of the windows, including fanlights, ceiling lights and sashes in

Partitions, shall be of steel casement windows, obtained from a firm selected by the Architects, and are to be fixed in position by the Contractor and all made watertight.

For the windows complete without glazing allow the lump sum of £1250 nett delivered on to Job.

(Co.21) PAVEMENT LIGHTS The Contractor shall allow the sum of £210 for "Maxway" or other approved pavement lights to be built in in concrete over ceiling lights, as shewn on drawings.

(Co.22) COLUMNS AND PROJECTIONS Build concrete columns at entrance to detail and carry out all cornices and other projections as shewn in reinforced work, all well anchored into main wall or structural members.

(Co.23) MAIN STRONGROOM The walls, floor and roof of Strongroom shall be formed of concrete as shewn on drawings. The walls and floor shall be 18" thick, and floor as for other portions of basement reinforced with five rows (each 3" apart) of No.30 "Expamet" properly overlapped at joints and angles and held securely in position while t tamping. The ends of all sheets shall be connected and wired at every junction to form continuous tie in every direction. The roof shall be 12" thick with four rows (each 2" apart) of No 30 "Expamet" similarly secured.

Form inlet vent with 6" square junction pipe in floor with 6" square grating in faucet with 4" glazed earthenware pipe laid same as soil drain with fall to outside of building 2'0" above ground at back. The outlet vent to be 4½" x 3" opening at top of wall with vertical flue in wall and sharp slope down to 9" x 3" vent in the outside where directed.

Allow the lump sum of £500 nett for a strongroom door and frame complete, including grille and gate inside.

When building the Strongroom the Contractor must provide an opening to the measurements which will be supplied, and on receipt of the door near the completion of the job he must fit it in position.

Leave recess in wall of cupboard in Manager's Room to size directed and build in small wall safe which will be delivered near completion of the job. Allow the lump sum of £50 nett for this safe complete.

(Co.24) BOOKROOM The walls, floor and roof of BooKroom shall be formed of concrete 8" thick reinforced with one row of 3/4" steel rods at 6" centres both ways securely wired together at intersections with double strands of No.6 galvanized fencing wire twisted to keep rods in position while tamping. The ends of all rods must be connected and hooked round other rods at every junction to form continuous tie in every direction.

Form inlet vent 6" square junction pipe in floor with 6" square grating in faucet with 4" glazed earthenware pipe laid same as soil drain, with fall to outside of building 2'0" above ground. The outlet vent shall have ~~MEAN~~ 4½" x 3" opening at top of wall connected to vertical flue in wall with sharp slope down to 9" x 3" vent on outside face of wall where directed.

Allow the lump sum of £50 nett for Bookroom door and frame complete, to be built in in a similar manner as specified for main Strongroom door.

(Co.25) VENTILATORS Ventilate Basement with approved "Pearson's" patent 18" x 9" cement air bricks finished to match plaster and placed where shewn on drawings.

SCHEDULE OF BEAMS AND GIRDERS.

UNDER GROUND FLOOR

No.	Off	Size over all	Eff. depth	Rods No.	Rods Size	Remarks.
W.B.1 W.B.3 W.B.5 W.B.1a W.B.6 etc.		19" x 12"	16½"	6	3/4"	Run six 3/4" bars round whole of building at ground level. To be bent up at 1/4 pts. of span over supports.
B.1a	2	19" x 10"	16½"	6	3/4"	
B.1b	1	19" x 10"	16½"	6	3/4"	
B.1	18	24" x 12"	16½"	6	3/4"	
B.2	2	19" x 10"	16½"	6	3/4"	
B.3	5	24" x 12"	22"	8	1"	
B.4	2	21" x 10"	20"	6	1"	
B.5	2	15" x 8"	12½"	4	5/8"	
GROUND FLOOR GIRDERS.						
G.1	1	26" x 10"	23½"	8	1"	
G.2	2	26" x 10"	23½"	8	1"	
G.3	2	19" x 18"	16½"	6	3/4"	
G.4	1	24" x 10"	22"	8	1"	
G.1a	1	26" x 10"	23½"	8	1"	
G.4a	1	24" x 10"	22"	8	1"	

BEAMS & GIRDERS - UNDER MEZZ. FLOOR.

No.	Off	Size over all	Eff. depth	Rods No.	Rods Size
W.B.1	1	19" x 10"	16½"	6	3/4"
W.B.3	1	24" x 12"	16½"	6	3/4"
W.B.5	1	24" x 12"	12½"	2 2	5/8" 3/4"
W.B.1a	1	24" x 12"	12½"	2 2	5/8" 3/4"
W.B.6	1	24" x 12"	21"	6	1"
W.B.6a	1	24" x 10"	20"	6	1"
W.B.7	1	24" x 12"	21"	6	1"
W.B.8	1	30" x 10"	27"	6	3/4"
W.B.10	4	24" x 12"	20"	4	5/8"
W.B.10a	6	24" x 12"	20"	4	5/8"
B.1a	2	24" x 12"	21"	4	5/8"
B.1b	1	24" x 21"	21"	4	5/8"
B.2	2	24" x 21"	21"	4	5/8"
B.1	2	24" x 12"	21"	4	5/8"
B.3a	1	24" x 12"	21"	6	1"
B.3b	1	24" x 21"	21"	6	1"
B.3c	4	24" x 12"	21"	4	3/4"
B.1c	10	12" x 8"	9½"	4	5/8"
B.3d	1	24" x 21"	21"	4	3/4"
B.1d	2	15" x 8"	12½"	4	3/4"
B.4	2	24" x 10"	18"	6	1"
S.1	2	18" x 8"	16½"	4	5/8"
S.2	2	18" x 8"	16½"	4	5/8"
S.3	1	18" x 8"	16½"	4	5/8"
GIRDERS. MEZZ.FLOOR.					
G.1	1	24" x 12"	21"	8	1"
G.2	4	28" x 21"	25½"	6	3/4"
G.3	2	28" x 21"	25½"	6	3/4"
G.4	1	24" x 12"	21"	8	1"
G.1a	1	24" x 12"	21"	8	1"
G.4a	1	24" x 12"	21"	6	1"

BEAMS & GIRDERS - UNDER 1st, 2nd & 3rd FLOORS.

No.	Off	Size ofer all	Eff. depth	Rods. No.	Size
W.B.1	1	15" x 8"	12½"	2 2	5/8" 3/4"
W.B.2	1	24" x 12"	21½"	6	1"
W.B.3	1	19" x 10"	16½"	6	3/4"
W.B.4	1	15" x 8"	12½"	4	5/8"
W.B.5	1	15" x 8"	12½"	2 2	5/8" 3/4"
W.B.1a	1	15" x 8"	12½"	2 2	5/8" 3/4"
W.B.6	1	23" x 10"	20"	6	1"
W.B.1b	3	15" x 8"	12½"	2 2	5/8" 3/4"
W.B.6a	1	23" x 10"	20"	6	1"
W.B.7	1	23" x 10"	20"	6	1"
W.B.8	1	30" x 10"	27"	6	3/4"
W.B.9	1	15" x 8"	12½"	2 2	5/8" 3/4"
B.1a	2	19" x 10"	16½"	4	5/8"
B.1	4	23" x 10"	20"	4	5/8"
B.2	1	19" x 10"	16½"	4	5/8"
B.3a	1	23" x 10"	20"	6	1"
(B.3b (on 1st Floor 24" x 12")	2	23" x 10"	20"	6	1"
B.3	4	23" x 10"	20"	6	1"
B.3c	2	23" x 10"	20"	6	1"
B.1	2	18" x 8"	16½"	4	5/8"
S.2	2	18" x 8"	16½"	4	5/8"
S.3	1	18" x 8"	16½"	4	5/8"
GIRDERS, 1st, 2nd & 3rd FLOORS.					
G.1	1	24" x 12"	21½"	8	1"
G.2	4	38" x 15"	35½"	6	7/8"
G.3	2	38" x 15"	35½"	6	7/8"
G.4	1	24" x 12"	21½"	8	1"
G.1a	1	24" x 12"	21½"	8	1"
G.4a	1	24" x 12"	21½"	6	1"

BEAMS & GIRDERS - UNDER ROOF.

No.	Off	Size over all	Eff.depth	Rods No.	Rods Size
W.B.1	1	15" x 8"	12½"	4	5/8"
W.B.2	1	24" x 12"	21½"	6	1"
W.B.3	1	15" x 8"	12½"	4	5/8"
W.B.4	1	15" x 8"	12½"	4	5/8"
W.B.5	1	15" x 8"	12½"	4	5/8"
W.B.1a	1	15" x 8"	12½"	4	5/8"
W.B.6	1	21" x 10"	18½"	6	3/4"
W.B.6a	1	21" x 10"	18½"	6	3/4"
W.B.1b	3	15" x 8"	12½"	4	5/8"
W.B.7	1	21" x 10"	18½"	6	3/4"
W.B.8	1	24" x 10"	21½"	6	1"
W.B.9	1	15" x 8"	12½"	4	5/8"
B.1a	2	15" x 8"	12½"	4	5/8"
B.2	1	15" x 8"	12½"	4	5/8"
B.1	4	21" x 10"	18½"	4	5/8"
B.3a	1	21" x 10"	18½"	6	1"
B.3b	2	21" x 10"	18½"	6	1"
B.3	4	21" x 10"	18½"	6	1"
B.3c	2	21" x 10"	18½"	6	1"
B.4	2	15" x 8"	12½"	4	5/8"
S.1	2	16" x 9"	14½"	4	5/8"
S.2	2	16" x 9"	14½"	4	5/8"
S.3	1	16" x 9"	14½"	4	5/8"
GIRDERS UNDER ROOF.					
G.1	1	24" x 12"	21½"	8	1"
G.2	4	33" x 15"	30"	6	7/8"
G.3	2	33" x 15"	30"	6	7/8"
G.4	1	24" x 12"	21½"	8	1"
G.1a	1	36 x 15"	33"	6	7/8"
G.4a	1	24" x 12"	21½"	6	1"

BEAMS - LIFT HOUSE ROOF.

No.	Off	Size over all	Eff.depth	Rods. No	Size
B.8	1	15" x 8"	12½"	4	5/8"
B.9	2	18" x 8"	15½"	4	3/4"
B.10	2	15" x 6"	12½"	4	5/8"

SCHEDULE OF PIERS.

No.	Size of pier over all	Vert. rods No.	Vert. rods Dia.	Distance from N.A.	Binders.
SUPPORTING ROOF.					
1	14" x 14"	4	7/8"	5"	Binders are to be
2	14" x 14"	4	7/8"	5"	1/4" round bars
3	16" x 16"	4	1"	6"	throughout, spaced
4	14" x 14"	4	7/8"	5"	not more than 6/10 B
5	14" x 14"	4	7/8"	5"	where B is smallest
6	24" x 12"	6	3/4"	4"	dimension of column.
7	14" x 14"	4	7/8"	5"	i.e. for 14" column
8	16" x 17"	4	7/8"	5"	spacing of binders =
9	21" x 21"	8	7/8"	8"	6/10 x 14" = 8·4,
10	18" x 18"	8	3/4"	7"	say 8".
11	18" x 18"	8	3/4"	7"	At footings & at each
12	21" x 21"	8	7/8"	8"	floor for three feet
13	16" x 17"	4	7/8"	5"	above and below this
14	14" x 18"	4	7/8"	5"	spacing to be reduced
15	16" x 21"	4	1"	6"	by half.
16	16" x 16"	4	1"	4"	4, 4a, Colms./10 & 11 are
17	16" x 16"	4	1"	4"	circular on Grd. Fl.
18	16" x 19"	4	1"	6"	to be reinforced with
19	16" x 16"	4	7/8"	5"	10 1" rods. 1/4"
20	16" x 17"	4	7/8"	5"	spiral binding.
21	21" x 21"	8	7/8"	8"	Pitch of helix 6"
22	21" x 21"	8	7/8"	8"	Columns 16 & 17 are
23	16" x 17"	4	7/8"	5"	circular on Grd. Fl.
SUPPORTING MEZZ. FLOOR.					(1'10" dia.) to be
24	21" x 12"	6	3/4"	4"	reinforced with
16a	21" x 12"	6	3/4"	4"	eight 3/4" rods.
17a	21" x 12"	6	3/4"	4"	

Same section of piers to be carried down to 1st floor. Above sizes and reinforcement are a minimum. Actual sizes to be taken from architectural drawings.

SCHEDULE OF PIERS.

No.	Size of pier Over all	Vert. rods No.	Vert. rods Dia.	Distance from N.A.	Binders.
SUPPORTING GROUND FLOOR.					
1	16" x 16"	4	1"	6"	Binders to be 1/4" round bars as before specified.
2	16" x 16"	4	1"	6"	
3	24" x 24"	8	1"	10"	
4	24" x 24"	8	1"	10"	
5	16" x 16"	4	1"	6"	
6	24" x 14"	6	7/8"	5"	
7	16" x 16"	4	1"	6"	
8	16" x 17"	4	1"	6"	
9	31" x 31"	8	1"	13"	
10	27" x 27"	8	1"	11"	
11	27" x 27"	8	1"	11"	
12	31" x 31"	8	1"	13"	
13	16" x 17"	4	1"	6"	
14	18" x 18"	8	3/4"	7"	
15	18" x 21"	8	3/4"	7"	
16	36" x 36"	8	1"	14"	
17	36" x 36"	8	1"	14"	
18	18" x 21"	8	3/4"	7"	
19	18" x 18"	8	3/4"	7"	
20	16" x 17"	4	1"	6"	
21	31" x 31"	8	1"	13"	
22	31" x 31"	8	1"	13"	
23	16" x 17"	4	1"	6"	
24	21" x 12"	6	3/4"	6"	Carried down as 12" wall.
16a	2'6" x 12"	6	3/4"	4"	
17a	2'6" x 12"	6	3/4"	4"	

FOUNDATIONS.

RECTANGULAR FOOTINGS.

Over all depth of concrete, 2'3"

Reinforcement to consist of 3/4" rods spaced at 5" centres both ways, and to have 3" cover at bottom of slab. At 3" below top of slab place 1/2" rods at 5" centres both ways. Rods to extend 12" beyond pier reinforcing on each side.

RUNNING FOUNDATIONS.

Three 3/4" rods to run along footing with 1/2" rods at 12" centres across slab.

BEAMS CONNECTING PIER FOOTINGS.

Connecting Colm. 8-9, 22-23, 20-21, 12-13, 2-3, 5-4, 1-2, 14-15, 18-19, 7-8, 23-1.	Beam 23" x 16" six 1" rods at top of beam are reqd. Where footings to carry walls are already provided these to be used as the beams and to be reinforced as above.

REINFORCING OF WALLS AND OPENINGS.

Walls	Reinforcing.
Concrete walls up to 6" thick	3/8" rods at 12" centres ea. way.
Concrete walls from 6" to 10" thick	Two rows of 3/8" rods at 12" centres each way.
Concrete walls over 10" thick	Two rows of 1/2" rods at 18" centres each way.
Lintels where concrete is under 6" thick	Two 1/2" rods with 9" bearing.
Lintels where concrete is over 6" thick	Two 3/4" rods with 9" bearing.
Round all openings except the heads where continuous bands or lintels apply.	Two 1/2" rods.
Main strongroom walls	To be reinforced with 5 rows of No.30 3" mesh expanded metal.
Main columns on front elevation	Eight 3/4" rods with 1/4" spiral binding. Pitch of helix 6"
Main cornice	Seven 5/8" rods and one 3/4" rod to run longitudinally with 5/8" bent rods at 18" centres. Floor reinforcement to be taken to top of slab and hooked into cornice.
Stairs	Two 1/2" rods to each tread and two 1" rods to each stringer. Where rods bend at landings to be anchored by 3/8" stirrups to top of slab.

FLOORS.

Basement	6" thick	1/2" rods spaced same as Grd. Fl.
Ground floor	6" "	1/2" rods at 7" crs. 1/2" distributors at 28" centres.
1st floor	5" "	3/8" rods at 4½" centres, 3/8" distributors at 18" centres.
2nd floor	5" "	Do. Do.
3rd floor	5" "	Do. Do.
Roof	4" "	3/8" rods at 5" centres, 3/8" distributors at 20" centres.

N.B. Slab between Beams B.4 Ground Floor.

Slab	6" thick	1/2" rods at 6" centres, 1/2" dist. at 24" centres.

Slab between Beams B.4 Mezz. Floor.

Slab	5" thick	1/2" rods at 7" centres, 1/2" dist. at 28" centres.

B R I C K L A Y E R.

(See also other trades and special clauses.)

(B.1) SAND. Same as for "Concretor".

(B.2) CEMENT. Same as for "Concretor".

(B.3) LIME. The lime is to be the best quality hydraulic lime of approved manufacture.

(B.4) MORTAR. Mortar in all brickwork to be composed of by measure two and one-half parts of sand to one of lime, to be mixed not earlier than the day before using, and one-half part of cement added at time of using.

(B.5) BRICKS. All bricks shall be approved hard, sound, red bricks of regular and approved size and shape, with clean arrises, well burnt as deep a red as possible, without flaws, cracks, or other defects and equal to sample on view at the Architects' Office. No soft or imperfect bricks or bats to be delivered on the ground. No broken bricks to be used except where necessary as closers.

(B.6) WETTING BRICKS. All bricks are to be thoroughly saturated with water and laid while wet.

(B.7) JOINTS. All joints, both bedding and vertical, are to be 1/4" thick and filled quite solid with mortar so that there shall not be the slightest cavity in any joint.

All brickwork shall be carried up quite uniformly, the difference in level between any two parts to be within two feet.

(B.8) WIRE BONDING. Insert in all brick walls every eight courses in height (in 4½" walls every four courses) and immediately above and below all openings except where concrete bands occur, a row of approved wire bonding to each 4½" in thickness, to be carried round all walls, hooked together at angles and junctions and turned up and down 3" wherever required.

(B.9) RAKING OUT FOR FLASHING. All joints for flashing shall be carefully raked out and afterwards pointed in cement to match rest of joints.

(B.10) WORK The work includes the erection of all those partitions or portions coloured red on drawings. The whole is to be built true and plumb to the thicknesses either shewn or specified.

(B.11) BOILER FLUE Build the flues to the size shewn from boiler with 9" brickwork all round to full height. The inner 4½" of thickness of the lower portion passing through the Basement, Ground and Mezzanine floors to be of the best firebrick jointed in fireclay. Finish the chimney above roof with a long taper chimney pot to approval.

(B.12) BRICK PARTITIONS The whole of the partitions coloured red on the upper floors are to be built true and plumb with 4½" brickwork set in cement mortar and to have wire bonding as already specified. Also build 4½" thick walls on roof to form pipe ducts and cover ducts with 3" thick concrete slabs.

(B.13) COKE BREEZE BLOCKS Build in approved coke breeze blocks wherever required in brickwork for the substantial fixing of all timber and joinery work, to project 1/4" from brickwork.

(B.14) BRICK VENEER The whole of the internal faces of the Basement, Heating Chamber shewn coloured red on Basement plan is to be built true and plumb as a 4½" veneer to protect the asphalt vertical dampcourse.

(B.15) ROOF COVERING The whole of the roof, including the and gutter in main cornice.
roofs over elevator machinery and area roofs, shall be covered with Val-de-Travers or other approved mastic asphalt. This covering, which shall be 1" in thickness laid in two coats, shall extend 6" up all parapets or adjoining walls so that the whole shall be permanently watertight.

The Contractor shall allow the lump sum of 15/- per square yard for this work to be carried out by experts.

(B.16) WROUGHT IRON GRILLES **The Contractor shall allow the lump sum of £50 for the two wrought iron grilles to be fixed in front of small windows on front elevation,** also between columns on front elevation.

C A R P E N T E R.

(See also other trades and special clauses).

(Ca.1) GENERAL. The distances given between the centres of the framing are to be in every case a maximum, and wherever spacing works out differently the distances between the centres are to be lessened by the insertion of an extra timber.

The whole of the work is to be of the best description, and the whole of the framing is to be framed, bolted, and spiked together in a manner approved by the Architects.

Should the sizes of any timbers be neither figured on the drawings not mentioned in this specification, the instructions of the Architects will be taken.

Care is to be taken that a clear space is left round the edges of all timbers in the walls.

All ironwork to be B. B. Crown or other equal quality, forged, fixed, and finished in a workmanlike manner; bolt heads and nuts twice diameter of bolt and one diameter deep each with two washers, each three diameters wide by quarter diameter deep. All holes in ironwork so forged that the sectional area of the iron is not lessened and the ends of the straps turned in. All ironwork is to be dipped into linseed oil at the forge while hot.

Straps, bolts, spikes and nails are to be full size and so placed as to ensure the most substantial work. Holes to be bored and all nails to be punched where necessary.

(Ca.2) TIMBER. The whole of the timber required for work must be thoroughly seasoned and carefully stacked with wood slips on the site, in a manner approved by the Architects and protected from damp and sun, within 6 (six) weeks from date of acceptance of tender. On failure thereof the Contractor shall forfeit the sum of two pounds stg. for each and every day that any portion of the timber remains unstacked, as aforesaid which sum shall be payable to the said Employer by the Contractor as and for liquidated damages, or the said Employer may deduct the sum from any monies payable by him to the Contractor.

All timber to be free from all defects such as knots and shakes, that for framing to be first quality building heart containing 50% heart wood and all to be guaranted thoroughly

seasoned and dry at time of using. On no account will work be accepted that shows any defect in this latter respect.

All visible timber is to be dressed, and all timber exposed to weather and damp shall be heart of totara.

All other timber, except where otherwise specified, shall be heart of rimu or matai.

All nails throughout are to be well punched.

(Ca 3) PLATFORMS Build platform of 2" joists securely fixed to floor and covered with 6" x 1" full heart of matai T. & G. flooring for ledger desks to s tand on, to be 9" above other floor, all as shewn on details of fittings and finished with 1" riser.

Similarly construct platform to Tellers' Boxes and enclosure for bills, but 3" above general floor.

(Ca.4)ROUGH FRAMES To jambs and heads of all door openings in concrete walls fix with 1/2" ragged bolts built into concrete a rough frame 2" in width by full thickness of concrete, for fixing door frames and finishings.

(Ca.5) BATTENS Provide and fix in beams, walls, ceilings, etc. and wherever else required, 1" x 1½" dovetailed heart of totara battens for fixing fibrous plaster cornices, mouldings, etc.

(Ca.6) FURRING FOR FIBROUS PLASTER WORK. The Contractor shall allow for all the furring necessary for supporting the fibrous plaster cornices and mock beams of the Ground Floor ceiling as shewn on Drawings 7, 8 and 9. The whole shall be constructed with 3" x 2" stuff and framed together and securely fixed to ceiling with bolts where necessary, all erected to approval. Provide 8" x 2" clean oregon joists to ceiling over Manager's Room secured to 4" x 2" ht. totara plates bolted to walls at 3'0" centres with 5/8" bolts. Include for two rows 8" x 1" dwanging.

(Ca.7) TANK STANDS Construct platforms for tanks to rest on the roof. They shall be heart of totara with 4" x 3" bearers and planked with 2" x 6" planks with 2" space between. The approximate size required in 7'0" x 5'0".

(Ca.8) ELEVATOR GATES Allow the sum of £250 for five gates to be erected complete at entrances to elevators.

Also provide and build in in concrete in Lift House on Roof three 15" x 6" x 45 lbs. R.S.Js. for the suport of lift machinery.

J O I N E R.

(See also other trades and special clauses).

(J.1) WORKMANSHIP AND MATERIALS. All timber to be of the best quality, free from all defects and to be absolutely all heart wood. All dressed work, joinery finishings, and all fittings to be prepared, racked and stacked directly the contract is signed to ensure the most perfect seasoning.

In all cases the size specified means the sizes of the material when rough, and not more than three-sixteenths of an inch will be allowed after dressing both sides.

Doors and other prepared joinery are to stand when finished the full size specified or shewn, and the timber to be well weathered after preparation and before putting together.

All inside dressed work is to be hand finished except otherwise specified.

As soon as the contract is signed all timber for Joiner's work shall be cut out and stacked but shall not be wedged up until just before fixing.

All glued joints must be cross tongued and finished in the best manner possible.

All joinery that is to be painted must be knotted and primed before being fixed in position.

All glazed doors to have movable beads to glazed panels.

The Contractor shall close up and protect all joinery including the stairs where liable to injury during the progress of the work.

(J.2) MOULDED WORK. All moulded work must be accurately worked to the full size details supplied by the Architects and all are to be worked on solid.

(J.3) TIMBER The whole of the exposed work in the Banking Chamber and Manager's Room is to be approved selected Blackwood of fine grain, and the exposed woodwork in the remainder of the building to be dark grained heart of rima.

(J.4) DOORS All doors and frames to be to detail, glazed

doors to have panels prepared with beads for glazing.

Door frames in brick or concrete walls are to be either heart of totara or blackwood as directed.

All door frames in walls where there are rough frames are to be 1½" thick by full width of rough frame, the timber to be the same as scheduled for the door under Schedule B. Frames in other walls are to be 4" x 2" solid of timber as above.

All doors shall be made and fitted up in accordance with the particulars set out in Schedule B and all to detail.

All sashed panels shall be prepared with beads for glazing with 1½" moulded sash bars where shewn.

All hinged doors mentioned in Schedule are to be fitted with a 5" pallas motion bright-cased mortice lock in addition to other furniture.

(J.5) GLAZING All glass shall be of approved manufacture, of the best quality without wave or blemish. The whole of the windows, glazed doors and internal screens are to be glazed in an approved manner with glass as set out in Schedule U.

(J.6) IRONMONGERY All ironmongery shall be selected by the Architects where they choose. The Contractor shall provide and fix all ironmongery and furniture mentioned in Schedule.

He shall also provide and fix on neat rails or where directed six dozen selected bronze hat and coat hooks p.c. value 20/- per dozen.

(J.7) SKIRTINGS Provide and fix timber skirtings around all walls of rooms mentioned in Schedule D. Skirtings of the size and of either heart rimu or selected blackwood moulded or plain as scheduled.

(J.8) [illegible].

(J.8) ARCHITRAVES Provide and fix timber architraves around all door openings mentioned in Schedule D to have timber architraves, of the size and of either heart of rimu or selected blackwood moulded or plain as scheduled.

(J.9) PICTURE RAIL Provide and fix to walls of Manager's Room 2" x 1" moulded selected blackwood picture rail to detail, and to the walls of all the offices on Mezzanine, First and Second floors and Resident Clerk's Bedroom and Sitting Room a similar heart of rimu picture rail.

~~(J.10) WARDROBES Provide and fit up in each Resident Clerk's Bedroom a neat wardrobe, wide to be panelled to match doors and top to be finished with neat cornice round all to detail.~~

(J.11) SINK DRAINING TABLE Provide and fit up where shewn in Staffroom a sink, with 1½" thick kauri grooved draining table, with housed 6" skirting round with shelves and match-lined cupboard doors below.

(J.12) W.C. SEATS. Fit up each W.C. with best approved hardwood hinged seat and cover on approved brackets, with proper rubber pads, and fit up neat shelf for cistern.

(J.13) FLAGPOLE Fix kauri or oregon flagpole 27'0" from roof level, of specially selected heart timber out of 8" x 8" worked to correct details, with galvanized pulleys as required for the cords. Tops to be covered with 5 lbs. lead and bottom to be well flashed. Securely fix flagpole to parapets with collars and clamps and bolts as required, and securing same keep woodwork clear so that the water cannot find any lodgement.

(J.14) NAMEPLATES The Contractor must allow a lump sum of £175 nett delivered and fixed in position of the following nameplates or letters:- the single letters "THE NATIONAL BANK

OF NEW ZEALAND LTD" to be fixed on the freize on street front, all outside nameplates, nameplates on doors and Directory inside entrance hall to Offices.

(J.15) BRONZE GRILLES Allow the lump sum of £175 nett for bronze grilles delivered, for the Tellers' and Bills counters, etc. and which must be fixed in position by the Contractor.

(J.16) STEEL SHELVING The Contractor shall allow the lump sum of £200 nett for steel or wooden shelving to be fitted in Basement, Bookroom and various Strongroom throughout the building. The lump sum provides for the fixing in position.

(J.17) RUBLINO FLOORING The Contractor shall allow the lump sum of £500 nett for the covering of the floors of the various rooms mentioned in Schedule D to be prepared for Rubline with Rubline flooring tiles. This work shall be carried out by experts, which is allowed for in the lump sum.

(J.18) BATTLESHIP LINOLEUM The Contractor shall allow the lump sum of £650 nett for the covering of the floors of the various rooms mentioned in Schedule D to be prepared for linoleum with "Battleship" linoleum to be laid by experts.

(J.19) HANDRAIL TO STAIRS. Supply and fix to staircase heart rimu handrail, shaped out of 4" x 3" timber all to detail. Handrail for stair at rear of Banking Chamber to be rimu from Basement to Ground Floor, blackwood from Ground to First Floor, and is to be shaped to detail out of 4" x 3" timber.

(J.20) VERTICAL DUCT A pipe duct is to be constructed where shewn on drawings in office adjoining staircase in front of building, properly framed with 1½" chamfered stiles and rails

1/2" panels. It is to be 9" x 6" inside dimensions constructed in such a manner as will enable it to be removed complete from the concrete walls. Plug concrete walls and fix with brass screws.

(J.21) ADJUSTMENTS: To all carpenter's work for all other trades. Before giving up possession the Contractor is to see that all doors, sashes, locks, etc work easily and make all necessary adjustments.

SCHEDULE B.

SCHEDULE OF DOORS.

Timber: B - Blackwood, T - Totara, R - Rimu.

Position	Timber	Size	Thickness	No.	Panels	Hinges	Furniture selected p.c. value	No. of doors	Remarks.
BASEMENT									
Boiler Room	T	7'0" x 3'0"	2"		Framed, ledged and braced & boarded	1 pr. 4½" butts	10/-	1	
Stationery and Storage	R	7'0" x 3'0"	2"	4	Chamfered both sides	Do.	12/6	2	
Book Lift	R	4'0" x 3'0"	1½"	2	Do.	Hung in box frame	10/-	1	
GROUND FLOOR									
Main entrance (exterior)	T	8'9" x 3'0"	2¼"	8	Bolection moulded outside and rounded inside	Three 4" loose pin butts	60/-	1 pr.	Hung in two leaves.
Main entrance, (Vestibule)	B	8'0" x 3'0"	2¼"	1	Bolection moulded both sides & glazed	Smith's double action springs	120/-	1 pr.	Do.
Office entrance (exterior)	T	8'3" x 2'3"	2¼"	4	Bolection moulded outside and rounded inside	Three 4" loose pin butts	40/-	1 pr.	Do.
Office entrance (Vestibule)	R	7'0" x 2'3"	2¼"	1	Bolection moulded both sides & glazed	Smith's double action springs	120/-	1 pr.	Do.

Position	Timber	Size	Thick-ness	No.	Panels	Hinges	Furniture selected p.c. value	No. of doors	Remarks
Doow to Basement from Office ent.	R	6'8" x 2'6"	1¾"	4	Flush moulded outside chamfered inside	Three 4" butts	10/-	1	
Doors in Manager's Room	B	7'0" x 3'0"	2"	5	Bolection moulded both sides	Three 4½" loose pin butts	15/-	2	
Telephone Room	B	6'8" x 2'8"	2"	1	Flush moulded both sides and glazed	Three 4" butts	12/6	1	
Book Lift	B	4'0" x 3'0"	1½"	2	Bolection moulded one side, chamfered other side.	Hung in box frame	10/-	1	
MEZZANINE FLOOR									
Staff Lavatory, Staffroom, Ladies' Lavatory & Res. Clerk's Sitting Room	R	6'8" x 2'8"	2"	4	Flush moulded both sides	Three 4" butts	10/-	4	
Doors to W.Cs.	R	6'8" x 2'3"	1½"	4	Chamfered both sides	1 pr. 4" butts	10/-	4	
Doors to Offices	R	6'8" x 2'8"	2"	4	Bolection moulded both sides.	Three 4" butts	40/-	2	

Position	Timber	Size	Thickness	No.	Panels	Hinges	Furniture selected p.c. value	No. of doors	Remarks.
FIRST FLOOR									
Doors to Offices	R	7'0" x 3'0"	2"	3	Bolection moulded both sides - top panel glazed.	Three 4" butts	40/-	5	
Doors to Lavatories	R	6'8" x 2'8"	2"	4	Bolection moulded outside, chamfered inside	Do.	10/-	2	
Doors to W.Cs.	R	6'8" x 2'3"	1¾"	4	Chamfered both sides	1 pr. 4" butts	10/-	3	
Doors to Bedrooms and Bathroom	R	6'8" x 2'8"	2"	4	Do.	Three 4" butts	10/-	3	
Doors to Wardrobes	R	6'8" x 2'3"	1¾"	4	Do.	1 pr. 4" butts	10/-	2	
SECOND FLOOR									
Doors to Offices (Corridor to Office)	R	7'0" x 3'0"	2"	3	Bolection moulded both sides - top panel glazed	Three 4" butts	40/-	4	
Between inner & outer Offices	R	7'0" x 3'0"	2"	3	Do.	Do.	10/-	3	
Lavatories & W.Cs.	R.	6'8" x 2'8"	2"	4	Bolection outside, chamfered inside.	Do.	10/-	2	

Position	Timber	Size	Thickness	No.	Panels	Hinges	Furniture selected p.c. value	No. of doors	Remarks
W.Cs.	R	6'8" x 2'3"	1½"	4	Chamfered both sides	1 pr. 4" butts	10/-	3	
THIRD FLOOR									
Same as Second Floor, with the following added.								12	
From Landing to Staircase to Roof	R	6'8" x 2'8"	2"	4	Bolection moulded outside, chamfered inside	Three 4" butts	10/-	1	
ROOF									
From Roof to Lift House	T	6'9" x 2'10"	2"		Framed, ledged, braced and boarded	McCabe track and hanger	15/-	1	Hung on outside of wall.

SCHEDULE C. SCHEDULE OF GLAZING

Position of glazing	Kind of glass
EXTERNAL	
10 windows in clerestory over Banking Chamber	White Flemish
Fanlights over main entrance and Manager's Room, sash over office entrance and two small sashes in main entrance	White Flemish
All fanlights in offices above ground floor and on rear elev.	White Flemish
All sashes to lavatories	White Flemish
Lower sashes of those windows in light areas	26 oz. clear
Lower sashes on main elevation	1/4" polished plate.
INTERNAL	
Main entrance vestibule doors	1/4" polished plate glass with bevelled edges and embossed with name, for which allow sum of £20 nett delivered unglazed.
Office entrance doors and doors to Phone room	1/4" bevelled polished plate glass.
11 ceiling lights in Banking Chamber	Selected lead lights for which allow sum of £120 nett delivered unglazed.
~~11 pavement lights~~	~~Allow the lump sum of £210 unfixed.~~
Top panels of doors to offices	White Flemish glass.

BANK FITTINGS.

(See also other trades and special clauses.)

NOTE:- A separate contract will be let for the whole of the work as specified under this heading, and the tenderer must allow in his tender the lump sum mentioned in Clause (G.20) for this work.

(F.1) CONDITIONS The General Conditions of Contract are those issued by the New Zealand Institute of Architects and a copy will form part of this contract, while the special conditions governing this contract are:-

(1) That the amount of the sucessful tenderer will be included as lump sum in the general specification for the building and the general Contractor shall accept the successful tenderer of this contract as his sub-contractor for the work included in this specification.

(2) Progress payments will be made through the general Contractor on certificate from the Architects and 25 per cent of the contract money will be retained for one month after completion, as required under Wages Liens Act, and 5 per cent for another two months for maintenance.

(3) Before the expiry of the maintenance period the Contractor for this work must see that all doors, drawers, locks, etc. work easily and make all necessary adjustments.

(4) That the work must be commenced as soon as the contract is signed and on notice being given by the general Contractor the whole of the fittings must be delivered and erection commenced within 21 days and completed within another 14 days. The first notice will not be given within 25 weeks after the singing of the contract. The penalty for non-completion will be £4:0:0 per day.

(F.2) WORK The work includes the supply and fixing complete of the following:-

In Banking Chamber:

(1) Four Tellers' boxes complete, including counters, desks, drawers, shelves and doors.

(2) Five ledger desks, each 6'0" long complete with two drawers, one cupboard and one bookrack.

(3) One ordinary desk 12'0" long with four drawers and four bookracks.

(4) One ordinary desk 11'6" long similar to No.3

(5) One ordinary desks 8'0" long with two drawers and two bookracks.

(6) Four ordinary desks 6'0" long each with two drawers and two bookracks.

(7) One accountant's table.

(8) One copying and stamps table.

(9) One typing table.

(10) Two public tables 5'10" x 3'3½" complete with screens.

(11) Two public tables 3'2" x 1'4".

(12) Four counters.

(13) Screens, including three doors.

In Manager's Room:

(1) One office table, movable.

(2) One desk 5'0" long with drawer and bookrack complete.

(3) One movable cupboard complete with doors, shelves, etc.

(F.3) MATERIALS AND LABOUR The Contractor shall provide all materials and labour of every description and other requisites necessary for the proper execution and completion of the whole of the works shewn on the drawings and described in this specification.

(F.4) MATERIALS All materials throughout shall be of the best quality procurable. The timber throughout, unless

otherwise specified, to be of approved selected blackwood, without defect, of fine grain and guaranteed thoroughly seasoned and dry at time of using.

All framing timbers and all other internal timbers hidden from view may be bone dry heart of rimu (i.e. the whole of the visible faces of all fittings must be blackwood).

(F.5) FITTINGS Form all fittings shewn on drawings and specified in Clause (F.2) and to full size details to be supplied. Any portions of the fittings not shewn are to be similar to other fittings shewn in similar positions.

The whole of the work to be of the best cabinet work properly framed, shaped, housed, jointed, tenoned and fitted together and finished perfectly smooth ready for oiling. All moulded work must be accurately worked to the full size details to be supplied, and all to be worked on solid. The screens and other panelling to be out of 2" material with 1/2" full panels, and all moulded as shewn. The posts to be encased as shewn with sunk panel on face. The counter tops to be 1½" full thickness. All drawers to be easy working, those under Tellers' counters to be divided as shewn for notes, and the other to be fitted with nine approved movable hardwood cash bowls to detail. All openings for drawers to be fully enclosed. All desks are to be fitted with bookracks as shewn.

All doors (three) to be full thickness of screen and to be similarly moulded. The cupboard doors to be 1½" full thickness panelled but not moulded.

(F.6) IRONMONGERY All doors to be fitted with mortice locks with selected bronzes brass lever furniture p.c. value 20/- each door. The tellers' box doors are to be provided with yale lock in addition to other furniture.

All cupboard doors, drawers, etc. to be fitted with selected locks p.c. value 7/6 each door or drawer. All cupboard doors to have bronzed brass cupboard bolt inside one leaf. All drawers to have selected drawer pull fitted p.c. value 5/- each. Brass hinges are to be used throughout.

(F.7) POLISHING The whole of the exposed faces of all fittings specified under this specification are to be carefully stained to approval and then French polished so as to produce an even and permanent gloss throughout. The whole of this work must be properly filled, toned and French polished, so brush work allowed, and is to be carried out by approved expert tradesmen, and may be done before putting together, provided that any portion damaged in the fitting up is renovated so as to match adjoining work.

P L A S T E R E R

(See also other trades and special clauses.)

(Pl.1) GENERAL Plasterer is to make good all plaster work after all other trades and leave all work clean and white and in thorough repair at completion.

Care to be taken to cover up and protect all fittings or woodwork throughout the building from plaster splashes during the progress of the work. The Contractor is to be held responsible for any damage which may occur from this cause.

All concrete work to be treated by plaster is to be properly hacked to give secure key and surfaces to be plastered are to be well wetted before being worked on so that there shall be perfect suction and unity, no drumminess will be allowed in any part of the work.

The Plasterer is to see that the Joiner has properly fixed all brackets and grounds before he commences the internal work. Grounds are to be laid where necessary, angles made solid, pipes trimmed for, blocks and pluge fixed for all fittings and all angles rounded.

All plastered or cement surfaces are to be made perfectly level, plumb, raking or curved where shewn or intended to be so; well straightened to grounds, floated, trowelled and finished to a fine face perfectly free from cracks, blisters, water marks or other imperfections, clean and of even tone throughout.

(Pl.2) WORK The whole of the walls, floors, ceilings, skirtings, architraves and cornices must be carried out and finished all as mentioned in Schedule D and all to details or as directed.

(P1.3) SAND Same as for "Concreter".

(P1.4) CEMENT Same as for "Concreter".

(P1.5) HYDRAULIC LIME Same as for "Concreter".

(P1.6) LIME The lime for putty is to be the best approved white chalk lime well slaked and screened.

(P1.7) CEMENT PLASTER The cement plasterto be composed of by measure two and one-half parts of sand to one of cement unless otherwise specified.

(P1.8) EXTERNAL PLASTERING The whole of the exterior faces of front elevation and the front wings of side elevations as far as top of adjoining buildings shall be plastered in two coats. The first coat is to be of cement plaster 1/2" thick and the final coat of cement stucco 1/4" thick in the proportions by measure of two parts of approved silver sand to one part of approved "Medusa" stainless white waterproof cement with sufficient red and yellow oxide added to give a finish similar in colour to Sydney sandstone.

The whole of this work shall be block-lined so as to imitate masonry and all joints shewn are to be cut out 1/4" deep and 3/8" wide and filled with "Medusa" white cement all jointed with jointing tool.

All mouldings, fillets, sells, columns, cornices, all entichments, etc. of the above portion shall be run in the same material and similarly finished.

The whole of the remaining walls including areas, parapets, etc., shall be plastered in two coats. The first cost is to be of cement plaster 1/2"thick and the final coat 1/4" thick of similar material waterproofed as specified later.

(P1.9) WATERPROOFING PLASTER The plaster for the final coat for external plaster, and of all the internal faces of external walls to be plastered, is to be mixed with "Toximent" or other approved waterproofer in the proportion of not less than 9 lbs. to each cask, or its equivalent in bags of cement used.

The Contractor is to be held responsible for the whole building being perfectly weatherproof in every respect and will be required to make good any defect and also any damage resulting.

(P1.10) INTERNAL PLASTER The whole of the internal faces of concrete or brick walls, partitions, ceilings, etc. to be plastered are to be first rendered with a coat of cement plaster 1/2" thick.

The whole of the walls are to be finished with either putty plaster, Keene's cement or tiles as mentioned in Schedule.D.

(P1.11) PUTTY PLASTER SETTING COAT. Finish the whole of the plastered walls and ceilings unless otherwise mentioned in Schedule or specified, with a setting coat composed of by measure four parts of Dunedin lime putty slaked at least a month before using, to two and one-half parts of well washed fine white sand with sufficient plaster of paris added to ensure hard setting, and finished perfectly smooth, true, even light and glossy. All angles in Lavatories and Bathroom are to be well rounded.

(P1.12) KEENE'S CEMENT The whole of the walls mentioned in Schedule D are to receive a coat of Keene's cement carefully applied and polished to a glass like surface.

(P1.13) FIBROUS PLASTER CORNICES Strongly fix all round beams and walls where mentioned in Schedule D fibrous plaster

cornices and other mouldings to the size and as shewn on drawings and details to be supplied.

The whole of the work to be in bold relief cast clean and smooth and finished by neatly stopping all joints in a thorough tradesmanlike manner and all made to match precisely the adjoining plaster.

(Pl.14) TILE DADOES All lavatories, ~~cloakrooms~~, W.Cs., etc. mentioned in Schedule D to have tiled dadoes are to be covered with 6" x 3" white glazed tiles of approved make and q uality, finished true and straight with 6" x 4" internal angle skirting and 6" x 4" external angle capping.

(Pl.15) TILE FLOORS All floors mentioned in Schedule D to be tiled are to be covered with plain ceramic mosaic tiling with plain key border all round each room.

(Pl.16) FINISH OF STAIRS The main stair for full height, the stair from Basement to Resident Clerk's Quarters, and all outside steps shall be finished in cement plaster and finished off with a wooden float to prevent slipping.

The treads of back stair shall be finished with carborundum nosings and a mixture of Portland cement and carborundum powder, in the proportion of one part of cement to two parts of the carborundum powder, dusted on the moist plaster and worked up to a smooth and even surface. One pound of carborundum is to be used for each tread.

Each tread of main stair for a width of 36" and each tread of back s tair for a width of 24" shall be finished with selected 6" x 4½" x 1/2" carborundum nosing tiles p.w. value 2/- each unfixed. The whole tread of all outside steps shall be finished with 9" x 4½" x 3/4" carb. nosings and 6" x 4½" x 3/4" tread tiles each p.c. value 3/-

unfixed. Leave sinking behind nosing on each tread of the internal stairs for linoleum to be fixed flush with general surface of tread.

SCHEDULE D.

SCHEDULE OF WALL, FLOOR AND CEILING FINISHES.

Position	Floor	Skirting	Dado	Ht. of dado	Walls	Ceiling	Cornice	Architrave
BASEMENT								
Strongroom, Stationery Store, Storage & main Basement	Cement plaster				Putty plaster	Putty plaster		
Boiler Room & Passage, including Staircase	Cement plaster				Cement plaster,	Cement plaster limewhited		
GROUND FLOOR								
Banking Chamber including Ent. Vestibule	Cement plaster prepared for Rublino	Keene's cement			Keene's cement	Putty plaster	Fibrous	Keene's cement & 5" x 1" moulded blackwood
Manager's Rm.	Do.	8" x 1" moulded blackwood			Do.	Do.	Do.	Do.
Telephone Room	Cement plaster prepared for lineleum	Keene's cement	Keene's cement	4'3"	Do.	Do.	Do.	5" x 1" moulded blackwood

Position	Floor	Skirting	Dado	Ht. of dado	Walls	Ceiling	Cornice	Architrave
Rear Staircase	Cement plaster to full height				Putty plaster	Putty plaster		
Bookroom	Cement plaster				Do.	Do.		
Public Office Entrance and Vestibule	Ceramic mosaic tiles	Keene's cement			Do.	Do.	Fibrous	5" x 1" moulded rimu
Office staircase & Landings to full height	Cement plaster	Do.			Do.	Do.		
MEZZ. FLOOR								
Lavatories & W.Cs.	White ceramic mosaic tiles	6" x 4" white glazed internal angle	6" x 3" white glazed tiles finished with 6" x 4" ext. angle	7'0"	Do.	Do.	Rounded	4" x 1" bevelled heart rimu.
Staffroom, Landing & Clerk's Sitting Room	Cement plaster prepared for linoleum	7" x 1" bevelled H. rimu			Do.	Do.	Rounded	Do.
Office & Landing Front Mezz.	Do.	Do.			Do.	Do.	Fibrous	5" x 1" moulded heart rimu

Position	Floor	Skirting	Dado	Ht. of dado	Walls	Ceiling	Cornice	Architrave
FIRST FLOOR								
Bedrooms & Landing	Cement plaster prepared for Linoleum	7" x 1" bevelled heart of rimu			Putty plaster	Putty plaster	Rounded	4" x 1" bevelled heart of rimu
Lavatories & W.Cs. & Clerk's Bathroom	Ceramic mosaic tiles, white	6" x 4" white glazed internal angle	6" x 3" white glazed tile with 6" x 4" external angle	7'0"	Do.	Do.	Do.	Do.
Offices	Cement plaster prepared for Rublino or Lino	7" x 1" moulded heart rimu			Do.	Do.	Fibrous	5" x 1" moulded heart rimu
Corridor & Landing	Do.	Keene's cement			Do.	Do.	Do.	Do.
2nd & 3rd FLOORS								
Lavatories & W.Cs.	White glazed ceramic mosaic	6" x 4" white glazed internal angle tile	6" x 3" white glazed tile with 6" x 4" ext. angle	7'0"	Do.	Do.	Rounded	4" x 1" bevelled heart rimu
Corridor & Landing	Cement plaster prepared for Rublino or lino	Keene's cement			Do.	Do.	Fibrous	5" x 1" moulded heart rimu
All offices	Do.	7" x 1" moubded			Do.	Do.	Do	Do.

NOTE All external angles where there are no moulded architraves are to be finished in Keene's cement and slightly rounded.

P L U M B E R

(See also other trades and special clauses)

(Pb.1) ACCORDANCE WITH BY-LAWS All work treated under this heading is to be strictly in accordance with the local by-laws, notwithstanding any omission herein, and to the entire satisfaction of the Local Authorities and the Architects.

All work in this specification not being in contravention to the by-laws is to be carried out as specified.

(Pb.2) CAST IRON All cast iron work is to be of the best quality, substantial, true, sound and clean and free from all defects, and painted in two coats of red lead or dipped in asphaltum as directed.

(Pb.3) SOIL PIPES All soil pipes are to be 4" diameter cast iron, at least 7½" lbs. per foot and in other respects similar to vent pipes.

From buchan trap to sewer the sewage drain shall be 4" heavy cast iron water main.

(Pb.4) VENT PIPES All main and soil pipe vents to be 4" diameter and similar to cast soil pipes, fixed where and as directed, each with approved galvanized vent cowl at height directed.

The main vent pipe from lavatory basins, bath, sink, etc. to be 2" galvanized wrought iron screwed pipe with 1½" branches of similar material. All vents within the building to be 6 lbs. lead. All vents to be carried up a sufficient height above the highest adjacent eaves and to have approved wire cap to stand clear of all projections, to allow straight run and to be fixed with strong wrought grip frames and bolted together and screwed to wall.

(Pb.5) WASTES All wastes within the building and the whole of the wastes and traps to be 6 lbs. lead, to pass through wall with good fall to prevent moisture leading in, and where necessary the waste to have "T" for vent.

The main waste pipe outside building from lavatory basins, sink, bath, etc. to be 2" galvanized wrought iron screwed pipe with 1½" branches of similar material all fixed in manner similar to vent pipes.

All concrete or tiled floors of lavatories or bathrooms are to have falls as directed and to have 1½" lead wastes opened out with gratings and carried through wall with hinged flap as directed.

(Pb.6) LEAD PIPES All lead pipes to be 6 lbs. solid drawn. All junctions of lead pipes with those of other metals are to be made with approved brass couplings.

(Pb.7) LEAD TRAPS All lead traps to be of approved form, of 6 lbs. lead with large mud plugs.

(Pb.8) PIPES AND FITTINGS All wrought pipes and fittings are to be best L. & L. wrought iron steam tubing galvanized, easy bends to be used instead of elbows and all joints screwed and made with red lead cement.

Flanges with bolts and nuts to be used for tank connections and brass unions and expansion joints where necessary.

(Pb.9) TAPS All taps are to be approved H.P. gun metal plated with good threads and full way and all other fittings to be of the most approved, complete and perfect character, to be marked "Cold" on top.

Valves to be approved full way gun metal wheel valves.

The positions and directions of all pipes and

fittings will be pointed out by the Architects and all are to be easily accessible.

(Pb.10) RAIN WATER PIPES All rain water pipes, unless otherwise specified, are to be approved heavy 4" diameter cast iron soil pipe, fitted with all necessary bends, branches and shoes, to be fixed with approved plain band fixings with ragged hold-fasts to walls and coach screws to wood.

The rain water pipes from roofs to light areas to be 3" galvanized wrought iron screwed pipe taken down inside wall to Basement, thence to drainage area. Both these areas to have an overflow pipe as well as the ordinary outlet.

(Pb.11) RAIN WATER HEADS All rain water pipes to have substantial plain C.I. heads to detail 2'0" x 8" deep, with tapered bell mouth and painted and fixed with bolts or screws, all as above. Each to have approved galvanized wire grating over top fitted round pipes and held on snugs.

(Pb.12) CESSPOOLS Form wastes to cesspools in asphalt roofing of 4" lead pipe opened out and grating at top and with bend to R.W. head below.

(Pb.13) FLASHING Flash in the best manner the chimneys, apron flashing to all parapets over Neuchatel asphalt roofs, and in every part of the work requiring it with 24 gauge copper, neatly tacked and dressed down with separate stepping pieces let 1" into brick or concrete work, plugged with lead and cemented over, and wherever required to exclude the moisture, and do all necessary to ensure the whole building being effectually watertight.

(Pb.14) W.C. PEDESTALS Provide and fit up each W.C. with best approved clean white pedestal apparatus as set out in Schedule E, complete with "P" trap with 4" lead soil pipe

to join cast iron soil pipe and 2" lead trap with cap over vent horn.

(Pb.15) FLUSHING CISTERN Provide and fit up each W.C. and urinal with flushing cistern, all as set out in Schedule E.

(Pb.16) URINALS Provide and fit up complete in a satisfactory manner the urinals shewn on drawings and set out in Schedule.

(Pb.17) LAVATORY BASINS. Provide and fit up in the best manner the lavatory basins set out in Schedule, each complete with traps, taps, plug, washers and frame to approval.

(Pb.18) SINK Provide and fit up the sink in Staffroom as shewn and set out in Schedule, complete with trap, taps, plug, washers and frame to approval.

(Pb.19) BATH Provide and fit up complete in the best manner a cast iron enamelled bath of approved quality and size, as set out in Schedule. Fit up complete with large grating, vulcanite plug and chain, with lead overflow and trap complete. The p.c. sum does not include the traps, taps for wastes, which must be provided by the Contractor.

(Pb.20) SANITARY FITTINGS The Contractor shall allow the lump sum of £270 nett for the supply and delivery of the whole of the sanitary fittings mentioned in Schedule E, and must fit up the whole complete in the best workmanlike manner. The lump sum does not include traps, taps, wastes, plugs or chains, which must be provided for by the Contractor, but does include the whole of the W.C. pedestals, flushing cisterns, urinals and automatic flushers, and lavatory basins and frames required and set out in the Schedule.

(Pb.21) SHOWER Provide and fit up complete in the best manner over bath a large approved copper rose shower.

(Pb.22) SHOWER SCREEN Provide and fix largest size plated circular rail with rings for shower curtain.

(Pb.23) SUPPLY TANKS Provide and fit up on platform where directed on roof two 400 gallon square wrot iron tanks properly connected with 2" couplings with gate valves complete.

(Pb.24) WATER SUPPLY From water main in street lay on water with 3/4" pipe to supply tanks on roof. The supply pipe to have 3/4" tee near top and take 3/4" pipe with valve to each tank, each terminating with 3/4" ball cock.

From supply tanks take 2" drop to fittings on 3rd floor, then 1½" drop to fittings on 2nd floor, then 1¼" drop to fittings on 1st floor and 1" drop for remainder. From these drops take off 1" pipe with gate valve at each floor level with 1/2" branches to each fitting on that floor.

Continue drops in 3/4" to point where directed in Boiler Room.

From 2½" connecting pipe between tanks take 2" pipe around the building as far as vertical duct. Pipe to be rpoperly fixed to parapet. Over duct place a 2" x 1" tee with 1" full-way valve and 1" drop down duct to level of mezzanine floor, with tees and stop ends for convenient connection at each floor level.

(Pb.25) WASTE FOR FUTURE CONNECTION In vertical pipe duct fix a 2" diameter screwed G.I. waste pipe from a point 3'0" above 3rd floor, dropping down to Basement and continuing under ground floor discharging over gully in area at rear of building. Fix junctions 12" above floor level on mezzanine and all floors above ready for future connection with lavatory basins.

(Pb.26) VENT PIPE From mezzanine floor to a point 10'0" above roof fix a 2" diameter screwed glavanized iron vent with 2" connections ~~XXX~~ at each floor level, and leave all ready for future connection. Finish each vent with an approved G.I. wire cap.

(Pb.27) CALIPHONT Provide and fit up complete on proper stand in Bathroom a copper caliphont to be selected, and fit up complete in Staffroom a gas ring.

Allow the p.c. sum of £20 for these fittings to be fixed by experts.

(Pb.28) GAS SUPPLY Lay on gas with pipes of full size, the meter to be placed in Store off Public Office Entrence.

Take 1½" galvanized pipe vertically from meter with tee at each floor level. From this raising main take 3/4" galvanized pipe embedded in each floor longitudinally through building and from this pipe take 1/2" risers with stop ends above floor where directed, ready for connection in each of the eight suites of offices on 1st and 2nd and 3rd. floors and one suite on mezzanine. Also run service for gas ring in Staffroom, caliphont in Bathroom and two points each on walls in Basement and Banking Chamber where directed.

SCHEDULE E — SANITARY FITTINGS

NOTE: All fittings Twyford's unless otherwise stated.

Position	No.	Fittings	Maker's No.	Size	Cistern
MEZZ. FLOOR					
Staffroom	1	Sink	216		
Clerks' Lavatory	3	W.C. pedestals	216		White earthenware low down basin with nickel plated flush pipe & external overflow.
Do.	1	Urinals (two stall)	403		Auto. flusher
Do.	3	Lav.basins	502/1	22" x 16"	
Ladies' Lavatory	1	W.C. pedestal	216		White earthenware low down basin with nickel plated flush pipe & external overflow
Do.	1	Lav.basin	502/1	22" x 16"	
1st FLOOR					
Men's Lav.	2	W.C pedestals	216		Cast iron cistern fixed at side with 1¼" inside dia. copper flush pipe
Do.	2	Lav.basins	502/1	22" x 16"	
Do.	1	Urinal	403		Auto. flusher
Ladies' Lav.	1	W.C. PEDESTAL	216		White earthenware low down basin with nickel plated flush pipe & external overflow
Do.	1	Lav.basin	502/1	22" x 16"	
Bathroom	1	Bath			
	1	Lav.basin	502/1	22" x 16"	
2nd & 3rd FLOORS					
Men's Lav.	4	W.C. pedestals	216		Cast iron cistern fixed at side with 1¼" inside dia. copper flush pipe

Position	No.	Fittings	Maker's No.	Size	Cistern
Men's Lav.	2	Urinals	403		Automatic flusher
Do.	4	Lav.basins	502/1	22" x 16"	
Ladies' Lavatory	2	Do.	Do.	Do.	
Do.	2	W.C. pedestals	216		White earthenware low down cistern with nickel plated flush pipe & external overflow

H E A T I N G E N G I N E E R

(See also other trades and special clauses.)

NOTE: A separate contract will be arranged for the whole of the heating installa tion of the building, and the tenderer must allow in his tender the lump sum mentioned in Clause (G.20) for this work.

(H.1) WORK The whole of the work under this heading includes the supply to the site and the fixing complete of the whole of the materials such as piping, boiler, radiators, and labour required for the complete heating installation of the Banking Chamber and Manager's Room and all the Offices.

(H.2) NOT INCLUDED IN LUMP SUM The work not included in the lump sum and which is to be allowed for by the Contractor is:- A pipe to be provided from the water supply tank to position directed near boiler as specified in "Plumber"; a hole for flue of boiler left in brick flue; the cutting of all holes in brick, concrete or woodwork, where necessary for the passage of the pipes, and the fixing where directed in the concrete walls and piers of Banking Chamber galvanized wheet iron pipes in lieu of leaving chases.

E L E C T R I C I A N.

(See also other trades and special clauses).

(El.1) GENERAL. The whole of the installation shall be carried out substantially as set out in this specification and shall be in accordance with the Electric Power Board's and Fire Underwriters' Regulations, notwithstanding any omission herein, and to the entire satisfaction of their Inspectors, and also to the complete satisfaction of the Architects.

The number and particulars of lights are shewn on the plans and given in the attached schedule, but the exact location must be ascertained from the Architects as the work proceeds.

The whole of the wiring shall be concealed and none but first class workmanship and materials will be allowed.

Any work or material which may be necessary for the full and proper completion of the contract is to be supplied without extra charge, notwithstanding that the mention of it may have been omitted from this specification or the schedule.

The general order and general method of execution of the several works shall be as such, in the opinion of the Architects or their representative, shall avoid any delays and be the best in the interests of the work as a whole.

(El.2) CONNECT TO MAINS. Make all necessary connections with the public mains.

(El.3) CONDUITS. All conduits shall be heavy ~~gauge steel enamelled~~ galvd. wrought iron screwed conduit of approved make and must be perfectly free from all burrs, rough edges and clean inside, of ample size so that the wires can be drawn in and out at any time without injury to the insulation.

Conduits, fittings, and distribution boxes must be electrically continuous throughout, being efficiently earthed at each floor and the whole bonded and earthed again at the main switchboard.

All conduits shall be properly bushed and those terminating behind switchboards shall have sockets and internal screwed bushes.

In sizes above 3/4" the use of small radius elbows shall

(E1.10) SYSTEM The mains shall be carried to main fuse and meter board, which will be placed at the head of stair to Basement. From this board lead mains to distribution board for Banking Chamber on landing outside Clerk's Bedrooms on 1st floor. A main switch shall be placed on this board to control the whole of the lights in the portion of building occupied by the Bank.

From the main board take mains to a distribution board placed on landing of each floor and mezzanine.

The lights from the two offices on mezzanine, the suite of offices and two single offices on 1st floor and the two suites and two single offices on 2nd and 3rd floors are to be wired back to the distribution board on each floor so that check meters for each can be placed on boards.

(E1.11) WORK The Contractor shall carry out the whole of the work as described in this specification and install complete all the lights as set out in Schedule F.

(E1 12) ELECTRIC LIFTS. The Contractor shall allow the lump sum of £1850 nett for the installation of the following electric lifts:-

(1) The erection of passenger elevator complete,

(2) The erection of an electric book lift.

The work not included in the lump sum and which is to be allowed for by the Contractor is all necessary provisionin connection with the incoming supply mains for the necessary power to supply the following motors:-

1 - 12 H.P. 400 volt 3 phase 50 cycles
1 - 3 H.P. " " " " " "

He shall also provide and fix on main distribution board the necessary fuses together with one three pole ironclad switch to control each of the above circuits independently, such switches to be located on the supply side of the fuses.

From the main distributing board he shall also run one 3 phase and neutral circuit for the 12 h.p. motors which circuit shall terminate in a 3 pole ironclad switch located in the passenger lift motor room situated directly above the main stair well.

Similarly he shall run one 3 phase and neutral circuit for the 3 h.p. motor from the main board, which circuit shall terminate in a 3 pole ironclad switch located in the Basement adjacent to the bottom of the book lift hatchway.

All cables, conduits, fuses, switches etc. are to be provided in place by the Contractor, and the following lighting points are to be included:-

(1) Provide and fix where directed at a point about midway in the passenger lift hatch, one lighting point. This point to be wired on separate circuit.

(2) Provide and fix in lift machine room, one lighting point complete with switch.

(3) Provide and fix in lift machine room, one plug point and switch for connecting thereto a bell transformer. This point to be wired on separate circuit as required by regulations.

SCHEDULE F. SCHEDULE OF LIGHTS

Position	No. of points	Switches	½ watt lamps	Ord. lamps	Fittings
BASEMENT					
Strongroom	5	1	5/50		Stump pendants
Stationery St.	1	1	1/50		" "
Storage Room	1	1		1/50	" "
Main Bank Basement	7	7		7/50	" "
Boiler Room	1	1		1/50	" "
Corridor & Landing	2	2		2/50	" "
GROUND FLOOR					
Banking Chamber	6	6	6/200		Selected
" "	1	Two way double wired	1/200		"
" "	5	5	5/100		"
" "	5	5	5/50		Desk standards
" "	3	3	3/50		Brackets
" Lobby	1	1	1/100		Selected.
Manager's Room	1	1	1/200		"
" "	1 plug for table lamp				
" "	1 " " radiator				
Banking Chamber	2 plugs for adding machines.				
Phone Room	1	1		1/25	Cord pendant
Book room	1	1		1/25	" "
Office entrance	1	1	1/100		Selected
Stairs to Basement	1	Twp way double wired.		1/50-	Cord pendant

P A I N T E R

(See also other trades and special clauses.)

(Pa.1) WORK The whole of the work treated under this heading is to be prepared, rubbed down and pumiced smooth and every part carefully stopped with lead putty. All timber failing to take the paint is to be re-painted to match rest of work.

(Pa.2) MATERIALS The lead used to be genuine white lead and the best orange for priming. Oil to be pure linseed oil and the colour to be well ground, all of approved make and quality.

(Pa.3) EXTERNAL WORK The front entrance doors to Banking Chamber and Office entrance doors are to be stained to approval and finished with three coats of finest durable body varnish.

Steel windows, railings and grilles where embedded in concrete or brick are to have one coat of Siderosthem anti-corrosive paint before concrete is placed in position, and all rebates of windows frames are to be painted one coat before glazing, and then all steel windows, railings and grilles painted two coats in tints directed.

(Pa.4) INTERNAL WORK All internal woodwork (excepting the blackwood finishings on ground floor) is to be stained to approval with an oil stain, tint to be approved, and all is to be carefully rubbed down, spirited, and finished with the finest oil flatting varnish to a perfectly smooth and fine, even, egg-shell polish throughout.

All blackwood finishings on ground floor are to be stained to approval with an oil stain, tint to be approved, and after staining are to be French polished, finishing to a

Position	No. of points	Switches	½ watt lamps	Ord. lamps	Fittings
MEZZANINE					
Landing & Stairs	2	Twy way double wired		2/25	Cord pendants
Clerks' Lav.	2	2		2/50	" "
Staffroom	1	1		1/50	" "
Ladies' Lav.	1	1		1/50	" "
Sitting Room	1	1	1/50		" "
Passage	1	1		1/25	" "
Offices	6	6		6/50	" "
Lading	1	1		1/50	" "
FIRST FLOOR					
Offices	12	12		12/50	Cord pendants
Landing	1	1		1/50	" "
Corridor	2	2		2/50	" "
Men's Lav.	2	2		2/25	" "
Ladies' Lav.	1	1		1/25	" "
Bedrooms	2	2	2/50		" "
Landing and Stair	2	Two way double wired		2/25	" "
Bathrpom	1	1		1/25	" "
SECOND FLOOR					
Offices	15	15		15/50	Cordpendants
Corridor	2	2		2/50	" "
Landing	1	1		1/50	" "
Ladies' Lav.	1	1		1/25	" "
Men's Lav.	2	2		2/25	" "
THIRD FLOOR					
Same as 2nd Fl.					
ROOF					
Motor Room	2	2		2/25	Stump pendant

high-grade lustrous finish to approval. No brush work will be allowed, and work is to be carried out by approved expert tradesmen, and may be done before putting together provided that any portion damaged in the fitting up is renovated so as to match adjoining work.

All internal ironwork, including hot water radiators, steel windows, outside of bath, lavatory and flushing cistern frames, stair balusters and lift enclosures, is to be painted two coats finished flat in tints directed. Before fixing paint backs of all radiators one coat of paint. Similarly paint all exposed pipes.

ALTERNATIVE PRICE FOR TERRA COTTA.

Each tenderer must state two prices in his tender as under:-

(1) For the whole of the works complete as specified in the preceding pages of this specification.

(2) An alternative price for facing with terra cotta that portion of the front elevation footpath level up to and including cornice forming sills to windows on mezzanine floor. Allow the lump sum of £1000, being the cost of the terra cotta delivered. For full particulars in connection with this alternative price see Schedule of Quantities.

I

Calculations for the National Bank Courtenay Place. in Reinforced Concrete.

Atkins & Mitchell
Architects.
Wellington

Dec 1927.

Slab Roof.

Assume dead load Slab & Beams	80 #/□ft
Total Load to be designed for	130 #/□ft
	LL 50 #/□ft

$B.M = \frac{wl}{12} = \frac{(130 \times 8) \times 8 \times 12}{12} = 8320$ "#.
Say 9000 "#

$d = \sqrt{\frac{9000}{95 \times 12}} = \sqrt{\frac{9000}{1140}} = \sqrt{7.9}$.

d = 3" Effective depth.

Make roof slab 4½"

Steel area $= \frac{.675}{100} \times 3 \times 12 = \frac{.675 \times 36}{100}$

$= \frac{24.3}{100} = .243$ □" per ft.

Use 3/8" rods @ 5" c/s gives .24□"
Distributors 3/8" rods @ 20" c/s.

Design of Beam B1. Span 11ft.

Floor area $7 \times 11 = 77$ □ft Say 80 □ft

Load $= 80 \times 130$ #/□ft $= 10400$ #s

$$B.M. = \frac{wl}{8} = \frac{10400 \times 11 \times 12}{8} = 171600 \text{ "#}$$

$$I \text{ req} = \frac{172}{16} = 10.7$$

Use 12" x 6" 4 5/8" ϕ rods E.D. 10 3/4"

Design of Beam B2 Span 8ft.

Floor area $= 8 \times 8 = 64$ □ft.

Load $= 64 \times 130 = 8320$ #

$$Bm = \frac{wl}{8} = \frac{8320 \times 8 \times 12}{8} = 99840 \text{ "#}$$

$$I \text{ req} = \frac{100}{16} = 6.2$$

Continue Beam B1.

Use 12 x 6 4 5/8" rods E.D. 10 3/4".

Design of Beam B3 Span 23ft.

Floor area $= 23 \times 8 = 184$ □ft.

Load $= 184 \times 130 = 23920$ # Say 24000 #

$$Bm = \frac{wl}{8} = \frac{3000}{24000} \times 23 \times 12 = 828000 \text{ "#}$$

$$I \text{ req} = \frac{828}{16} = 51.7$$

Use 20 x 8" 6 1" ϕ rods.

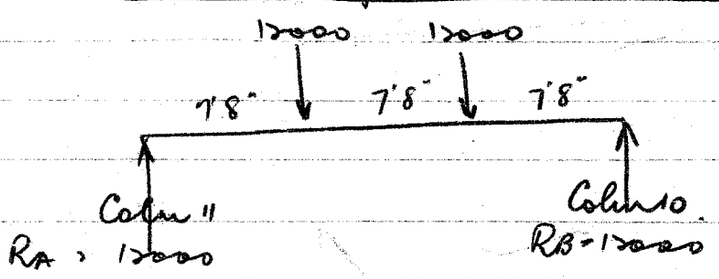
E.D. 18 1/4"

Design of Girder G2

Carries Parapet wall only.

Load = $7 \times 5 \times \frac{1}{2} \times \frac{12}{144}$ = 2460 lbs.

Design of Girder G3. Span 23ft.



BM max = 12000×92 = 1104000 lbs.

Parapet Load.

= $23 \times 5 \times \frac{1}{2} \times 144$ = 8280 lbs say 8000 lbs.

BM = $\frac{\text{load}}{8} \cdot \frac{8000}{8} \times 23 \times 12$ = 276000 lbs

Total BM = 1,380,000 lbs.

Design Beam as rectangular Beam.

BM = $95 B d^2$ assume B = 15"

$d = \sqrt{\frac{1380000}{95 \times 15}} = \sqrt{\frac{1380000}{1425}} = \sqrt{968}$.

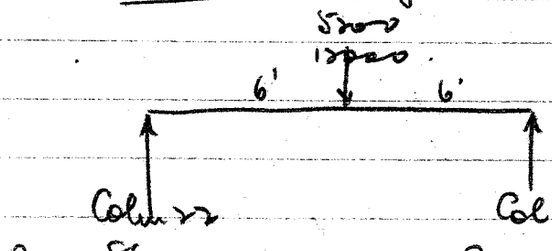
= 31.11 Eff depth.

$A_s = \frac{675}{100} \times 31 \times 15 \cdot \frac{311.5}{100}$ = 3.11 □"

6 7/8" ϕ rods give 3.6 □".

VII

Design of Girder G4a. Span 18ft.



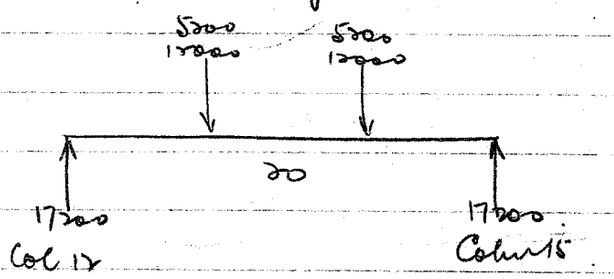
BM = 8600 × 6 × 12 = 619200 "lbs.

Z req = $\frac{6720}{16}$ = 38.7

Use 20" × 8" 6 1" ϕ rods Ed 18¼"

Gives Z = 58.6

Design of Girder G1 Span 80ft.



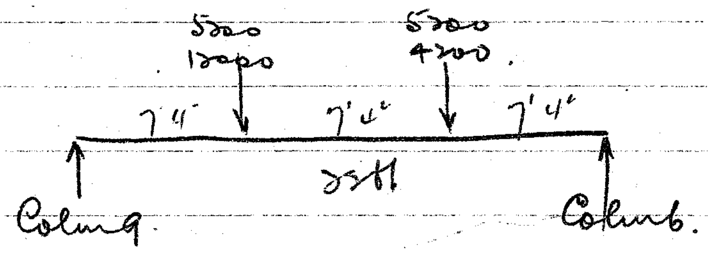
BM = 17800 × 80 = 1,376,000 "lbs.

Z req = $\frac{1376}{16}$ = 86.

Use 24 × 10 8 1" ϕ rods E.D. 22"

Gives Z = 124.

Design of Girder G4. Span 22ft.



$R_A = \frac{2}{3} \times \overset{5730}{\cancel{7300}} = 11460$

$+ \frac{1}{3} \times \overset{3130}{\cancel{9400}} = 3140$

14.600

$R_B = 13000$#.

$BM = 14600 \times 88 = 1,274,800$ "#s.

Z reqd $= \frac{1274}{16} = 79.6$

Use 24×10 8 1" ϕ rods E.D. 22.

Gives $Z = 121$.

Wall Beams Roof.

Design of Beam WB1. Span 12ft.

Parapet Load $= 3 \times \frac{1}{2} \times 12 \times 144 = 2592$#

Floor load $= 12 \times 3 = 36$ □ft.

Load $= 36 \times 130$ 4680.

Total Load 7272

$BM = \frac{wl}{8} = \frac{\overset{1000}{\cancel{8000}} \times 12 \times 12}{8} = 144000$ "#s.

Z reqd $= \frac{144}{16} = 9.$

Use 15×8 4 $\frac{5}{8}$" round bars.

Design of Beam WB2 Span 6 ft.

Parapet Load $6 \times 3 \times \frac{1}{2} \times 144 = 1296$ say $1300^{\#}$.

Design of Beam WB3 Span 15 ft.

Parapet Load $3 \times 15 \times \frac{1}{2} \times 144 = 3240^{\#}$
Floor area $15 \times 3 = 45$ □ft.
Load $= 130 \times 45$ 5850
Total Load 9090

$BM = \frac{WL}{8} = \frac{9100 \times 15 \times 12^{3}}{8_{2}} = \frac{409500}{2} = 204750^{\prime\prime\#}$

Z reqd $= \frac{205}{16} = 12.8$ React 4600.

Use 15 x 8 4 5/8" ϕ rods.

Design of Beam WB4 Span 9 ft.

Parapet Wall $= 9 \times 3 \times \frac{1}{2} \times 144 = 1944$ Say 2000

Reaction $1000^{\#s}$

Use 15 x 8 4 5/8" ϕ rod.

Design of Beam WB5. Span 8ft.

Parapet $3 \times 8 \times \frac{1}{2} \times 144$ = 1728.

Floor area - 8×4.5 = 36 Sq ft

Load = 130×36 4680.

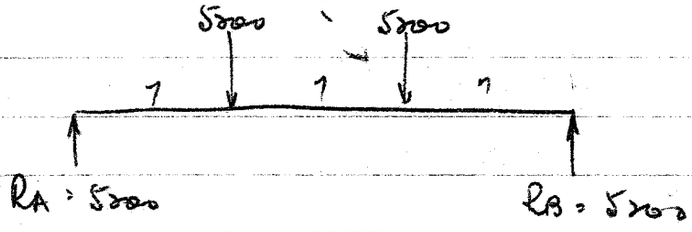
Total Load 6408.

Bm - $\frac{6500 \times 8 \times 12}{8}$ = 78000.

Z req = $\frac{78}{6}$ = 5 approx. Reach 3850#.

Use 15×8 4 5/8" ϕ rods.

Design of Beam BoB6. Span 21ft.



Bm max = 5800×84 = 436800 in#.

Parapet = $21'' \times 3 \times \frac{1}{2} \times 144$ = 4536.

Bm = $\frac{We}{8}$ = $\frac{4536 \times 21'' \times 12^3}{8}$ = 156780.

Total Bm 593580.

Z req = $\frac{594}{16}$ = 37.1

Use 21×10 6 3/4" rods.

Lift House Roof Beams

Design of Beam B8. Span 12 ft.

Roof area supported = 12 × 8 = 96 sq ft.

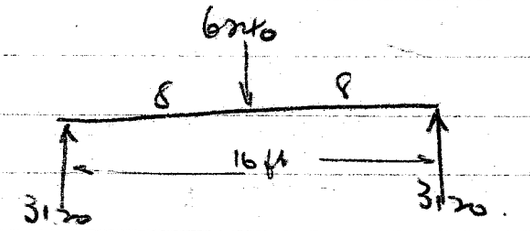
Load = 96 × 130 = 12480 lbs

Bm. $\frac{wl}{8} = \frac{12480 \times \frac{6}{12} \times \frac{3}{12}}{8} = 199680$ lb-in.

Z req'd = $\frac{200}{16}$ = 12.5.

Use 15 × 8 4 5/8" rods.

Design of Beam B9. Span 16 ft.



Bm. = 3120 × 8 × 12 = 299520 lb-in.

Z req'd = $\frac{300}{16}$ = 18.7.

Use 16" × 8" 4 3/4" ϕ bars.

Design of Beam WB 10 Span 12ft.

Roof area: $12 \times 4 = 48$ □ft.

Load: $48 \times 130^{\#} =$ 6240.

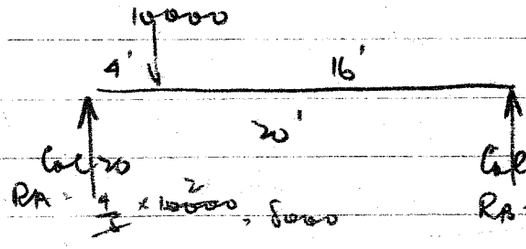
$$Bm = \frac{wl}{8} = \frac{6240 \times 12 \times 3}{8} = 112\,320 \text{ in-lb.}$$

$$\text{I required} = \frac{112}{16} = 7^2$$

Use 15 × 6 4 $\frac{7}{8}$" rods.

Design of Wall Beam WB8 Span 20ft.

Wall load $= 8 \times 20 \times \frac{1}{2} \times 144 = 11520$ say 12000 #.



$$Bm = \frac{wl}{8} = \frac{12000 \times 20 \times 3}{8} = 360\,000 \text{ in-lb.}$$

Bm:	8000 × 48	384000
	Total Bm	744000 in-lb.

Design as Rectangular Beam.

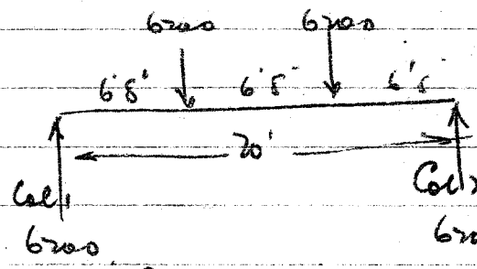
$$d = \sqrt{\frac{744000}{95 \times 16}} = \sqrt{783} = 27"$$

Make beam 30" × 10" overall.

$$A_s = \frac{675}{\text{Top}} \times 27 \times 16 = 675 \times 27 = 1.82 \square"$$

6 $\frac{3}{4}$" rods = 2.64 □"

Design of Beam WB 6a. Span 20ft.



BM = 6200 × 80 = 496000 lbs.

Parapet Load = ~~20~~ 10 × 3 × 1/12 × 144 = 4320 #

BM = $\frac{wl}{8}$ = $\frac{~~44000~~\ 22000 \times ~~20~~\ 10 \times 12}{8}$ = 132000 lbs

→ Total BM = 628000 lbs.

Z req'd = $\frac{628}{16}$ = 39.2

use 21 × 10 6 3/4" ϕ bars.

Design of Beam WB 9 Span 12ft

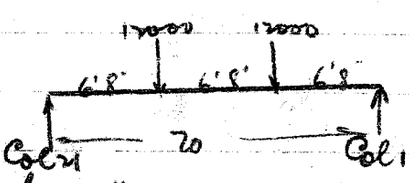
wall load = 8 × 12 × 1/2 × 144 = 6912 say 7000 #

BM = $\frac{wl}{8}$ = $\frac{7000 \times 6 \times 12^3}{8 \times 4}$ = 42000 " #.

use 15 × 8 4 5/8" ϕ rods.

Design of Beam G1a. Span. 20ft

Carrying Lift machinery

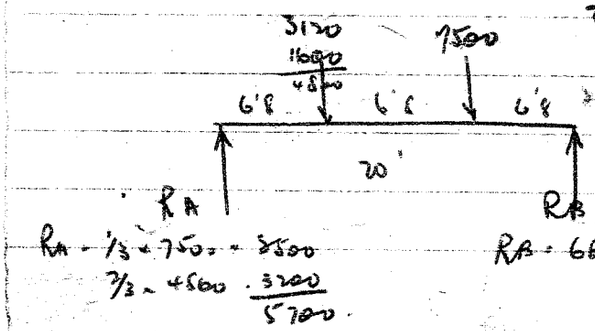


BM = 12000 × 80 = 960000 lbs.

Lift House wall

Wt = 15 × 7 × 1/2 × ~~144~~ 72 = 7560 say 8000 #

BM = $\frac{wl}{8}$ = $\frac{~~50000~~\ 40000 \times 20 \times 12}{8}$ = 240 000



BM = 6600 × 80 = 528 000

Total BM 1,768,000

Design of G1a (Contd)

$$d = \sqrt{\frac{1728,000}{95 \times 15}} = \sqrt{\frac{172800}{1425}} = 34''$$

$$A_s = \frac{.675}{100} \times 34 \times 15 = 3.4 \square''$$

Use 6 7/8" rods give $6 \times 6 = 3.6 \square''$.

Use B6 × 15 — 6 7/8" rods.

Typical Floor. Third Floor.

Live Load	70 #/□'
assume dead Load	115 #/□'
Total Load	185 #/□'.

Floor slab. Span 8ft.

Bm. $\frac{wl}{12} = \frac{(185 \times 8) \times 8 \times 12}{12} = 11840$ #ft
Say 12000 #ft

$d = \sqrt{\frac{12000}{95 \times 12}} = \sqrt{\frac{1000}{95}} = \sqrt{10.5} = 3.19$.

make slab 5" / overall.

$A_s = \frac{.675}{100} \times 3.19 \times 12 = \frac{8.1 \times 3.19}{100} = .258$ □"

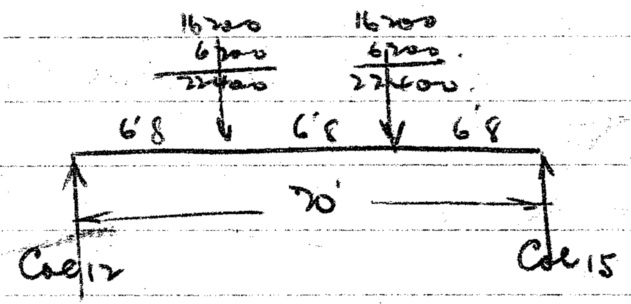
Try 3/8" ϕ rods @ 4½" c/c.

$\frac{11 \times 12}{4\frac{1}{2}} = \frac{.11 \times 12" \times 2}{9_3} = \frac{.88}{3} = .29$ □" OK.

use 3/8" rods @ 4½" c/c. gives .29 □" per ft.
3/8" distributors @ 18" c/c.

Design of Girders

Design of Girder G1 Span 20ft.



BM = 22400 × 80 = $\frac{12(1792,000}{150000}$ "lb.

Z reqd = $\frac{1792}{16}$ = 112.

Use 24 × 10   8   1" φ rods   ED 22

Gives Z = 121.

Design of Girder G2 Span 6'6"

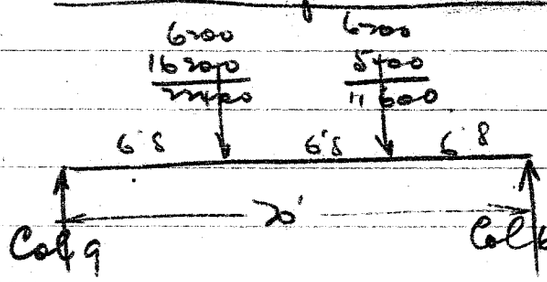
Wall load = $4 \times \frac{13}{2} \times \frac{1}{2} \times 144$ = 1872.

Wt of beam $3 \times \frac{5}{4} \times \frac{13}{2} \times 144$ = 3510

Total Load 5382 say 5400.

Continuous Girder G3.

Design of Girder G4 Span 20ft.



6700 / 16200 / 22900

6700 / 5400 / 11600

$R_A = \frac{1}{3} \times 11600 = 3866$

$+ \frac{2}{3} \times 22900 = 14932$

18798

$R_B = 34000 - 18800 = 15200$

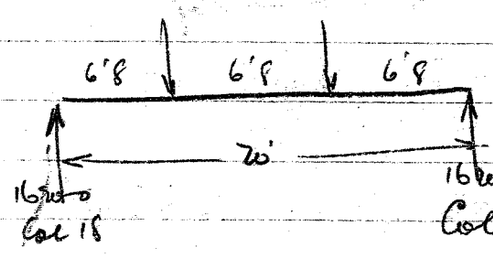
$BM_{(max)} = 18800 \times 80 = 1,504,000$ "lbs.

$Z_{req} = \frac{1504}{16} = 94$

Use 24 x 10' & 1" ϕ rods. E.D. 22"

Gives Z = 121.

Design of Girder G1a Span 20ft



$BM = 16200 \times 80 = 1,296,000$ "lbs.

Stair loads.

Area = 14 x 5 = 70 sq ft.

Load = 70 x 185 = 12,950

$BM = \frac{wl}{8} = \frac{12950 \times 20 \times 12^3}{8} = 360\,000$

1,656,000

$Z_{req} = \frac{1656}{16} = 103.5$

Use 24 x 10 & 1" ϕ rods.

Gives Z = 121.

Design of Beam WB3 Span 15 ft.

Wall load = 10 × 15 × ½ × 144 = 10800#
Floor area = 15 × 3 = 45 ft□
Load = 45 × 185# = 8325
Total Load. 19125.

Bm = $\frac{wl}{8}$ = $\frac{10000 \times 15 \times 3}{8}$ = 450 000 "#

Z reqd = $\frac{450}{16}$ = 28.1.

Reqd = 18 × 8   6. 3/4" ϕ rods. E.D. 16½

Design of Beam WB4 Span 9 ft.

Wall load = 10 × 9 × ½ × 144 = 6380#.

Design of Beam WB5 Span 8 ft.

Wall load = 10 × 8 × ½ × 144 = 5760#
Floor area = 4 × 8 = 32 □ ft
Load = 32 × 185 = 5760#
Total load = 11520

Bm = $\frac{wl}{8}$ = $\frac{12000 \times 8 \times 12}{8}$ = 144 000 "#

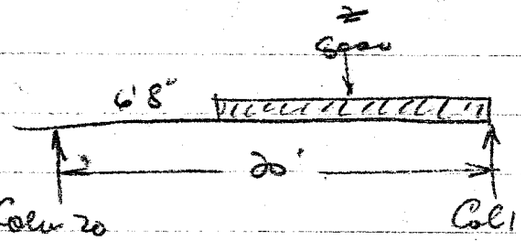
Z reqd = $\frac{144}{16}$ = 9.

Beam Reqd = 12" × 6"   4 5/8" ϕ bars
E.D 10¾

Design of Beam W8 Span 20 ft.

beam load = $10 \times 20 \times \frac{1}{2} \times 144$ = 14400 #.

Bm = $\frac{14400 \times 20 \times 3}{8}$ = 432000 in-lbs.



$R_A = \frac{1}{3} \times 8000 = 2666$ $R_B = 5333$.

Stair load = $3 \times 14 = 42$ sq ft.

Load = $42 \times 185 = 7770$ say 8000 #

Bm = 5333×6 = 47640.

Total Bm = 858,640

$d = \sqrt{\frac{858000}{95 \times 10}} = \sqrt{903} = 30.05$

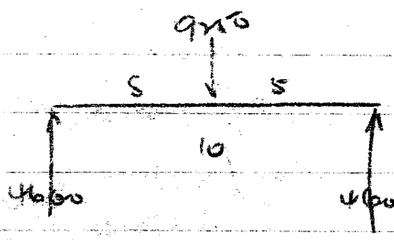
$A_s = \frac{675 \times 30 \times 10}{100}$ = 2.025 sq in.

Use 6 3/4" rods over 26 sq in.

Design of Beam W8 Span 11 ft.

beam load = $10 \times 10 \times \frac{1}{2} \times 144 = 7200$ #.

Bm = $\frac{wl^2}{8} = \frac{7200 \times 10 \times 3}{8}$ = 108000 in-lbs.



Bm = 4600×60 = 276000 in-lbs.

Total Bm = 384000

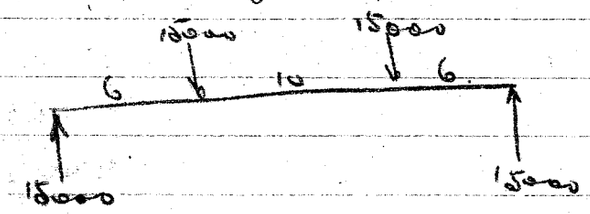
$Z = \frac{384}{10} = 24$.

$d = \sqrt{\frac{384000}{95 \times 10}} = \sqrt{\frac{384000}{950}} = \sqrt{404}$.

$d = 20$"

Use 6 3/4" rods.

Design of Beam B 3d. Span 22ft.



Bm max = 15000 × 72 = 1,080,000 inlbs

wall 22 × ½ × 10 × 144 = 15840 #s

Bm. $\frac{we}{8}$ = $\frac{16000 \times 22 \times 12}{8}$ = 528000.

Total Bm 1608000.

$d = \sqrt{\frac{\frac{8000}{16000000}}{\frac{95}{19} \times 12}} = \sqrt{\frac{800000}{57}} = \sqrt{14035} = 36"$

Make beam 38 × 12"

$A_s = \frac{675}{100} \times \frac{36 \times 12}{1} = \frac{289.45}{100} = 2.89$ □"

Use 6 ⅞ ϕ bars gives 3.6 □".

Design of Beam B 3c. Span 11ft.

Roof area = 11 × 3 = 33 □ft. Load = 33 × 130 = 4290.

11 × 3 × 33 □ft = 33 × 185 = 6105

wall load 10 × 10 × ½ × 44 = 7200

17595.

Bm = $\frac{15000 \times 11 \times 12}{8}$ = 297000 inlbs. Total

$I = \frac{297}{16} = 18.6$

Use 24 × 12 4 ¾" rods.

Design of Beam B4. Span 16ft.

Floor area = 8 x 16 = 128 □ft.

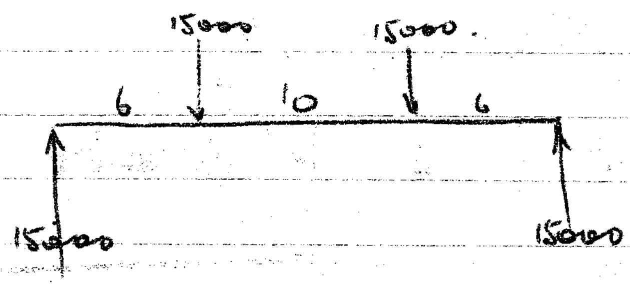
Load = 128 x 240 = 30,000 #.

BM = $\frac{wl}{8}$ = $\frac{30000 \times 16 \times 12}{8}$ = 720 000 "#

Z reqd = $\frac{720}{16}$ = 45.

Use 21 x 10   6 1" bars.

Design of Beam B3a. Span 22ft.



BM = 15000 x 72 = 1080 000 "#

Floor area = 22 x 3 = 66 □ft.

Load = 66 x 240. = 29040 #

BM = $\frac{30000 \times 22 \times 12}{8}$ = 99 0000.

2,070,000

Z reqd = $\frac{2070}{16}$ = 130.

Use 26 x 12   8 1" φ rods.

Mezz floor Floor slab 10 ft span.

$$\text{BM} = \frac{we}{12} = \frac{(185 \times 10) \times 10 \times 12}{12} = 18500$$

$$d = \sqrt{\frac{18500}{95 \times 12}} = \sqrt{\frac{3700}{228}} = \sqrt{16} = 4$$

Make slab 5" thick.

$$A_s = \frac{.675}{100} \times 4 \times 12 = .32$$

½" rods @ 7" c/c
½" dist @ 8" c/c

Colm No 1. Colm 83 is similar

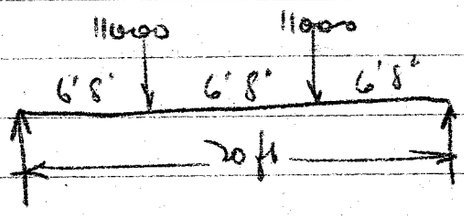
	Roof	3rd Floor	2nd Floor	1st Floor	Mezz X	Gd Floor
Roof Beam to B1	3600	6400	6400	6400	6400	10000.
" " to B7	6200	12700	12700	12700	12700	20000.
Colm & Covering	3500	3500	3500	3500	3500	4000.
Total for Storey	13300	22600	22600	22600	22600	34000.
Accum Total		35900	58500	81100	103700	137700.
Direct Stress	60 #/□"	158 #/□"	254 #/□"	352 #/□"	450 #/□"	459 #/□"

Use Standard 14" × 14" Colm.

16 × 16.
Eq area 300 □"

NB Sizes are minimum, for actual sizes see architectural drawings. In almost all cases these sizes are exceeded.

Design of Girder G1. Span 20ft.



BM = 11000 × 80 = 880000 lb.
Floor area = 3 × 20 = 60 □ft.
Load = 60 × 240 = 14400 #.

BM = $\frac{14400 \times 20 \times 12}{8}$ = 432000.

Total BM. 1312000

Z req'd = $\frac{1312}{16}$ = 82

use 26 × 10" 8 1" ϕ rods.

~~Ground floor~~ Floor slab Span 8ft.

BM = $\frac{wl}{12} = \frac{(240 \times 8) \times 8^2}{12}$ = 15360

$d = \sqrt{\frac{15360}{95 \times 12}} = \sqrt{13.5} = 3.7$.

make slab 5"

$A_s = \frac{675}{100} \times \frac{15}{4} \times 12^2 = 30$.

½" rods @ 7" c/c ½" dist @ 28" c/c.

Floor slab Span 10 ft.

BM = $\frac{wl}{12} = \frac{(240 \times 10) \times 10 \times 12}{12}$ = 24000 lb

$d = \sqrt{\frac{24000}{95 \times 12}} = \sqrt{\frac{400}{19}} = \sqrt{21} = 4.5$.

make Slab 6" thick

$A_s = \frac{675}{100} \times \frac{9}{2} \times 12$ = 36 ½" rods @ 6" c/c.

½ dist @ 24" c/c

Colm No 2.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz Floor	Gd Floor.
Reach Beam WB1	36000	64000	64000	64000	64000	100000.
WB2	7000	22000	22000	22000	22000	35000.
Colm Covering	20000	20000	20000	20000	20000	30000.
Total for Storey.	63000	106000	106000	106000	106000	195000.
Acc. Total		169000	275000	381000	487000	682000.
Brick Press.	30 #/□'	74 #/□'	130 #/□'	165 #/□'	212 #/□'	327 #/□'

Use 14 × 14 Colm

16 × 16 Colm
Eq. Area 300 □"

Colm No 3.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz Floor	Engine Room
Roof Beam Bl.	5200	6200	6200	6200	6200	10000.
" " WB3	4500	9500	9500	9500	9500	16000.
" " WB2	700	2700	2700	2700	2700	—
" Girder G4A	8000	11200	11200	11200	11200	16500.
Colm & Covering	2500	2500	2500	2500	2500	3000.
Total for Storey	21500	31600	31600	31600	31600	45500
Accum Total	21500	53100	84700	116300	147900	193400
add 16% LL-DL	3325	7960	12700	17400	22100	29000
for continuity.						
Design Load	24825	61060	97400	133700	170000	222400
	82 #/□"	203 #/□"	324 #/□"	412 #/□"	566 #/□"	335 #/□"

Use 16 x 16 Colm Eq. Area 300

24 x 24 Colm
664 □"

Colm 4.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz/Ft.	Gr. Floor
Load Beams WB3	4500	9500	9500	9500	9500	10000
" " B2	4200	4500	4500	4500	4500	6000
" " WB4	1000	3200	3200	3200	3200	—
Colm Covering	2500	2500	2500	2500	2500	3000
Total for Storey	12200	19700	19700	19700	19700	19000
Acc. Total	12200	31900	51600	71300	91000	110000
add 15% DL+LL for Contin.	1820	4650	7700	10700	13620	16500
	14020	36550	59300	82000	104620	126500
Direct Stress	61 #/in²	160 #/in²	260 #/in²	356 #/in²	439 #/in²	270 #/in²
use 14 × 14 Colm	Equiv Area = 230 in²					20" × 20"
						467 in²

eg

Colm Loads.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz. F.	Grd Floor
Roof Beam WB4	1000	3200	3200	3200	3200	3200
" " WB5	3200	5800	5800	5800	5800	6000
Colm Load	2000	2000	2000	2000	2000	2300.
Total for Storey	6200	11000	11000	11000	11000	11500.
Acc Total.		17200	28200	39200	50200	61700.
Direct Stress	30 #/□"	75 #/□"	183 #/□"	170 #/□"	220 #/□"	206 #/□"
						16×16
Use 14 × 14 Colm:						300 □"

4

Col No 6.

	Roof	2nd Floor	3rd Floor	4th Floor	Mezz Floor	Ground Floor
Roof Beam WBS	3200	5800	5800	5800	5800	6000.
" " WB1	3600	6400	6400	6400	6400	12000.
" Girder G4	12000	15200	15200	15200	15200	—
Colm & Cap.	3400	3400	3400	3400	3400	4000.
Total for storey	22200	30800	30800	30800	30800	22000.
Accum Total		53000	83800	114600	145400	167400.
add 15% DL + LL	3330	7900	12460	17200	21700	25000.
Total	25530	60900	96260	131800	167100	192400.
	79 #/□"	188 #/□"	296 #/□"	404 #/□"	515 #/□"	500 #/□"

Use 24 × 12" Colm Area 288. 24 × 14

386 □"

Column 7.

	Roof	2nd Floor	3rd Floor	4th Floor	Mezz. Fl.	1st Floor
Roof Beam & Bl.	3600	6400	6400	6400	6400	12000
" " & B6.	7600	13400	13400	13400	13400	22000
Col. & Covering.	2500	2500	2500	2500	2500	3000
Total for Story.	13700	22300	22300	22300	22300	37000
Accum. Total.		36000	58300	80600	102900	139900
	60 #/ft.	160 #/ft.	253 #/ft.	350 #/ft.	447 #/ft.	466 #/ft.
	Use 14 x 14	Colum.				16 x 16
						300 #/ft.

Colm No 8 — Colm No 13 as similar

	Roof	1st Floor	2nd Floor	1st Floor	Ground Floor	Grd Floor
React Beam 681	3600	6400	6400	6400	6400	10000.
686.	7600	13400	13400	13400	13400	22000.
680	—	—	—	—	—	5000.
Colm & Covering	2500	2500	2500	2500	2500	3000.
Total for Storey	13700	22300	22300	22300	22300	40000.
Accum Total		36000	58300	80600	102900	142900.
Direct Stress	60	160 #/in²	253 #/in²	350 #	447 #/in²	473 #/in²

Use 14 × 14 Colm. — Col 16×16

300

Colm No 9.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz Fl	Gd. Floor
Reach Beam B3	12000	16300	16300	16300	16300	—
" " WB1.	3600	6400	6400	6400	6400	10000.
" Girder G4.	14000	18800	18800	18800	18800	16500.
" " G2.	1700	2700	2700	2700	2700	3000.
Colm Covering.	4000	4000	4000	4000	4000	5000.
Total for Storey.	35400	48200	48200	48200	48200	34500.
Accum Total.		83600	131800	180000	228200	262700.
Add 15% DL + LL	5400	12600	19700	27000	34200	39000.
Total.	40800	96200	151500	207000	262400	301700.
	88 #/0"	207 #/0"	324 #/0"	443 #/0"	560 #/0"	370 #/0"

Use 20 × 20 Colm area - 467.

Use 27 × 27 ft

- 29
18

817.

Colm 10

		Roof	3rd Floor	2nd Floor	1st Floor	Mezz Fl.	Grd Floor
Reach	Beam B3	12000	16250	16250	16250	—	22000.
	Girder G2	1200	2700	2700	2700	2700	3000.
	G3	16000	18800	18800	18800	16000	—
	Beam B1c	—	—	—	—	5700.	10000.
Colm & Covering		4000	4000	4000	4000	4000	5000.
Total for Floor		33200	41750	41750	41750	28400	40,000
Acc. Total			74950	116700	158450	186850	226850
add 15% DL-LL		4970	11200	17400	23600	28000	34000
Total		38170	86150	134100	182050	214850	260850
Direct Stress		103 #/□"	238 #/□"	360 #/□"	488 #/□"	505 #/□"	315 #/□"
		use 18" round Colm on Ground Floor.					21 x 21.
		10 1¼" bars Eq. area = 425 □"					8 1" bars.
		use 18 x 18 area 313 □" about.					a - 81

Colm No 11.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz Floor	Grd Floor
Lead Beam B3.	12000	16250	16250	16250	—	—
Girder G2	1200	2700	2700	2700	2700	—
" G3.	16000	18800	18800	18800	16000	—
Beam B1C.	—	—	—	—	5700	10000.
Colm & Covering	4000	4000	4000	4000	4000	5000
Total for Storey	33200	41750	41750	41750	28400	15000.
Acc. Total		74950	116700	158450	186850	201850
Add 15% DL = LL	4970	11200	17400	23600	27800	30000.
	38170	86150	134100	182050	214650	231850.

Use 18" round Colm of on Ground Floor — 27×27

10 1/4 bars Eq. area 425□" — 8 1"

Use 18" × 18" area 373□" — area = 517

Colm 14 Colm 19 is similar.

	Roof	3rd Fl	2nd Floor	1st Floor	Mezz Fl	Gd Floor
Reach Beam SI	7000	3500	3000	3000	9000	3500
" WB ba	7600	13400	13400	13400	13400	22000
Colm Coverings	2000	2000	2000	2000	2000	2300
Total for Storey	16600	18900	15400	18400	24400	27800
accum Total		35500	53900	72300	96700	124500
Direct Stress	77 #/□"	164 #/□"	252 #/□"	314 #/□"	420 #/□"	533 #/□"
						16 × 16
Colm 14 × 14	Equiv area 230 #/□"					373 #/□"

10

63

Colm 15 & 16 are similar.

	Roof	3rd Floor	2nd Floor	1st Floor	Mezz Flr	Grd Floor
Reaction BS	7000	3500	3000	3000	9000	3500
" Beam Sx	3500	1750	1500	1500	4500	1750
" Gride. Gr	17200	22400	22400	22400	22400	33000
Colm & Covering	3000	3000	3000	3000	3000	3000
Total for Storey	30700	30650	29900	29900	38900	41250
Accum Total	30700	61350	91250	121150	160000	201300
Direct Stress	102 #/□"	204 #/□"	305 #/□"	404 #/□"	533 #/□"	540 #/□"
Use 16 × 16	Gross Area 300 □"					18 × 18

59

Colm 16 Colm 17 is similar

	Roof	2nd Flr	3rd Floor	1st Floor	Mezz Flr	Grd Floor
Read Sp Sr	3500	1750	1500	1500	4500	1750
" Sz	7000	3500	3000	3000	9000	3500
Colm+Covers	3000	3000	3000	3000	3000	3500
Total for Storey	13500	8250	7500	7500	16500	8750
Accum Total		21750	29250	36750	53250	62000
Direct Stress	45 #/□"	72 #/□"	98 #/□"	123 #/□"	178 #/□"	207 #/□"
Base 16 x 16	Colm Sq. Area - 300 #/□"					

Colm No 20.

	Light House	Roof	2nd Floor	2nd Floor	1st Floor	Bsmt Floor
Reach Beam 6B9	3120.	3500	8200	8200	8200	8200.
" " 6B8	3120.	14000	9800	9800	9800	9800
Colm & Covering	2500	2500	2500	2500	2500	2500.
Total for Storey	8740	20000	20500	20500	20500	20500.
Accum Total		28740	49240	69740	90240	110740.
Direct Stress	35 #/□'	126 #/□	214 #/□	305 #/□'	395 #/□	480 #/□'

Colm 21.

	Lift House	Roof	3rd Floor	2nd Floor	1st Floor	Ground Fl.
React Beam w Bg.	3120.	3500	8200	8200	8200	8200.
" B3.	—	12000	16850	16850	16850	16850.
Girder G2	—	1830	7600	7600	7600	7600.
" G1	3120.	18000	16200	16200	16200	16200.
Colm & Covering		4000	4000	4000	4000	4000.
Total for storey	6240	38730	47850	47850	47850	47850.
Accumulate		44970	92820	139470	187320	233970.
add 15% DL-LL	930	6700	13820	20800	28000	35000
Total	7170	51670	106640	160270	214720	268970.
Direct stress		112 #/□"	227 #/□"	342 #/□"	456 #/□"	572 #/□"

use 20 × 30 Colm. Area 467.

Colm No 22.

	Roof	3rd floor	2nd fl	1st fl	Ground fl	Gr fl
Roof Beam WB1	38600	6400	6400	6400	6400.	
" B3.	12000	16250	16250	16250	16250.	
Under Gdr	8600	11200	11200	11200	11200	
" G2	1830	2700	2700	2700	2700.	
Colm & Casing.	4000	4000	4000	4000	4000.	
Total for storey	29430	40550	40550	40550	40550	
Accum Total		69980	110530	151080	191630	
add 15% DL+LL	4400	10400	16400	22600	28600.	
Total	33830	80380	126930	173680	220230.	
	172 #/□'	172 #/□'	272 #/□'	372 #/□'	472 #/□'	

Use 20 x 20 Colm. Area 467 □'

Colun 24.

	Roof	3rd Fl	2nd Fl	1st Floor	Mezz Fl.	Grd Floor
Reach Beam B/C					8000	10000
WB10a	(2 beams)				2400	8000
Colun & Covering					3500	3500
Total for Storey					13900	21500
Accum total						35400

Colun is made 18" x 12" architecturally.

75

C Design of Foundations.

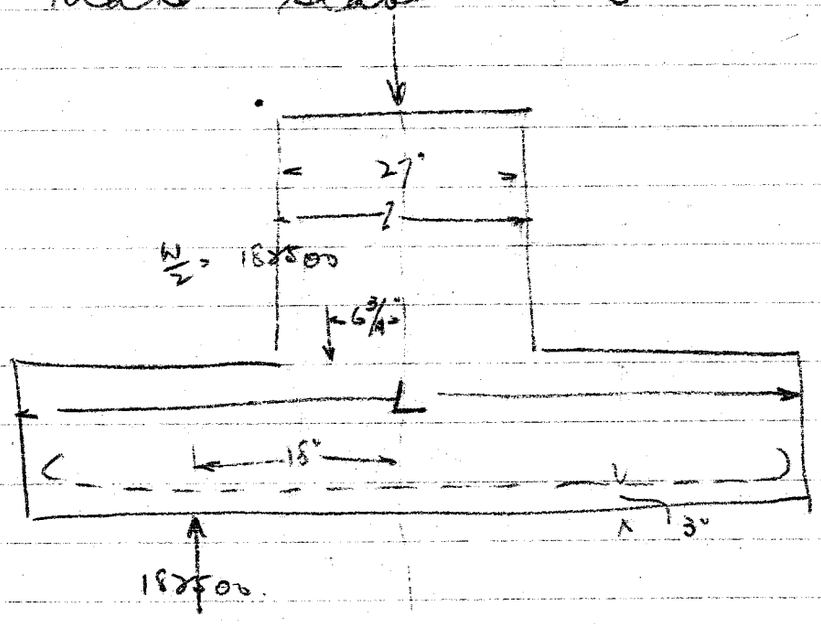
Colm No 12.

Max Load on centre per 365000 #.

Area req'd for footing @ 5 T/□ft.

$$= \frac{73000}{5 \times 2240} = 32.6 \text{ □ft.}$$

Make Slab 6' × 6'



$$B = \frac{w}{8}(L-l) = \frac{365000}{8}(72-27)$$

$$= \frac{365000}{8} \times 45 = 2053125$$

$$d = \sqrt{\frac{2053000}{95 \times 72}} = \sqrt{300} = 17.3.$$

Make slab 18" deep.

$$A_s = \frac{675}{100} \times 17 \times 72 = \frac{675 \times 1224}{100} = 8.2.$$

Eff depth of slab is actually 23" deep.

Use 14 3/4" rods @ 5" c/c giving 6.16 □" both ways.

Running footing under wall of Strong Room.

Wt of wall $10 \times 1\frac{1}{2} \times 24 \times 144 = 51840$.

$\frac{52000}{24}$ = 2160 #/ft run

$\frac{60000}{24}$ = 2750 #/ft run

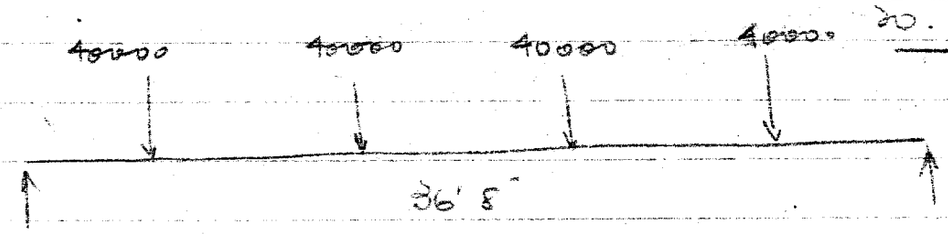
4910

Total per ft run = 2¼ Tons/ft run

Make footing 2' 6" wide.
i.e. capable of carrying 12½ T/ft run.

Outside wall between Colns 8 & 13

20. 23.



Wt of wall per ft run.
Concrete 1 × 10 × 1 × 144 = 1440 #
Brick wall $\frac{9}{24} \times 10 \times 1 \times 144$ = 540
1980 #/ft run.

$\frac{160000}{36}$ = Say 4444 #/ft run : Say 1 Ton per ft run.
Say 2 Tons/ft run.

Total Wt per ft run = 3 T/ft run.

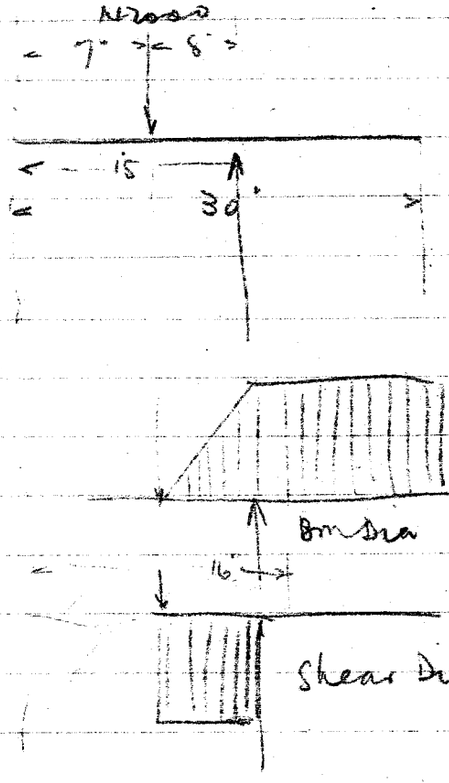
Make footing 3ft wide.

Design of footing for Colm 8.

Load 142000 #

Area reqd = $\frac{142000}{5 \times 2240}$ = 13 □ft

Make base 6'0 × 2'6".



Bm. 142000 × 8 = 1136000 "#

I reqd = $\frac{1136}{16}$ = 71.

use 22×8 with 6 1" bars

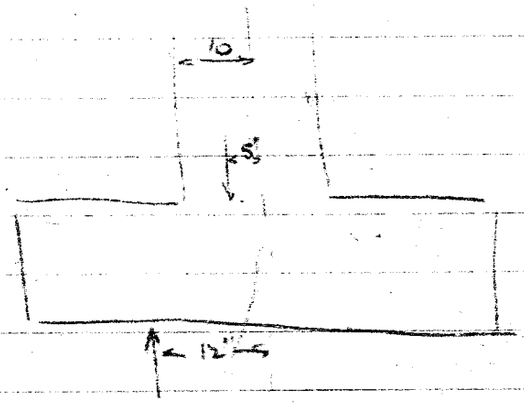
neg Mt of 1136000 "#

Shear of 142000# is covered by Colm having 6" width.

Design of footing for Colm 4. Load 126500#

Area reqd = $\frac{126500}{5 \times 2240}$ = $\frac{126500}{11200}$ = 11.3

Make footing 4'0" × 4'0" gives 16 □ft



$S = \frac{w}{8}(L - l)$

$= \frac{126400}{8}(48 - 20)$

$= \frac{126400 \times 28}{8} = \frac{31600 \times 28}{2} = 44 \times 2490$ "#

$d = \sqrt{\frac{442400}{95 \times 45}} = \sqrt{99} = 10$

$A_s = \frac{675}{99} \times 10 \times 45 = \frac{2250}{10} = 3.24$ □"

9 3/4" rods gives 3.96.

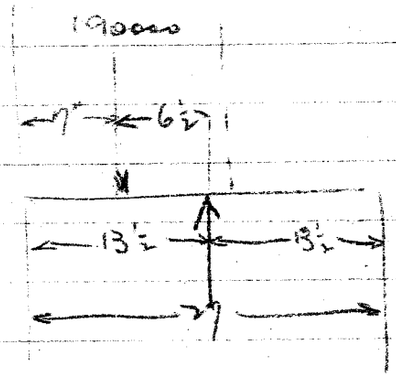
3/4" rods @ 5" c/c both ways.

Design of Footing for Column Load 190 000

Area req'd. $\frac{190000}{5 \times 2240} = \frac{190000}{11200}$

= 17 Sq ft.

Make footing 2'3" × 8'0"



Bm. 190 000 × 6.5 = 1235 000 "#

L req'd = $\frac{1236}{16}$ = 77.

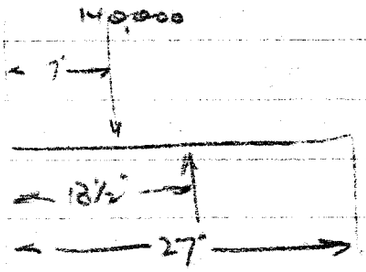
use 2'2" × 12' 6 1" bars.

Design of footing for Column.

Load = 140 000 #.

area req'd = $\frac{140\,000\#}{11200\#}$ = 12.5 Sq ft.

2'3" × 6.0" footing.



Bm. 140 000 × 6.5 = 910 000 "#

L req'd. $\frac{910}{16}$ = 60

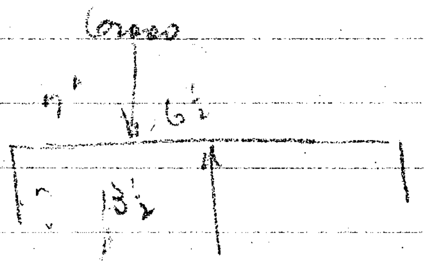
use 2'2" 6 1" ϕ bars.

84.

Design of Footing to Column 5

Load = 61700 area reqd = $\frac{62000}{5 \times 2240}$

= $\frac{62000}{11200}$ = 5.5 □ ft.



BM = 62000 × 6.5 = 403000.

Z reqd = $\frac{403}{16}$ = 25.

Footing for Column 3.

Load = 196000 # Concentric

Area reqd = $\frac{196000}{5 \times 2240}$ = 17.5

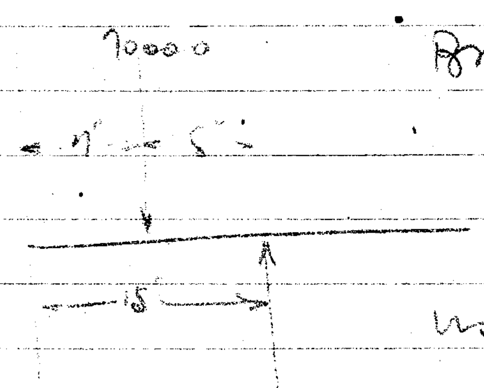
make footing 4' 6" × 4' 6".

Footing to Column 2

Load = 68200 #

Area reqd = $\frac{68200}{11200}$ = 6 □ ft

make footing 2' 6" × 4 = 10 □ ft.



BM = 70000 × 8 = 560000 "#

= $\frac{560}{16}$ = 35

Use 18 × 8 6 – 3/4" rods.

Footing for Colm No 1.

Area reqd = $\frac{137700}{11200}$ = 12.3 □ft

Make footing 6' × 6' 0".

Footing for Colm 14. Load 190000 #.

Area reqd = $\frac{190000}{11200}$ = 17 □ft

Make footing 3' × 6' = 18 □ft

Footing for Colm 15.

Load = 201000 area = $\frac{201000}{11200}$ = 18 □ft.

Make footing 4' 6" × 4' 6" = 20.25 □ft

Footing to Colm 16. Load 113000 #.

Area reqd = $\frac{113000}{11200}$ = 10 □ft.

Make footing 4' 0" × 4' 0"

Wt of Concrete pier

= $\frac{1}{3}$ × 3 × 10 × 144 = 12960 #

Total load = 126000 #.

Bm = $\frac{W}{8}(L - l)$ = $\frac{126000}{8}(48 - 36)$

= $\frac{126000 \times 12}{8}$ = 189000".

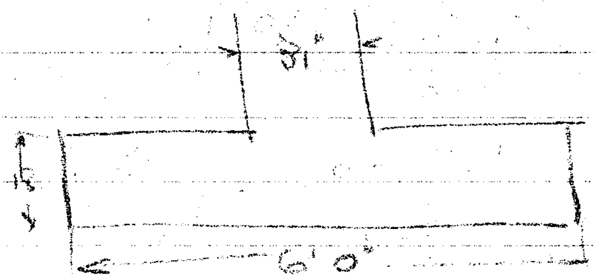
d = $\sqrt{\frac{189000}{95 \times 48}}$ = $\sqrt{\frac{2000}{48}}$ = $\sqrt{42}$ = 7"

A_s = $\frac{.675}{100}$ × 10 × 48. = 3.2 □"

9 3/4" bars gives 3.96 □"

∴ 3/4" bars @ 5" C to C both ways.

Punching Shear. 86



Upward Pressure = 5 Tons/□ft = 11200#

Punching Shear (total) = $11200 \left(\frac{72^2 - 31^2}{144}\right)$

$= 11200 \frac{(72-31)(72+31)}{144}$

$= 11200 \times \frac{41 \times 103}{144} = \frac{4223 \times 11200}{144}$

$= 335000.$

Stress = $\frac{335000}{31 \times \cdot 85 \times 18 \times 4} = 170$ #/□"

This is high. Safe Shear 120 #/□"

Make slab underfounds. 2' 8" deep.