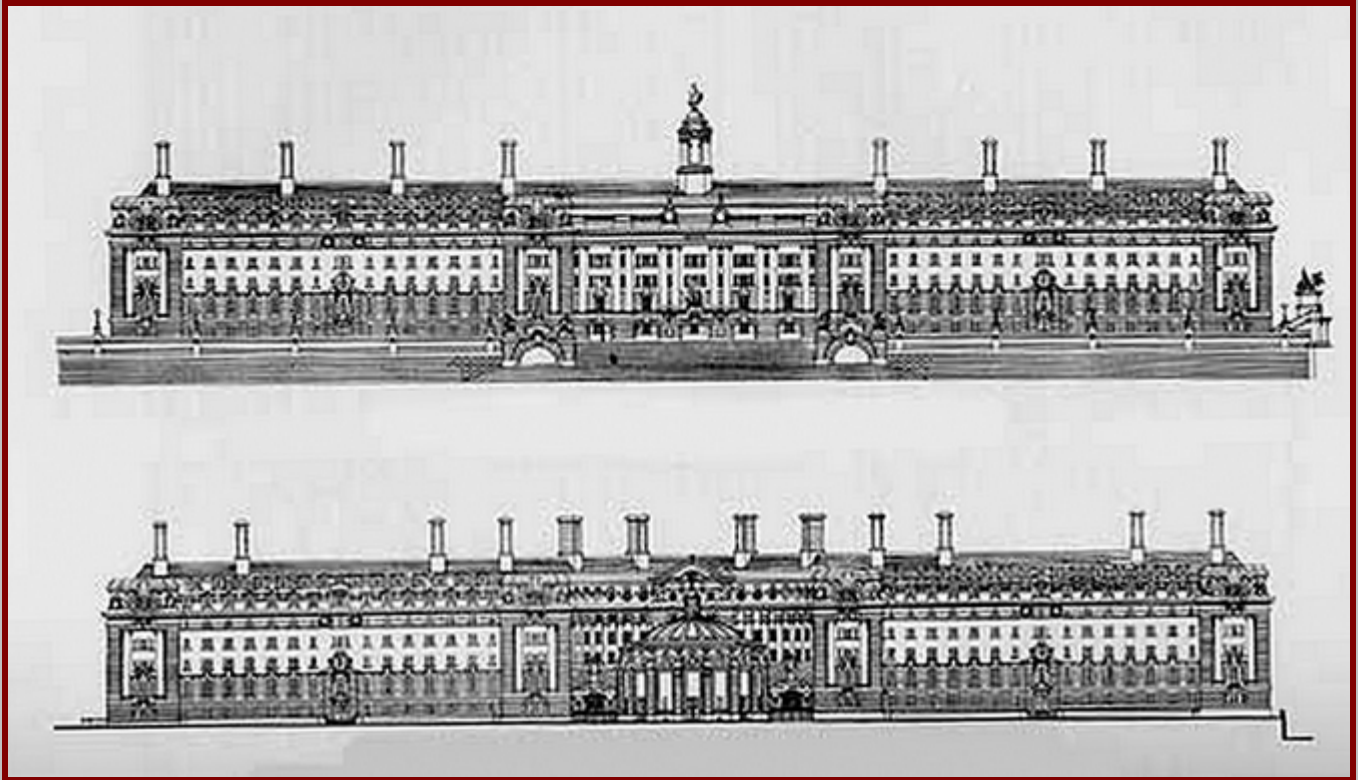


A Brief Description
OF THE
Heating & Ventilating Plant
AT THE
NEW COUNTY HALL,
WESTMINSTER

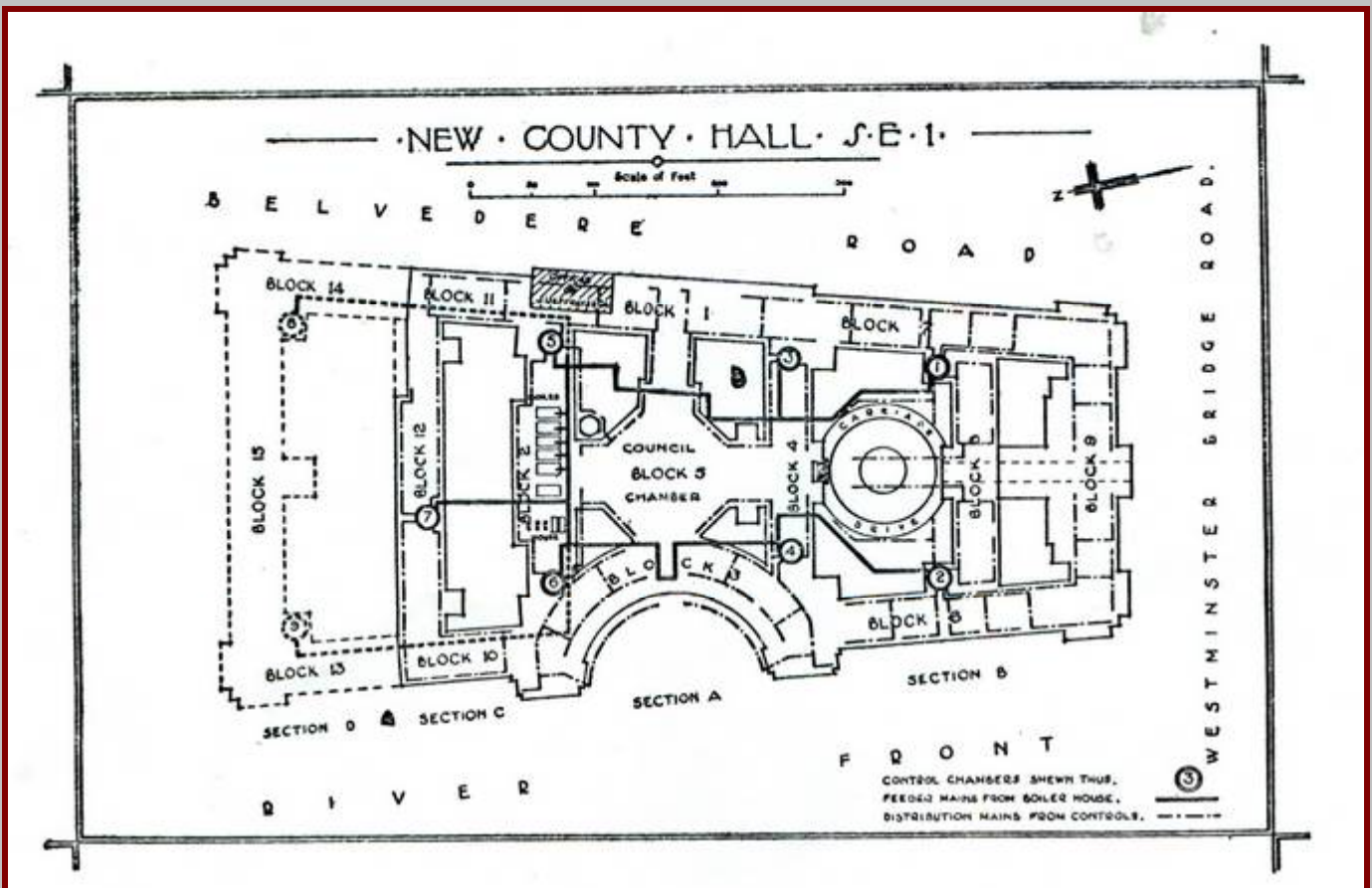
*With Notes on the Methods employed by
the Contractors for carrying
out the Work.*

**J Jeffreys was the lead
H&V Contractor**

—
1922



Original design for County Hall



Plan of 1922

Preliminary.

The Heating and Ventilating Plant at the New County Hall is divided into two separate contracts :—

Main Contract.

- (a) Heating Apparatus throughout the whole building.
- (b) Hot Water Supply for the whole building.
- (c) Plenum and Exhaust Ventilation for the building with the exception of the Council Chamber Suite.
- (d) Steam Services for Cooking, Plenum Plants, etc.

Council Chamber Contract.

Comprising the Special Plenum Ventilation of the Council Chamber Suite.

The main contract is being carried out by the following four firms in collaboration :—

Messrs. J. JEFFREYS & CO., LTD.

Messrs. R. CRITTALL & CO., LTD.

Messrs. G. N. HADEN & SONS, LTD.

Messrs. NORRIS & DUTTON, LTD.

The scheme was designed generally upon the lines indicated in the specification prepared and issued by the professional advisers engaged by the Council and a joint quotation was submitted by the four firms, but as the Council could not

accept a joint quotation, the contract was given to Messrs. J. Jeffreys & Co., Ltd., as representing the four firms and, as will be seen later, the work is being carried out conjointly by the four firms.

The Council Chamber Contract was secured by The Buffalo Forge Co., Ltd.

Main Contract.

The whole of the work in connection with this contract is being carried out by the Managing Committee, as a separate concern, with its own General Office, Designing and Drawing Staff and separate Banking Account and is entirely independent of any of the four firms' respective offices. The Committee is composed of four members, one from each firm, as follows :—

MR. P. M. B. GRENVILLE

(Messrs. J. Jeffreys & Co., Ltd.), *Chairman.*

MR. J. L. MUSGRAVE

(Messrs. R. Crittall & Co., Ltd.).

MR. F. H. HORTON

(Messrs. G. N. Haden & Sons, Ltd.).

MR. H. W. DUTTON

(Messrs. Norris & Dutton, Ltd.).

The Committee meet together fortnightly, but each member has his special responsibility : Mr. Grenville dealing with technical details and design generally, Mr. Musgrave and Mr. Horton supervising the erection of the plant and general progress, and Mr. Dutton being responsible for the General Office Staff, including particularly the Buying and Ordering Departments.

The Manager of the contract is Mr. Heath (Messrs. Crittall & Co.) and Mr. Bone (Messrs. Norris & Dutton) is in charge of the Designing

and Drawing Staff and Mr. Bosworth (Messrs. J. Jeffreys & Co.) is the Foreman of Works. Mr. A. Norman, of Messrs. Norman & Sons, Chartered Accountants, deals with all financial matters and also serves as Secretary to the Committee.

In order to form an idea of the magnitude of the work in the Drawing Office, the following data may be of interest :

Approximate number of plans, details, etc. completed up to date (mostly double-elephant size)	450
Number of pages of summary calcula- tion sheets for heat losses	81
Number of pages of calculation sheets for friction losses up to date	428
Pages of Specifications of Works and various Schedules of Prices, etc., up to date	177

Progress.

An interesting departure, believed to be novel, at any rate in its completeness, is being carried out by the Progress Department in charge of Mr. Munro (Messrs. Norris & Dutton). Isometric charts, showing the whole system, are filled in *every day* in such a way that the progress to date can be seen at a glance *and in addition the work done by every separate fitter engaged for each day is clearly indicated.* Copies of these charts being supplied to the Architects' and Council's representatives, they are kept continually in close touch with the progress of the works.

Description of Plant in Main Contract.

Heating Apparatus.

The heating generally is by hot water with forced circulation served direct from four boilers of the "Gunboat" type, situated in a central boiler house in sub-basement. This apparatus deals with the heating of the whole building, with the exception of the Council Chamber Suite and the seventh floor, the latter being heated by low pressure steam to avoid undue head pressure, and the sub-basement, which is dealt with by 3-unit Plenum Plants.

The four hot water boilers, together with two similar steam boilers, are being manufactured by Messrs. Davey, Paxman & Co., Ltd., of Colchester, to a special design prepared by the Council's Chief Engineer.

The hot water heating plant is divided into seven sections, each with its own control chamber, which are indicated on the key plan on page 2. The building was so divided into sections in 1912, when calorifier chambers were reserved, but in view of later satisfactory developments in forced hot water circulations, the Council's schemes were modified and their specification provided for a centralised pumping plant and hot water boilers with control chambers and flow and return manifolds taking the place of the calorifiers.

Trunk mains are led from the boiler house to the control chambers, from which distributing mains are taken to pick up the risers serving the radiators from the basement to the sixth floor.

Sectional valves with emptying cocks are provided, both at the control chambers and on the risers. It has been found possible in nearly all cases to run the risers in chases, which were already provided in the building, with the result that very few unsightly pipes will be in evidence.

It may be of interest to note that since the heating work commenced the Council have purchased from the Globe Pneumatic Engineering Co. an air compressor set and the necessary tools for drilling clean holes through brick and concrete, and there has been a very considerable saving in the time and cost of cutting away.

The ventilating radiators are provided with a specially designed fresh air inlet register and control gear and all radiators are provided with hand control and specially designed "Permaset" double regulating valve of the "lockshield" type. Owing to the height of the building special provision had to be made for expansion, and the connections where radiators are close to the risers are entirely in copper, which in addition to allowing the necessary spring gives a better appearance where the connections are exposed.

It will be noted that practically all the radiators have top flow connections and, apart from the increased efficiency of this arrangement, as air pipes are taken from each flow riser, each radiator is automatically freed of air. This deviation from the Contractors' original proposals, in which "Airlet" valves were to be used, was introduced at the request of the Council's representatives, as even in the comparatively small temporary heating plant continual troubles arose owing to the radiators becoming cold through air lock. This is a most important consideration in a large building.

Central Boiler House Plant.

Owing to the necessity of retaining the majority of the temporary boilers, circulating pumps, etc., for this winter, this portion of the plant cannot be shown in an advanced stage at this visit. Two of the permanent heating boilers are now erected and the first of the two steam boilers.

Circulating Pumps.

The circulating pumps will be four in number, each capable of dealing with half the eventual load (including the future Section D.) All the pumps are to be direct driven—two by electric motors and two by high speed Gwynnes vertical steam engines designed for running without oil in the cylinders, so that the exhaust can be utilized in the hot water service calorifiers and returned direct for re-use.

Heating on Seventh Floor.

The heating of the seventh floor is independent of the main apparatus and is by low pressure steam. This is, however, quite a small plant as this floor only extends over a small portion of the central block on the river front.

Heating of Sub-Basement.

The heating of the sub-basement—apart from the heat from the trunk and distributing mains,—is dealt with by three plenum units each consisting of steam battery, centrifugal fan and distributing trunking. These plants ensure a constant supply of warm air to the many store, strong and muniment rooms, keeping same dry and warm without any possibility of leakages damaging valuable records.

Heating of Residential Quarters.

The heating of residential quarters on the sixth floor is taken from the main apparatus but so arranged that the heating of these quarters can be continued by a gas boiler should the main boilers be shut down.

Hot Water Services.

There are four separate hot water systems as follows :—

Main System dealing with the lavatories throughout the building.

Kitchen System No. 1 dealing with the kitchens and service rooms on the seventh floor.

Kitchen System No. 2 dealing with the service rooms on the first floor.

System for residential quarters.

Main System.

This apparatus is served by two steam calorifiers fixed in the Central Plant House and utilizes the exhaust steam from the circulating pump engines supplemented by live steam direct.

Each calorifier has a storage capacity of 2,000 gallons and a duty of raising 1,200 gallons per hour to 160° Fahr.

The circulations, which are designed on standard lines, are provided with forced circulation by two direct coupled centrifugal pumps, one motor-driven and the other engine-driven; one pump is spare.

Small Systems.

The remaining systems are dealt with by storage calorifiers, and being simple in design do not call for any special comment. The hot water services for the residential quarters are, however,

ealt with in a similar manner to the heating of these rooms.

Water Softener.

Cold water is supplied to the hot water service through a Wilson & Perrett Water Softener having a capacity of continuously softening 1000 gallons per hour to a hardness not exceeding 6 grains per gallon.

As the capacity of the softener would not be sufficient for the heavy demands that occur in an office building, say during lunch time, a 7000 gallon storage tank is provided for softened water, the feed pipes for hot water service and steam boilers being taken from same.

Steam Plant.

Boilers.

Two steam boilers are provided of similar construction to the hot water boilers, and these will be worked at 60 lbs. pressure and will supply steam for :—

Hot water service calorifiers.

Plenum plant for Council Chamber.

Plenum plant for sub-basement.

Heating on seventh floor.

Uninterrupted service to chemical laboratory on the sixth floor.

As one boiler will easily carry the full duty, this is all that will be required during the summer months. Steam services are taken to the various points and reduced in pressure for the plenum batteries and the direct heating system.

All the condensate is returned for re-use where possible, the condense piping being entirely in copper.

Boiler Feed Pumps.

Two Weir Standard Boiler Feed Pumps are provided, each capable of carrying the full duty.

Draining Arrangements.

As the boiler house is below the level of the drains, special provisions are made for draining. A main draining pipe, picking up all the emptying cocks and blow-off cocks from boilers and all other draining pipes from the plant, is taken to a large receiving tank and thence lifted to the sewer by an automatic centrifugal pump electrically driven.

The following data in connection with the central plant is interesting:—

Approximate capacity of the four heating and two steam boilers - 36,000,000 B.T.U.

Main chimney 135 ft. high \times 5½ ft. diam.

Fuel storage provided - - 2,150 tons.

Extract Ventilation.

Main Extraction.

For the extract ventilation of the Offices generally register grids are fixed in the internal walls connecting with false ceiling ducts formed over the main corridors. These grids, which are arranged for permanent and hand regulation work in conjunction with the ventilating radiators. Where false ceilings cannot be arranged, sheet metal ducts are provided. The ducts connect to 10 large vertical shafts thus dividing the main extract ventilation into as many sections. At the top of each shaft a special shutter of large area is provided to allow of natural extraction, if desired, and at the base of each shaft is fixed an electrically driven centrifugal fan discharging by a separate

trunk to above the shutter. The position of the fans at the bottom of the shafts is necessary owing to the difficulty of properly controlling a number of fans situated above the roof, far apart and difficult of access.

Lavatory Extraction.

This is entirely independent of the main system and is also treated in sections, there being 10 sets. The fans in this case are fixed near the roof, each consisting of an electrically driven centrifugal fan connected up to the various lavatories by sheet metal trunking.

Special Sets.

In addition to the main office and lavatory sets, there are seven special extraction sets dealing with unit departments, etc.

Data.

Approximate weight of air moved in above plants exclusive of Council Chamber plant	} tons per hour	468
Total number of radiator registers	....	1,632
Total number of plenum and extract grids and registers	.... ....	1,450

General Data Referring to Heating, Hot Water Supply & Steam Plants.

Total number of radiators and sky- light loops....	....	....	....	2,152
Total number of valves of all kinds				6,244
Approximate total length of piping of all kinds ....	....	....	.... Miles	30
Approximate number of fittings for pipes ....	....	....	....	40,000

Notes on Erection.

Considerable thought was given to the best methods to be adopted in carrying out the actual erection of the plant and it was decided that as much as possible of the work, apart from ordinary "fixing," should be dealt with on the job. A workshop was fitted up with power machines for screwing, drilling, cutting, etc., and in addition welding plants were installed so that headers of any size can be made up as required. It was, however, found that owing to the size of the building it was best to deal with the cutting and screwing of the small pipes locally by small kits close to the work. Several stores for material are provided, each in charge of a storekeeper, and the materials are booked in and out and proper stock sheets kept.

Each fitter starting a new job has all the right materials served out to him without waiting, and is continually fed with what he requires to "carry on."

The fact that each man's work is recorded on the progress charts has no doubt created a spirit of emulation amongst the men which is decidedly beneficial to the progress of the works.

Heating and Ventilation of the Council Chamber Suite.

As previously mentioned the heating and ventilating of the Council Chamber and Committee Rooms is a separate contract in the hands of the Buffalo Forge Co., Ltd., London.

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The whole of the Heating and Ventilating work is supervised on behalf of the Council by Mr. W. E. Riley, F.R.I.B.A., M.I.C.E., assisted by Mr. Thos. Moodie, to whom special duties have been delegated in this direction.

As a result of the Council's representatives and the Contractor's staff being in close touch throughout the period of designing and execution, the time usually lost in deciding the innumerable questions in a contract of this magnitude has been reduced to a minimum.

It should be noted that no photographs are to be taken, nor is any report of the visit to be published in the Press without first obtaining the permission of the London County Council.

P.M.B.G.