(No. 10.)

1896.

SESSION II.

PARLIAMENT OF TASMANIA.

SEWER AND DRAIN VENTILATION, AND HOUSE DRAINAGE:

REPORT BY MR. A. MAULT, CONSULTING ENGINEER TO THE BOARD.

Presented to both Houses of Parliament by His Excellency's Command.

Cost of printing—£3.

Scale of Feet

Scale of Chains

MACQUARIE ST

ANTILL ST

WATCHHOUSE LANE

DAVEY ST

G.W.Wilson

Charlotte Green

W.H.Winch

Cascade Brewery Co. Ltd.

A.Turnbull and F.H.Harrison

Mrs Whyte

Mrs Mays

Hy. Sheen

Dobson, Mitchell & Allport

Sunday School

M.Gorman & P.Deegan

J.Feathem

Wesleyan Chapel

Dobson, Mitchell & Allport

Chas., Robt. & Martin Day

To accompany Report on "Antill Sheet Block"

H. Maultt
Govt Engr to the Board

January 1896

SEWER AND DRAIN VENTILATION, AND HOUSE DRAINAGE.

THE METROPOLITAN DRAINAGE BOARD.

GENTLEMEN,

1. IN accordance with your instructions I have prepared a plan shewing the details of the sewer and drain ventilation and the house drainage of a block of buildings in the City of Hobart. The block, of which I have the most complete details, is that comprised between Macquarie-street on the north-west, Davey-street on the south-east, Antill-street on the north-east, and Watchhouse Lane on the south-west, and this is shewn on the accompanying plan, with details of all the features of the ground and buildings, and of all the works necessary for their proper drainage.

2. This block is situated at nearly the head of one branch of the sewers. Its area, including its share of the adjoining streets, is about $3\frac{1}{3}$ acres. It is occupied by 38 dwelling-houses, a chapel and a schoolroom, and the number of its inhabitants is about 170, being about $51\frac{1}{2}$ to the acre. As it is so thickly occupied now, it is probable that the provision herein made for its drainage will be sufficient in the future however much the general population of Hobart may increase.

3. The main sewer draining the block will be a seven-inch pipe-sewer in Macquarie-street, a six-inch pipe-sewer in Watchhouse Lane, with two 6″ and six 4″ branches for house-drainage. The ventilation of the main sewer will be effected on the same principle as that of all the sewers in the metropolitan system. Each sewer will be divided into sections, separated from each other and from the house-drains by syphon-traps. These syphon-traps will all be contiguous to man-holes or intercepting chambers, as shewn on the plan, so that they will be completely under control for cleansing and other purposes. The ventilation section of the block is shewn to begin at the man-hole at the junction of Macquarie and Antill streets. That man-hole and the syphon below it will separate it from the sewers lower down Macquarie-street; and it will receive fresh air through the inlet ventilator shewn. This inlet ventilator will consist of a valve box fixed about nine feet above ground, with a mica valve hung so as to permit only the ingress of the fresh air. If anything should occur in the sewer to cause an uprush of air from the man-hole, the uprush would close this valve and prevent the egress of any foul air. But proper provision will be made for its egress where it can do no harm. At the upper end of the Macquarie-street sewer there will be another man-hole with a syphon, and from the lower end of the syphon an upcast ventilating shaft will be carried up about twenty feet above ground and finished with a revolving cowl of a pattern which will take advantage of whatever wind is blowing to exhaust the sewer of air. Each of the branch drains before mentioned will also be separated from the main sewer by an intercepting chamber with a syphon-trap on the sewer side of it, and from the lower end of this syphon there will be an upcast ventilating shaft similar to that above described. Thus, whatever fresh air is admitted at the Antill-street man-hole, and whatever vapour is given off by the sewage, can only escape by these upcast shafts, and their outlets are kept well away from any chance of being offensive. With reference to the vapours given off by the sewage, it must be remembered that the sewage will always in Hobart be fresh; that is, it will never have time to ferment or putrefy. In no sewer will it ever be three

hours old before discharge, and in this particular sewer it will never be a quarter of an hour. The following facts will show how ample is this provision made for ventilation :—There are 190 cubic feet of air space in the ventilation section above described. The effective inlet space in the mica valve chamber is nine square inches. If the air in the sewers is to be renewed every hour, 190 cubic feet of air must pass in at the valve in the hour, being a wind motion of less than two-thirds of a mile in the hour—a very light breeze indeed. If there be no motion whatever in the external air the syphon action between the inlet and outlets will be sufficient to cause as much draft as is necessary. To provide against the danger of a too energetic ventilation, such as would blow the water out of the syphon-traps, much larger outlet than inlet orifices are provided.

4. The house-drains will be ventilated on exactly the same principles. There will be an intercepting chamber with a syphon-trap between each system of house-drains and the sewer. Fresh air will be admitted to the intercepting chamber and the drains through a valve-box, and the air from the drains will be sent out through up-cast shafts with cowls, all as described above. The positions of these intercepting chambers and inlet and outlet ventilators are shewn on the plan. In this block there are no houses having water-closets within their walls, had there been, a similar system of ventilation would have been adopted, the outside soil-pipe being continued upwards as an up-cast shaft, with a cowl and arrangements to prevent the entry of foul air into the house.

5. There are in these blocks some service-drains with trapped grids and other fittings already laid, and, of course, as far as practicable advantage will be taken of them ; but as it is impracticable without spending time and money in opening ground and examining them, to say to what extent they can be utilised, I have thought it safer to estimate for an entirely new system of drains. It is therefore more likely that the following amounts will exceed the needful provision, than that they will be insufficient.

6. The following table gives the quantities and cost of the works required to drain this block of buildings and to ventilate the drains :—

	£	*s.*	*d.*
112 yards of 6″ pipe drains, laid complete, at 4*s.* 6*d.* a yard...	27	15	0
Extra for ten bends and junctions, 1*s.* 6*d.*.....	0	15	0
395 yards of 4″ pipe drains, laid complete, at 3*s.* a yard.....	59	5	0
102 bends and junctions, 4″, at 8*d.*	3	8	0
220 yards of 3″ pipe drains, laid complete, at 2*s.* 6*d.*.....	27	10	0
64 bends and junctions, 3″, at 6*d.*.....	1	12	0
No. 8 man-holes and intercepting chambers, at £2.....	16	0	0
330 feet 3″ galvanized iron pipes and fixings, 4*d.*.....	5	10	0
No. 16 cowls with guys, 10*s.*	8	0	0
No. 7 mica valves, 7*s.*.....	2	9	0
No. 38 cast iron trapped grids and fixing, 10*s.*	19	0	0
Ten per cent. for contingencies.....	17	3	0
	£188	7	0

This makes the average cost of draining each house in the block to be £4 14*s.* 2*d.*, exclusive of the provision of water-closet apparatus.

7. With respect to the provision of water-closet apparatus, I see no reason to alter the estimate I gave you in my preliminary report on house drainage, that the cost of providing an efficient one would be £3 6*s.* a house, exclusive of the building which is taken to be already provided, as it is in nearly every case. This cost, added to that of the house-drainage above given, would make the total cost in this block £8 a house.

8. As so much doubt has been expressed as to the reliability of these estimates, I beg to suggest that the Members of the Board having technical knowledge of the whole subject, both of the work necessary to be done to properly drain the houses, and the cost of the work, should be asked to accept the office of a Committee to examine this block, plans in hand, and report whether any necessary work has been omitted, or any part of its cost underestimated.

I have the honour to be, Gentlemen,
Your faithful Servant,

A. MAULT, *Consulting Engineer to the Board.*

Hobart, January 22nd, 1896.

WILLIAM GRAHAME, JUN.,
GOVERNMENT PRINTER, TASMANIA.

FURTHER REPORT ON HOUSE DRAINAGE AND DRAIN VENTILATION.

The Hon. the Chairman and the Members of the Metropolitan Drainage Board.

GENTLEMEN,

1. In accordance with your instructions, I have had surveys made and levels taken of the block lying between Davey-street and Fitzroy Place, and append hereto a plan of it, and of the drainage arrangements that are required for it. Its area, including its share of the streets bounding it, is about 12⅓ acres. It is occupied by 22 houses, and the number of its inhabitants is about 122, or ten to the acre. By day the number of inhabitants is probably 150, as there are two schools in it.

2. The main sewer draining the block will be a 12″ pipe sewer in Fitzroy Place, a 6″ pipe sewer in Davey-street, a 6″ pipe sewer in Antill-street, and another 6″ pipe sewer in Molle-street, as shown on the plan. The plan also shows all the necessary house drains. The greater part of these house drains are already made, and are apparently in good working order, but will require examination, and to be connected with the sewers and ventilated. As anticipated, the work is heavier than in the case of the Antill-street block, as the houses are farther apart, more distant from the sewer, and, being larger, have more sanitary accommodation, there being 34 water closets and 22 fixed baths in the block.

3. The following table gives the quantities and cost of the works required to drain this block of buildings, and to ventilate the drains:—

	£	*s.*	*d.*
985 yards of existing drains to be examined, at 1*s*.	49	5	0
402 yards 4″ drains, laid complete, 3*s*.	60	6	0
Extra for 89 bends, junctions, &c., 8*d*.	2	19	4
144 yards 3″ drains, laid complete, 2*s*. 6*d*.	18	0	0
44 bends, junctions, &c., 6*d*.	1	2	0
18 intercepting chambers, 40*s*.	36	0	0
663 feet of galvanized iron 3″ pipes, at 4*d*.	11	1	0
25 cowls and guys, 10*s*.	12	10	0
17 mica valves, 7*s*.	5	19	0
14 cast iron grids and fixing, 10*s*.	7	0	0
Ten per cent. for contingencies	20	5	8
	£224	8	0

This makes the average cost of draining each house in the block to be £10 4*s*. Taken in connection with the Antill-street block, the average cost of draining each house in the two blocks would be £6 13*s*. 2*d*.

4. The yearly rateable value of the property in the two blocks is £2646. The total cost of the house drainage is £412 15*s*.; the interest and sinking fund upon which, at £5 per cent., would be £20 12*s*. 9*d*. a year: and a 2*d*. rate would produce £22 1*s*.

DRAINAGE OF A HOUSE.

5. To carry out your instructions as to an illustration of the principles of house drainage by giving full details with respect to a house, I have taken the house No. 28, Davey-street, which is in this block, and given an enlarged plan of it, and its drainage. The outlet for its drainage is the sewer in Fitzroy Place, and there is throughout a good fall for the drains. They will be constructed with 4in. and 3in. glazed stoneware pipes, joined in cement or asphalt; each branch drain being laid in a straight line from inlet to outlet as far as practicable. Curves where necessary will be made with special pipes, taking eight to form the circle; and all junctions will be formed with junction pipes of which the branch will have a similar curve. In this house there is no necessity to pass with a drain under any of the floors; if there had been this portion of the drain would have been laid in a bed of concrete six inches thick all round the pipe, with an inspection and ventilating shaft at each end.

6. The drainage fittings in this house consist of—

(*a*) Two sinks, one in the scullery and one in the butler's pantry: the waste-water pipes from these will pass through the wall and deliver the water in the open air over trapped grids hereinafter mentioned.

(*b*) Three baths, the waste-pipes from which will deliver their water in like manner.

(*c*) Four water-closets: two of these are on the first floor, delivering through siphon-traps into a lead soil-pipe, the straight portion of which is continued upward, as shewn, to a sufficient height above the roof, and finished with a cowl to act as outlet ventilator; the two other closets are in outbuildings, and will deliver through siphon-traps into the drains: all the closets will have waste-preventing siphon cisterns with large flushing pipes, and after-flush. No water-closets should be permitted in houses except against an outer wall, so as to provide for proper inlet and outlet ventilation of the closet itself apart from the drains.

(*d*) Four cast iron trapped grids (including one in the carriage wash), with moveable catch-baskets and hinged gratings: all these will serve when needed as flushing inlets for the drains.

(*e*) A horse-pot grid and basket in the stable; and

(*f*) An intercepting chamber built of brick-work, with floor in which half-pipes are laid for the drains so as to permit of inspection and control, and with air-tight wooden lid.

7. The ventilation of the drains is thus effected:—An upright T junction pipe is inserted at the sewer end of the siphon, at A, from which a 3-in. ventilating shaft is carried up as shewn and marked O.V, with a cowl with a vane which keeps its mouth away from the wind and keeps towards the wind a smaller upward sloping inlet to create a draught. The siphon cuts off the air connection with the sewers, which are ventilated through the outlet ventilator just described. Fresh air is admitted into the house drains through the inlet ventilator at the intercepting chamber. This inlet has a mica valve hung so as to permit only the ingress of air. The air thus admitted flows through the pipes and finds its egress at the outlet ventilator, which is a continuation of the soil-pipe as before described, which has a similar cowl to that above referred to. When a current of air is thus established it is found sufficient not only to ventilate the line of pipe in which it actually passes, but also to draw the air into it from the branch drains flowing into it every time an inlet of water into them takes place.

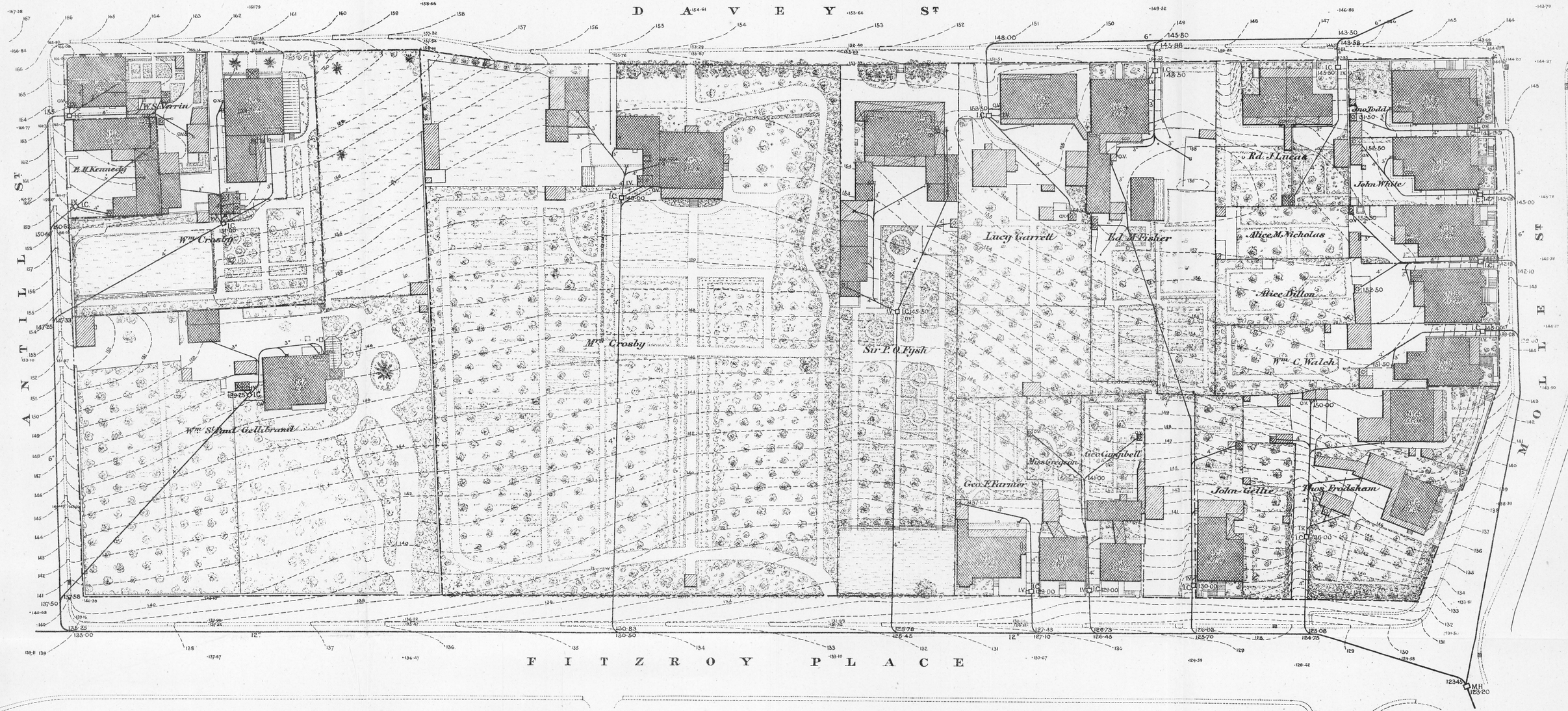
8. It will be thus seen, first, that no sewage will be left to stagnate and ferment in the drains; secondly, that no foul air from the street-sewers will be able to get into the house-drains; and, thirdly, that no foul air from the drains can get into the house.

9. With regard to the above estimates of the cost of the drainage works, I beg to repeat my suggestion that they be specially examined upon the ground by a technical committee of the Members of the Board.

I have the honour to be,
Gentlemen,
Your faithful Servant,
A. MAULT,
Consulting Engineer to the Board.

Hobart, 7th February, 1896.

WILLIAM GRAHAME, JUN.,
GOVERNMENT PRINTER, TASMANIA.


D A V E Y ST
ANTILL ST
MOLE ST
F I T Z R O Y P L A C E
W.S. Verrin
P.H. Kennedy
Wm Crosby
Wm St. and Gellibrand
Mrs Crosby
Sir F.O. Fysh
Lucy Garrett
Ed. H. Fisher
Alice M. Nicholas
Alice Dillon
Wm C. Walch
Rd. J. Lucas
John White
Jno Todd
Geo. F. Farmer
Miss Gregson
Geo Campbell
John Gellie
Thos. Bridsham
Scale of Links
Scale of Feet
To accompany report
J. Manuel 7th February 1865.

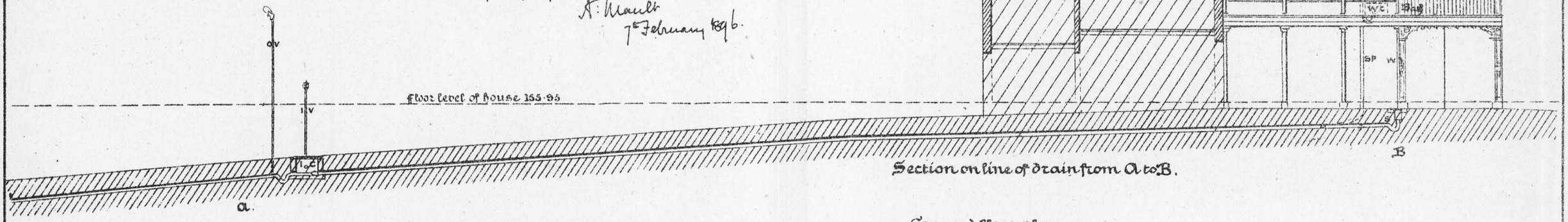
House Drainage.

Scale of feet 5 10 15 20 25 30

Explanatory Note:-

CH. Coach-house: CW. Carriage wash.
Sk. Sink: St. Stable: M. Manure pit. S. Siphon trap
IC. Intercepting Chamber: IV. Inlet Ventilator: OV. Outlet Ventilator.
WC. Water-closet: WP. Waste-water-pipe: SP. Soil pipe: TG. Trapped grid
The levels are given in feet and decimals above mean sea level. The figures without a line or above the line shew the levels of the surface; those below the line the levels of the inverts of the drains

To accompany Report
A. Mault
7th February 1896.



Section on line of drain from A to B.

Ground floor plan.