

**Report on tubular drainage, &c.; for Jennings' Buildings, Kensington : with distribution of charges over twenty years / By Mr Edward Gotto ... April 25th, 1849.**

**Contributors**

London (England). Metropolitan Commission of Sewers.  
Gotto, Edward.

**Publication/Creation**

[London] : Printed by Reynell and Weight ..., [1849]

**Persistent URL**

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# Metropolitan Sewers.

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## TUBULAR DRAINAGE, &c.,

FOR

JENNINGS' BUILDINGS, KENSINGTON;

WITH

DISTRIBUTION OF CHARGES OVER TWENTY YEARS.

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SPECIFICATIONS and ESTIMATES, with PLANS, prepared by  
MR GOTTO, Assistant Surveyor, for the consideration of the  
WORKS COMMITTEE.

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RESOLVED, *on the 8th February, 1849*,—"That MR GOTTO prepare Plans,  
" Specifications, and Estimates of the Works which he recommends for  
" the Sanitary Improvement of Jennings' Buildings; and that he con-  
" trast the gross expense at which they may be executed by the Com-  
" mission with the ordinary builder's gross prices, if the works should  
" be executed in the usual manner by the owners or occupiers; and  
" show the yearly charge on the owners and occupiers if the gross  
" expenses of executing the works by the Commission be charged by  
" way of Improvement Rate for twenty years."

## REPORT.

DESCRIPTION  
OF JENNINGS'  
BUILDINGS.

The block of houses referred to in this order is shown on the accompanying plan, No. 1, and is a distinct area of buildings, having

On the north, Kensington High street;

On the south, garden ground belonging to Mr Shepherd;

On the west, the gardens at the back of houses in High street.

It is separated from the adjoining property, and is clearly defined, by very high walls.

Their Sanitary  
Condition.

The sanitary condition of this place was serious and alarming before temporary measures of relief were adopted by cleansing the streets, sewers, and cesspools, &c., the cholera committing extensive ravages, and is described in the evidence of Mr Guazzaroni, the medical officer of the parish, in the Report of Mr R. D. Grainger, of the General Board of Health, as follows—

“The cholera in Jennings’ buildings commenced in the night of January 17th; the disease has occurred in six families, of whom ten are Irish. The total cases of well-marked cholera amount to twenty-two, of whom ten have died. Two cases occurred on Saturday, two yesterday, and one to-day (29th January, 1849) up to 10 A.M. There have been a large number of cases of diarrhoea, some severe, with cramps of the extremities; the discharges were often very pale.”

Mr Grainger went into several of the houses on the 28th of January last, where he found patients labouring under cholera; and he observes—

“It is further satisfactory that, up to the present time, there has been no case of cholera in Kensington beyond the limits of Jennings’ buildings, and that the general state of health of the inhabitants is good.” It is the opinion of the three medical officers of this parish, Messrs Guazzaroni, Godrich, and Frost, “that the outbreak of the cholera in Jennings’ buildings was in no degree connected with the removal of the children from Tooting to Kensington. It is also important to state, as indicating the undoubted presence both of the predisposition to cholera, and cholera poison itself, that three months ago a case of true cholera occurred in Jennings’ buildings.” Here is an illustration of a feature of the dangerous malady, that when the cholera reaches a place, which from certain local causes has an attraction for, and is susceptible of it, and the inhabitants predisposed to the disease, then its narrow limit may be clearly discerned to be coincident with the extent over which the influence of those local causes prevails. It is a remarkable fact, and one not altogether irrelevant to the object of this Report, that while cholera prevailed within the space shown in the accompanying plan, the immediate neighbourhood was altogether free, not only from actual cholera, but also from the premonitory symptoms of that disease. This is so far important, as it simplifies and confines the sphere of the inquiry.



The local causes, to which, humanly speaking, may be attributed the visitation of that particular place by the cholera, are explained by the medical officer already quoted, in the following terms:—

THE LOCAL  
CAUSES OF  
CHOLERA.

“ Many of the houses (in Jennings’ buildings) were very crowded ; has seen five or six in one bed ; has seen repeatedly two or three families in one room. This is almost exclusively among the Irish.” Mr Grainger stated before the Board of Guardians, that “ no time should be lost in relieving the inordinate overcrowding of the houses in Jennings’ buildings.” He further writes to the Vice-Chairman of the Board—“ It is essential that a house or houses of refuge be immediately provided, in order to remove those persons who are still unattacked from overcrowded rooms.” I am further informed that this overcrowding arises from letting lodgings, and that the only time to witness its true extent is at night. There is a great indisposition on the part of the inhabitants to give any information on the subject.”

Overcrowd-  
ing.

The medical officer resumes:—“ The privies are in a very bad state, some of them full up to the seat, and the drainage is very defective.” In one instance the occupants of twenty-one houses use one set of necessaries, and throughout the buildings there is a very great disproportion of such accommodation to the number of persons, so that every abomination is thrown into the streets;—and there being no sufficient overflow from the cesspools, and no water-power whatever, they become filled up in an incredibly short time after they have been emptied. Their construction is extremely objectionable, and they are very dark. The structural arrangement of most of the houses is such as not to admit of the introduction of private water-closets in the houses, being generally only one room deep and wide, with a common staircase, each floor being distinct tenements.

Inefficient  
Drainage and  
Foul Cess-  
pools.

The defective nature of the drainage of this place has been described in my Report presented on the 7th of February as follows:—“ The drainage of Jennings’ buildings is defective and irregular in construction, and has been a source of annoyance and complaint from as far back as the year 1664 to the present time. Originally an ancient watercourse crossing High street, and discharging into lower sewers, it has been, from time to time, arched over, and now passes under several houses, from High street into Jennings’ buildings; is difficult of access, and calculated to accumulate deposit. Upon examination lately made, in consequence of the outbreak of the cholera, the gullies and drains in that neighbourhood were found to be nearly full of soil.” There have been indeed, in some parts, house-drains constructed ; but their inefficiency furnishes an instance of the waste of money expended in this way, by owners undertaking the work themselves, and an illustration of the folly of attempting any sort of house-drainage without a well-regulated supply of water.

There is but little ventilation in these houses ; and the arrangement of the Courts is such as very much to obstruct external and thorough ventilation ; the entrance to the Courts being sometimes under a narrow archway, with no other outlet.

Imperfect  
Ventilation.



But while it is admitted that inordinate overcrowding and insufficient ventilation are evils great enough to create a predisposition of the constitution for the cholera, and aggravate the disease when it exists, yet it is no longer doubted that an ill-drained place is the most injurious of all, producing atmospheric impurities inviting to the cholera, and upon which it may be said to feed. Calculated as such places are to foster and strengthen disease, and to produce a state of moral degradation among the inhabitants, it is highly injurious to leave them as they are, or rather allow them to grow worse and worse, until by repeated visitations such fearful maladies acquire a virulence which has been seen to overcome its accustomed limits, and though slowly, yet certainly, to expand itself to places perhaps not in so wretched a state, yet bad enough not to escape; and thus such a place as this becomes a dangerous nidus of disease.

IMPROVE-  
MENTS RECOM-  
MENDED.

It is therefore of the very highest importance, for the public safety, that means should be taken to reconstruct the drainage of such places, and that all offensive matter, capable of being disposed of in that way, should be removed by available supplies of water; that new water-closets should be constructed, the existing necessities remodelled, and ample means provided for collecting the more solid refuse in dust-bins to be carted away daily; and indeed to put in force all the powers conferred upon the Commission for improving their condition.

Accordingly in my Report, presented to the Works Committee on the 7th February last, it was recommended—

“That the old sewers be filled up and abandoned, and this block of houses treated  
“specially as dependent for outfall upon the new sewer in (Young street  
“and) James street, and glazed stoneware pipes laid down as shown  
“on the accompanying plan. New necessities to be constructed  
“(according to the sketches now submitted) so as to answer the  
“purpose and act in a similar manner as flushing tanks, at the heads of  
“the pipe sewers; and that the expense be levied as an Improvement  
“Rate.”

It appears that the Metropolitan Sewers' Act gives no power to Commissioners to interfere with ventilation or overcrowding, but they may be dealt with under section 66 of the Public Health Act.

It is not desirable, in this instance, to construct water-closets in the houses; for the expense would be very materially increased, both in providing so many separate water-closets, as well as sufficient tanks and apparatus for each house, on account of the intermittent supply of water. Apart, however, from motives of economy, it would not be expedient, for no sort of improved self-acting apparatus, however simple, would be proof against a class of people of such negligence and dirty habits as the lower class of Irish poor; the remedy would soon be found to be worse than the original evil, for what is now thrown into the street would be



kept in the houses. These conveniences in such localities should be subject to the daily inspection and control of a public officer; which is really, under these circumstances, the only security for their proper action.

The existing necessities are intended to be remodelled in such a way as to dispense entirely with the cesspool; and new necessities for the use of, and belonging to, a certain number of houses, are proposed to be constructed of hollow bricks, as being cheaper, lighter, and stronger than stock brickwork. Ventilation will be provided by louver boards in the door panels; and light, by laying rough plate-glass to form the roof. A continuous tank of stoneware, similar to the egg-shape invert of a sewer, will be laid under the whole length of the seats with a good fall, at the lowest part of which a valve is placed to flush out the contents through six-inch pipes into the main sewer pipe; an overflow is also provided so as to admit of the water standing at a certain height. The necessity and expense of a water-cistern is avoided. This simple arrangement will be constructed in such a way that the whole may be under the control of the flap-man at present employed on the district, whose duty it will be to turn on the water into the tank under the seat, and at the same time to flush away its contents into the main sewer pipes. This operation will be performed once a day, or more frequently in cases of emergency. The stopcock for the water supply and the valve for the discharge will be accessible only to him. And thus will be removed daily, by suspension in water, that which now accumulates in a very short time, produces dangerous consequences, is a fruitful source of disease and misery, and requires at short intervals an expensive and disgusting mode of removal.

Six-inch pipes are recommended from the tanks under the necessities in preference to a smaller description, because they effect a greater flushing power.

The inconvenience to the inhabitants from the existing state of things is very great; for it is evident that when the cesspools become almost full, the necessities are unfit for use, no care is then taken to cleanse them, and every sort of indecency is committed and allowed to exist, to the manifest injury of health and morality.

The cost of the proposed remedy for this evil is very inconsiderable, and it will be shown to be cheaper than maintaining the present necessities, and allowing to exist the inconveniences already described.

Too much attention cannot be paid to the water-closet arrangements; they are of primary importance, and should be the first objects of all inquiry and inspection with a view to sanitary improvement. The necessity for house-drainage begins here, and upon the proper construction of these indispensable requisites of health depends the efficient working of every system of drainage with which they are connected.

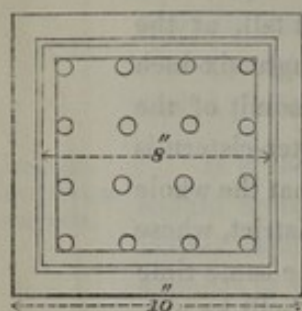
It is proposed to use *half-socket* main sewer pipes of glazed stoneware, by which more uniform joints may be secured, and junctions easily exchanged for plain lengths, as future occasion may require.



The gullies are intended to communicate with the sewer by four-inch stoneware pipes brought up to a sand-trap of stoneware in one piece, according to the annexed drawing, which shows the grate, also of stoneware, with round holes bevelled inwards instead of the usual slits, which admit the passage of pieces of straw, sticks, and such matters as are likely to be impediments in a tubular system.

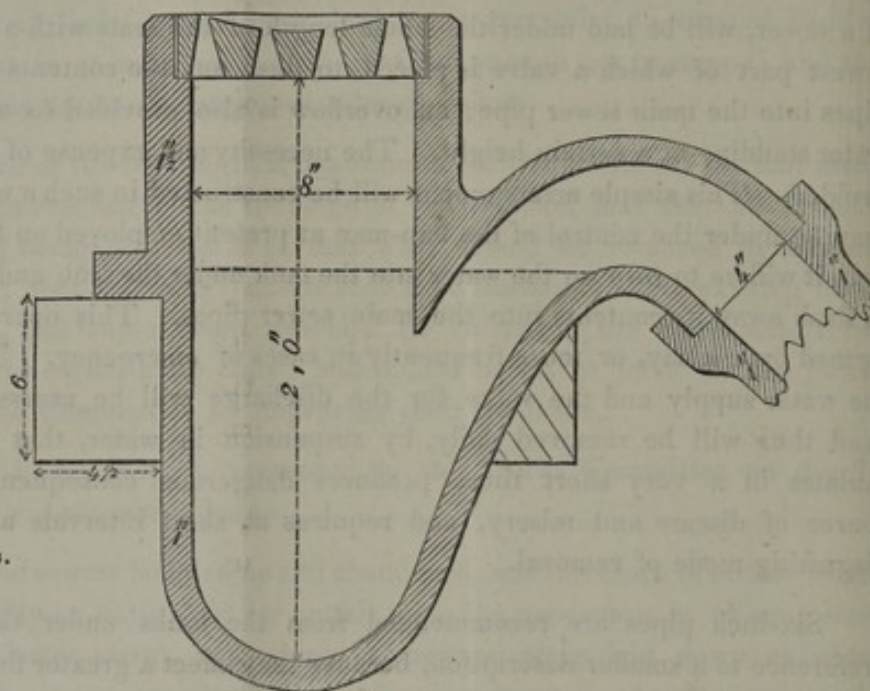
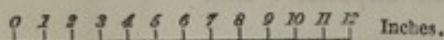
Plan.

Section.



STONEWARE GULLY.

Scale.



Dust-bins, common to the inhabitants, have been formed in some places, and, I observe, have been generally used. Multiplying these conveniences will have a very beneficial tendency to cleanliness and health, and will render inexcusable and improbable the too common practice among the poorer classes of throwing solid refuse into the cesspools.

If the dust and other refuse be thrown into the streets, they require cleansing much oftener, the parish is put to an additional expense, the refuse is rendered valueless, and so the contractor also loses—for he is generally paid for the cleansing, and pays for the dust. In parts such as that under consideration, where the population is dense, there must be in proportion a very large accumulation of solid refuse; and if a sufficient number of receptacles to facilitate collection and removal be not provided, this pecuniary loss must therefore be still greater, the atmosphere must become seriously unwholesome, and the temptation to retain it in the house is afforded. But with such conveniences the solid refuse is collected and



removed before putrefaction and decomposition take place, and the poison contaminates the air. It is recommended that the dust-bins should have covers with locks, accessible only to the scavengers, and a hole in the cover to receive the dust.

These are the sanitary improvements contemplated and recommended in this Report for Jennings' buildings. But this spot should always be the object of peculiar care and attention on the part of the parish authorities, under whose direction the street paving, repairing, sweeping, and washing should be unremittingly performed.

The existing available resources to carry out the objects of this Report are as follows :—

The outlet is already provided into a sewer of the first class,  $5.6 \times 3.0$ , along Young street, east side of Kensington square, and James street.

ft. in.    ft. in.

The surfaces of the streets, lanes, and alleys are for the most part paved with pitchers and paving bricks.

There is an abundant though intermittent supply of water ; a great number of the houses have availed themselves of it, and the remainder are supplied by six public pumps. It will be seen, that in the proposed arrangement for water-closets the inconvenience of the intermittent supply is sought to be obviated.

Few places in the metropolis can be selected, possessing the same local applicabilities, where the drainage is more defective, and such improvement more eminently required ;

Or where greater facilities are afforded for the introduction of a tubular system of drainage ;

And for advantageously organising the arrangements for distributing the expense to be paid by the parties individually benefited, over a series of years.

In the execution of these works it will be necessary to pass through the basement of the house in Kensington square shown on plan, through the house and garden No. 7, through the garden attached to the house marked 75, and through the houses marked 20 and 32 on the plan. Notice of entry upon the premises must be given (sec. 62).

It is required further (by sec. 65 of the Metropolitan Sewers Act) that the Surveyor should report the most advantageous mode of contracting. This I beg to recommend should be by contract, upon tender, for the complete execution of the work, and for the maintenance of the same in repair for the term of five years.

The probable estimate for the works proposed to be defrayed by the District Sewers Rate is 261*l.* if stoneware pipes are used, and 215*l.* if red earthenware pipes are used.

ESTIMATES.



## ESTIMATES.

There will be probably no expense in maintaining these works in repair for many years, if properly constructed in the first instance.

The smallness of the difference in the two estimates furnished above for the main sewer pipes is accounted for, in that the cost of laying, digging, filling, and carriage is the same in both cases (and that forms by far the larger part of the expense), while the only difference is in the cost of the pipes. Several months, however, must elapse before red earthenware pipes, suitable for the purpose, could be procured.

In the estimates for the private improvements, appended in a tabular form, the charges of private builders have been put about fifty per cent. above the contract charge if the works be done under the Commissioners. The nature of the works being unusual for private builders, it is impossible to arrive at an exact estimate of their charges in each case; but, according to my experience, the above arrangement shows a moderate addition.

The appended estimates include draining the houses, providing soil-pans and apparatus to single houses, new necessities and tanks to sets of houses, emptying and filling up cesspools, and laying on the water for the necessities, but do not include the charge for water, which would be, for houses which have private water-closets, about  $1\frac{1}{2}$ d. per week, and of course much less per house for such as have common necessities. It has been already stated that the majority of the inhabitants have availed themselves of the water supply, so that no additional charge for water would be incurred by them.

I have given in detail an instance which has lately come under my notice, which shows the estimate of the private builder for draining a house, &c., to be 16*l.*, and my estimate for the same work if done by the Commissioners 10*l.* 11*s.* 4½*d.*

There are various objectionable points in the subjoined description of the work for draining a house, but I have followed the specification of the builder, that the comparison may hold good, although by the substitution of other and better materials for the cistern, &c., the cost might be reduced to about 9*l.* 10*s.*

In my estimate the present scale of prices has been adopted, which it is expected will be eventually very much reduced; but even at these prices, with a constant water supply, instead of an intermittent, as in the above case, the amount would be reduced to 6*l.* 6*s.*

*Estimate by a Builder for draining One House, and connecting the  
Water Supply.*

“To lay down a four-inch patent galvanized flap mouth, with four-inch glazed stoneware pipes from sewer through vault and basement floor; filling up cesspool in back yard; provide and properly fix a stoneware pan to closet; making good paving, flooring, &c. Take off roof to privy in back yard, provide and fix proper



bearers, ceiling, joists, and inch covering over the same. Provide and fix five-pound lead flat, with flushings. Also provide and fix one-and-a-quarter inch dovetailed cistern three feet long, two feet six inches wide, and two feet high; five-pound lead sides and six-pound bottom, with ball-cock, brass washer, waste and brass valve.—Estimate, 16*l*."

*Estimate for draining One House and connecting the Water Supply, if the Work be done by Contract under the Commissioners.* ESTIMATES.

	£	s.	d.
Taking up the floor of basement, making good, &c.—carpenter and labourer, one day . . . . .	0	8	0
Fir braces to joists . . . . .	0	3	6
Labourer, preparing bed for pipe-drain—one day . . . . .	0	3	0
Breaking through the wall of cellar, back area, and side of sewer —bricklayer and labourer, half a day . . . . .	0	4	0
Materials . . . . .	0	3	0
Valve-flap, and fixing . . . . .	0	5	0
Emptying two cubic yards cesspool, at 6 <i>s</i> . per cubic yard . . . . .	0	12	0
Filling up cesspool, four-and-a-half cubic yards, at 1 <i>s</i> . 6 <i>d</i> . per cubic yard . . . . .	0	6	9
Taking off the roof to privy in back yard, and adapting the rafters and ceiling joists to carry the cistern (the tiles to belong to contractor)—carpenter and labourer, quarter of a day . . . . .	0	2	0
Fifty-four feet of four-inch glazed stoneware pipes, jointed in cement, at 8 <i>d</i> . per foot . . . . .	1	16	0
Eight feet of two-inch ditto, at 6½ <i>d</i> . per foot . . . . .	0	4	4
Extra upon No. 2 junctions . . . . .	0	1	4
No. 1 glazed stoneware water-closet pan, and fixing . . . . .	0	9	6
Sixteen feet super. one-inch rough deal, edges shot, for lead flat, at 5 <i>d</i> . per foot . . . . .	0	6	8
Twenty-nine feet six inches super. one-and-a-quarter inch deal, wrought one side, and dovetailed for cistern, at 9 <i>d</i> . per foot . . . . .	1	2	1½
Eight feet super. three-quarter inch ledged cover for cistern, at 6 <i>d</i> . per foot . . . . .	0	4	0
1 <i>cwt</i> . 3 <i>qrs</i> . 14 <i>lb</i> . of lead in cistern, flat and flushings, including solder, labour, wall-hooks, and nails, at 24 <i>s</i> . per <i>cwt</i> . . . . .	2	5	0
Ball-cock, brass washer, &c. . . . .	0	6	0
Eight feet of half-inch waste pipe, at 6 <i>d</i> . per foot . . . . .	0	4	0
No. 2, half-inch joints, at 1 <i>s</i> . 9 <i>d</i> . each . . . . .	0	3	6
Sixteen feet of three-quarter inch service, at 8 <i>d</i> . per foot . . . . .	0	10	8
No. 3, three-quarter inch joints, at 2 <i>s</i> . each . . . . .	0	6	0
No. 1, stool-cock for water-closet . . . . .	0	5	0
	£10	11	4½

It will appear from the estimates for works herein proposed to be charged as private improvements, that if they are executed by the owners them-

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ESTIMATES. selves, it will cost them, on an average, 4*l.* 6*s.* 5*d.* per house, or a total immediate outlay for the whole block of houses of 428*l.*; and the work would be done by irresponsible workmen, with great uncertainty both as to the time when the whole would be completed, and as to the efficiency of the execution and materials. It is evident that it would be very doubtful whether the work would or could be executed in a satisfactory manner, or so as to work systematically, or answer perfectly the objects intended.

Whereas, if it be executed under the Commissioners by a common contract, the average expense would be 2*l.* 17*s.* 6*d.* per house, or about 50 per cent. less of immediate outlay; and the gross immediate outlay would be 285*l.*, or 143*l.* less than if the owners did the work themselves. Moreover, it must be observed, that if the Commissioners do the work, the owners will have the advantage of the superintendence of responsible public and qualified officers, who would carefully watch the progress of the work, and insure its perfect operation. Cases of failure have been brought before the Commissioners, which invariably turn out to arise from imperfect workmanship. It is therefore of great public importance that the house-drainage should be constructed not only under the inspection of the Surveyor to the Court, but by the Commissioners' Contractor, who would be accustomed to the nature of the work, responsible for its efficiency, and bound to maintain it in repair for a term of years.

But if the principle of distribution of the expenses over a term of years (say twenty) be adopted, then, instead of an immediate outlay of 4*l.* 6*s.* 5*d.* per house, if the owners do the work, an average improvement rate of only 4*s.* 4½*d.* per annum would be required, or about 1*d.* per week per house.

As a measure of sanitary improvement, the substitution of water-closets for the cesspools is required, which, although at an annual expense of 4*s.* 4½*d.* per house per annum, is cheaper than the cleansing cesspools, for which the owners are liable. And in those parts where there are no necessities or cesspools, the expense of cleansing the ordure from the street would not be much less.—(Vide Sanitary Report, 1842, pp. 243, 394, and 453; Health of Towns Report, 1844, p. 350.)

It is stated by Mr Thorn, a contracting scavenger, in the first Report of the Health of Towns Commission, 1844, p. 275, to the effect, that excreta from a lodging-house with a family on each floor accumulates at the rate of about five loads in twelve months, for the removal of which, by the most offensive and unpleasant mode of hand-labour and carting, the owner has to pay 10*s.* per load, that is, 2*l.* 10*s.* a year. The night-soil, which is under these circumstances a great pecuniary loss to the proprietor, and a source of danger to the occupier, would, if immediately carried away and applied, as it ultimately must be, to the land, prove a profitable source of income to the district, and considerably reduce the rates upon the owners or occupiers of the property. The principal obstacles hitherto experienced to house-drainage have been the large expense and its immediate outlay; and when the



enormous cost of these works under the old defective system of large barrel-drains and cesspools is considered, it can scarcely be wondered at: but the recent advance of knowledge and experience on this subject shows that a most complete, efficient, and scientific arrangement may be effected at about one-fourth the expense. And the Commissioners having the power of spreading the payment of that amount over a series of years, reducing the annual rate to an incredibly small sum, at once removes the difficulties alluded to.

ESTIMATES.

In reference to the distribution of the expense of these works:—

DISTRIBUTION  
OF CHARGES.

In section 38 of the Metropolitan Sewers Act, it is provided that if the Commissioners, in destroying old sewers, “shall deprive any person of the lawful use of such sewer, it shall be the duty of the Commissioners to provide some other sewer or a drain as effectual for his use as the sewer of which he is so deprived;” and therefore the expense of the destruction of the old sewers and gullies, and the substitution of the proposed new main sewer pipes and gullies, will be defrayed out of the District Sewer Rate (see also sec. 76): from this source also the expense of maintaining in effective action of the whole will be paid.

A Private Improvement Rate is recommended for works the benefit of which may be individualised; such as the reconstruction of the existing water-closet apparatus common to several houses—the construction of new necessities, under like circumstances, with the drains from them and other parts of the premises.

As the Commissioners have power to apportion as between several rates any expenses incurred (vide sec. 83), I have submitted for your consideration the foregoing apportionment of the cost of these works, and have described further in the plan No. 1, by a strong line, thus, ———, the part of the sewer pipe which is proposed to be charged to the District Sewers Rates; and by a dotted line, thus, ....., that which is proposed to be charged to the Private Improvement Rates.

It must be observed, however, that this is new ground and deserves much consideration. It might be suggested, notwithstanding the section of the Act quoted above, that the ratepayers of the entire district should not be charged with the expense of reconstructing the drainage of a special district, although that special district had previously paid by way of frontage for the use of the insufficient sewer; and it might be made a question whether the expense so incurred should not be considered as lost, and the new work paid for by a Special Sewers Rate.

I beg to recapitulate the recommendations of this Report:—

Summary of  
Recommend-  
ations.

1. That the old sewers and gullies be destroyed and abandoned, that a new system of tubular glazed stoneware main sewer pipe be laid down, and that the expense of this work be defrayed out of the District Sewers Rate.
2. That the existing necessities and dust-bins be remodelled, new necessities and dust-bins constructed, and the house-drains laid with glazed stoneware



Summary of  
Recommend-  
ations.

- pipes into the main sewer pipes described above; that the expenses thus incurred be paid by the owners as an Improvement Rate for twenty years.
3. That the whole of the above works when in operation be placed under the charge of the flap-man of the district.
  4. That it be represented to the Board of Guardians and to the Paving Board that the public safety demands this place should have their peculiar attention and care, and that under their directions the street paving, repairing, sweeping, washing, and removal of dust and solid refuse should be constantly and unremittingly performed.
  5. And, finally, I have to recommend that the necessary forms of notices be prepared by the Solicitor, and presented to the next Court; and that when these are ready and approved, the works be carried out.

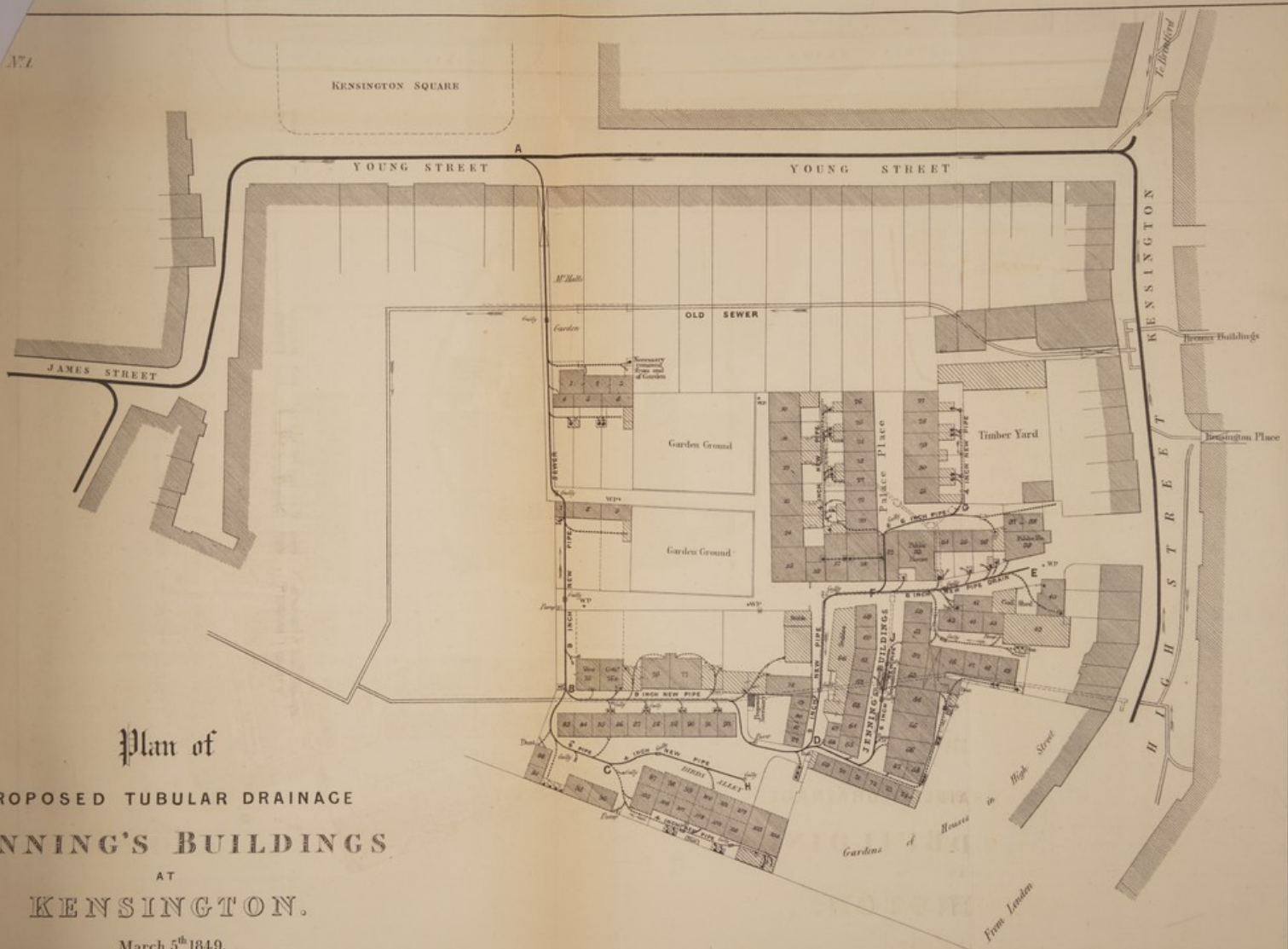
EDWARD GOTTO,

*Assistant Surveyor.*

METROPOLITAN SEWERS OFFICE,

APRIL 25, 1849.

172



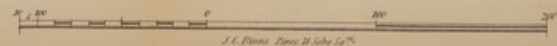
Plan of  
PROPOSED TUBULAR DRAINAGE  
JENNINGS'S BUILDINGS  
AT  
KENSINGTON.

March 5<sup>th</sup> 1849.

METROPOLITAN SEWERS.  
12<sup>th</sup> March 1849.

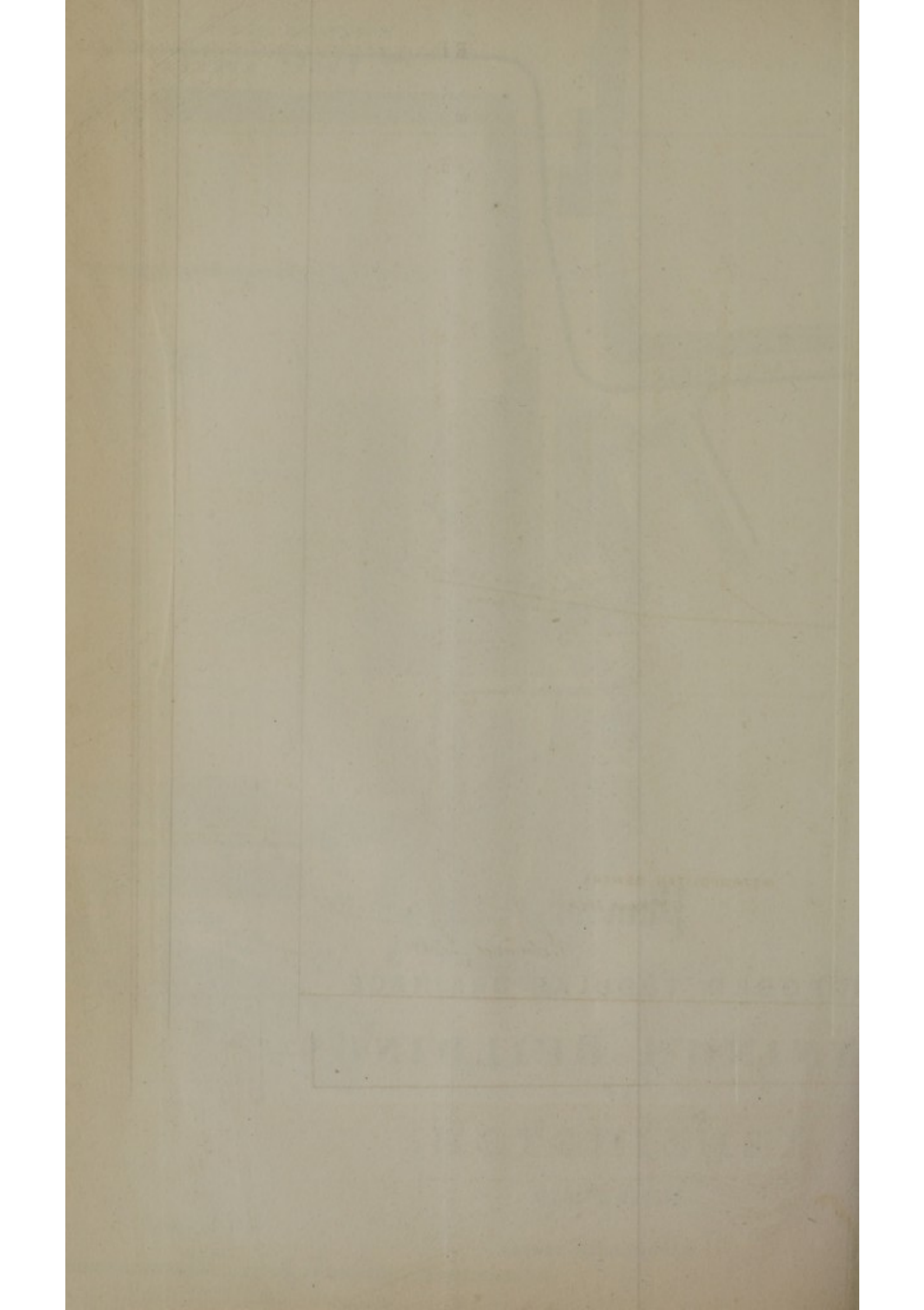
*Edward Gellie*

Scale of Feet.



J. C. Pinner. Drawn by John Gellie.







The image shows two scales from a ruler. The top scale is labeled "Horizontal Scale" and has markings from 0 to 60 inches, with "60 Feet" at the end. The bottom scale is labeled "Vertical Scale" and has markings from 0 to 30 inches, with "30 Feet" at the end. Below the scales is the text "J.C. Pinner's Ruler 30 Inch Square".

METROPOLITAN SEWERS.

12<sup>th</sup> March, 1849

1849.  
Edward Gotte.



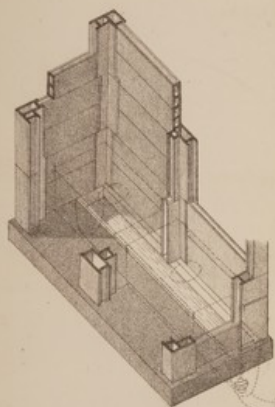
THE GREAT BRITISH EMERALD

AND THE EMERALD

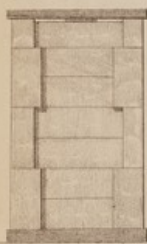
Nº 2.

DRAWING OF COMMON NECESSARIES.

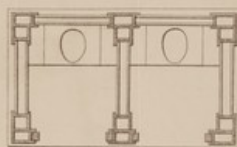
of hollow bricks.



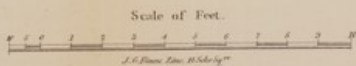
INTERIOR.



SIDE ELEVATION



PLAN

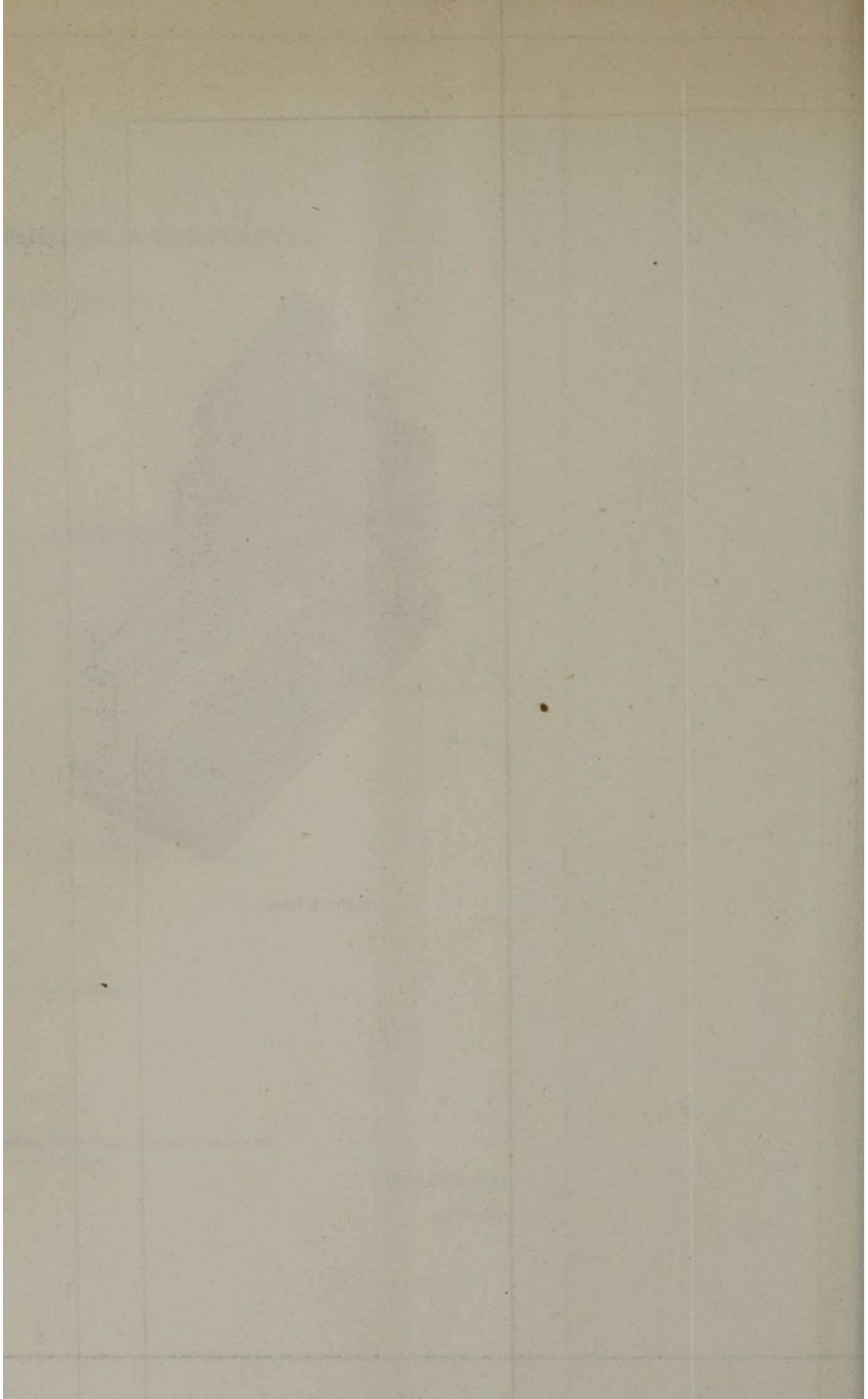


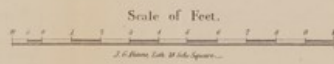
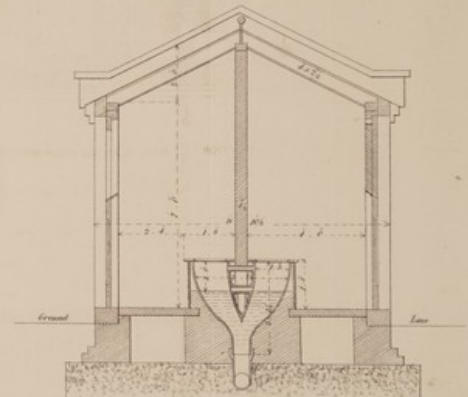
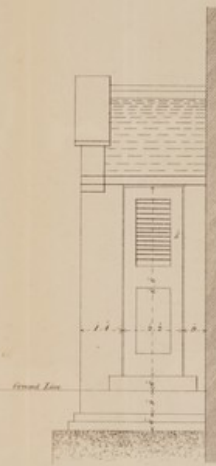
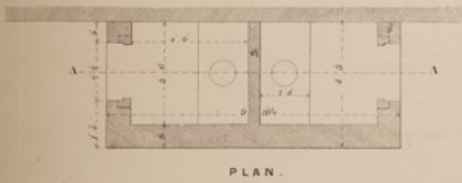
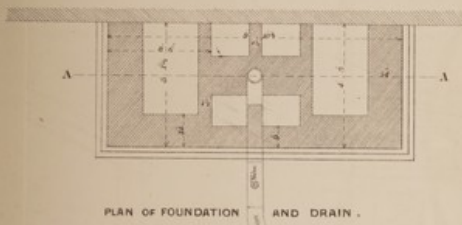
METROPOLITAN SEWERS.

12<sup>th</sup> March 1849.

*Edward Gostle*







*John Phillips*



101  
b  
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or  
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## SPECIFICATION OF THE PROPOSED WORKS.

The Contractor to give the proper notices to the Surveyor of Pavements, Water and Gas Companies, and other parties whom it may concern, of the commencement and completion of the works ;

To give notice.

To provide and maintain all requisite protection for the public safety, by night and day, by properly boarding, fencing, lighting up, and watching the works during their progress ;

To provide public protection.

To provide, fix, maintain, and remove, when so directed by the Surveyor, all tackle and materials necessary for the proper shoring up all buildings, vaults, water and gas pipes, and mains, or any other thing that may be affected or endangered hereby.

Shoring and strutting.

All damages and accidents that may occur to the adjoining property or the public by reason of the execution of these works, from what cause soever, are to be made good at the expense of the Contractor.

All damages to be made good by contractor.

The works are to be kept perfectly free from water that may arise from any causes during their progress, and at the cost of the Contractor.

The works to be kept free from water.

The accompanying plans and sections referred to by, and in explanation of, these specifications, and signed by the Surveyor, as well as any further drawings that may be required during the progress of this work, are to be strictly followed and abided by, as to workmanship, form, dimensions, depths, inclinations, and direction of the proposed sewer pipes, and as to the construction of all other works more particularly described and specified herein.

Drawings to be followed by the contractor.

## LENGTHS AND SIZES OF THE MAIN SEWER PIPES.

Length and size of pipes.

Description of Sewer Pipe as shown on the Plan.	Length of 9-in. Pipe.	Length of 6-in. Pipe.	Length of 4-in. Pipe.
From A to B - - -	380	—	—
From B to C - - -	—	85	—
From B to D - - -	195	—	—
From C to H - - -	—	—	97
From D to F - - -	140	—	—
From D to J - - -	—	128	—
From E to F - - -	—	111	—
From F to G - - -	—	110	—
Total - - - -	715	434	97



- Excavating.** To excavate the ground for the sewer-pipes, gully-drains, house-drains, and other works, in the lines shown on the plan, to the required widths, depths, and falls. To ram hard and properly consolidate the bottom of the trenches.
- Bad foundation to be removed, and concrete to be substituted.** To remove all loose, soft, or otherwise improper soil, mud, slime, or old work, substituting in such places a bed of concrete, compounded of clean Thames stone ballast, unscreened, and ground blue lias lime, in the proportions, respectively, of 6 to 1.
- Filling up. Certain timbers to be left in the trenches.** To fill up the trenches to the level of the adjoining ground, every layer of 12 inches to be carefully rammed; such planks and timbers are to be left in the trenches as may be directed.
- Pavements to be made good.** The pathways and pavements are to be temporarily made good where they are under the jurisdiction of the Paving Board, and until the Board takes charge of them: but in all private and other property they are at once to be made permanently good: and in both cases the entire expense is to be paid by the Contractor.
- Cartage of all descriptions to be performed.** To provide cartage for pipes, materials, and all other matters and things necessary for these works.
- Offensive matter to be removed immediately.** To remove all offensive matter immediately it is exposed, and to use sufficient disinfectant fluid to prevent public inconvenience.
- Superfluous soil to be removed.** To cart away all superfluous earth, soil, rubbish, or materials, without loss of time; and the whole line of streets, lanes, courts, and other places to be left perfectly clear, clean, and free, at the completion of these works.
- Old sewers to be destroyed.** To dig to, break up, and destroy, the old sewers shown by double-dotted lines on the plan, and all house-drains and gullies connected therewith that upon inspection may be found to be inefficient.
- And this work shall be so done as not to create a nuisance.
- To fill up, ram, and make good such excavations, providing all requisite additional earth.
- The old materials to belong to the contractor.
- Glazed stoneware pipes, with half sockets, are to be used for the main sewer.
- Sewers to be of stoneware pipes.** The pipes are to be provided by, and at the cost of, the Contractor, and jointed with blue lias cement and clean sand, compounded in equal proportions.
- Materials to be provided at the cost of contractor.** The junction, of the 9-inch pipe (underpinned with concrete) is to be effected with the Young-street Sewer in Kensington square, 9 inches above the bottom of the invert, and the brickwork on the side of the said sewer made good.
- Junction with the sewer in Kensington square.** The pipe is to leave the sewer in a curved direction towards the passage, under Mr Hall's house, as shown on the plan, and to pass under the kitchen floor of that house.



The house walls and the kitchen basement disturbed by this part of the work are to be carefully secured by the Contractor during its progress, and made good at its completion in every part.

Walls and floors disturbed are to be made good.

At the point B on plan, a curved double junction is to be put in, in order to continue pipes of a smaller diameter (6 inches eastward and 9 inches northward).

Main junctions.

At the point D on plan, a main junction length is to be put in for a 6-inch branch to the north; and at F a double 6-inch junction is to be put in to continue to two branches with 6-inch pipes. At the point C a 4-inch junction is to be left.

To reconstruct the old gully-drains with 4-inch glazed stoneware circular socket pipes, with cement joints, in the position shown on the plan, effecting the communication at the side of the main sewer pipe, with a curve in the direction of the current.

To reconstruct old gully-drains.

The whole of the gratings are to be of stoneware, perforated with circular holes, bevelled at the lower end, and will be supplied by the Commissioners.

The present gratings to be exchanged for a smaller description with circular holes and of stoneware.

But the carting and fixing of the sixteen new gratings, and the taking up and carting of the old gratings to the Commissioners' yard, are to be done by, and at the expense of, the Contractor.

Under each gully-grating is to be placed a sand-trap of stoneware according to the drawing, with a syphon trap of the same material as described for the drain, but the whole to be in one piece.

Sand-traps.

Lengths, with 4-inch and 6-inch junctions, are to be put into the main line wherever they are required and shown on the plan, for gullies, house-drains, overflow of pumps, rain-water pipes, &c.

Junctions for house-drains.

Each junction is to be effected with an easy curve in the direction of the current in the sewer pipe.

To excavate, shore up, prepare the bottom of, and afterward fill in the trenches for, the house-drains and tanks, as described above for the main sewer pipes.

House-drainage.

To liquefy and pump out the contents of each cesspool, using a sufficient quantity of deodorising fluid.

Cesspools to be emptied.

To break up and destroy each such cesspool.

Broken up.

And to construct in its place a tank of stoneware, and of the forms shown on the annexed drawings, Nos. 3 and 4, with a loaded valve and ground stoneware socket in the lowest part of the tank, connected by a chain with a crank handle.

And reconstruct to act as flushing tanks with valve.

To conduct from this valve a 6-inch stoneware pipe, laid with cement joints, into the main sewer pipe.

Drain.

And from the level of the intended water line, a 2-inch overflow stoneware pipe jointed in cement, with a syphon trap, also to the main sewer pipe.

Overflow.



The water to be laid on with iron pipe and stop-cock.

The water to be laid on to each tank, with  $\frac{3}{4}$ -inch iron gun-barrel pipe, with screw socket, with a stop-cock by the side of the crank handle.

New common necessities to be constructed.

Walls of hollow brick.

Two common necessities to be constructed in the position shown on plan, and in the manner described in the annexed drawings, with walls 4 inches thick of hollow brick, made of approved clay, by patent machinery, and burnt in improved kilns.

Floor of hollow tile.

The floor of hollow tiles bedded on and laid in mortar, upon a foundation properly levelled, rammed, and otherwise prepared.

And roof of glass.

To cover the building with  $\frac{1}{2}$ -inch rough plate-glass, with an inclination of 6 inches in 10 feet.

And tanks as before described.

The tanks to be constructed as described above, with water supply, stop-cocks, drain, and overflow complete.

Fitting up seats and risers.

To fit up the seats and risers with 1-inch wrought yellow deal upon fir bearers 3 inches by 3 inches.

Roof and other water.

The roof water, sink float and other refuse waters, are to be carried into the principal house-drain by 2-inch pipes; lengths for curved junctions being left in the 4-inch pipes.

Existing insufficient house-drains are to be destroyed and the drainage reconstructed.

All the drains from houses, gullies, or otherwise, which are at present connected with old sewers hereby proposed to be abandoned, are to be examined, and such as are in the opinion of the Surveyor inefficient and not adapted to the system herein laid down are to be destroyed and replaced. The drainage of such houses, gullies, or other places, to be diverted into the proposed new sewer pipe as before described.

The work to be left clear of rubbish &c.

The whole of the sewers, pipes, drains, and other work, to be left perfectly clear of earth, rubbish, or other obstructions; and the surfaces of the streets, pavements, and other places where these works shall have been carried on, to be thoroughly washed and cleaned at the completion of the work.

Dust-bins.

To put over each existing dust-bin a cover of  $1\frac{1}{4}$ -inch ledged deal, with an opening 8 inches square in the same, with a small door properly hung in a solid frame at the lower part, for the purpose of removing the dust. Each such door to be furnished with a strong fastening.

To construct the new dust-bins described in the plan, of  $4\frac{1}{2}$ -inch brickwork, with covers and doors as described above.

The Contractor is to maintain the whole of these works in repair and effectual working order, and remedy any derangement that may arise (except from the negligence or misuse of the inhabitants) for the term of five years.

No allowance will be made to the Contractor for extra or additional work, unless the same shall be ordered, in writing, by the Surveyor; and unless a correct account or voucher of the said work is delivered to the Surveyor within three days from its completion.

Should it be deemed necessary at any time to suspend the progress of the works, on account of the weather or any other cause, the Surveyor shall be at full liberty to do so, and no extra charge shall be made on this account by the Contractor.

The Contractor is to be answerable and responsible for all accidents which may occur during the performance or in consequence of these works, and to take every precaution to guard against the same, by shores, struts, and braces, and to indemnify and save harmless the Commissioners, and their officers and servants, from all acts, defaults, or neglects of the Contractor or his servants, and against any actions, suits, costs, damages, and expenses to be occasioned thereby; and that in case of any accident occurring to any person or persons by any of the acts, deeds, default, or neglect of the Contractor, or his workmen or agents, during the progress of the said works, or in consequence thereof, it shall be lawful for the said Commissioners to make such reasonable compensation to such person or persons as they the said Commissioners shall think expedient, and deduct the amount of the monies to be paid to such person or persons from the amount to be paid to the Contractor for the works to be done under this specification, or proceed to recover the amount of the same, from the Contractor or his sureties, in such manner as they may think fit.

EDWARD GOTTO,

*Assistant Surveyor.*



ESTIMATES for the HOUSE-DRAINAGE of JENNINGS' BUILDINGS with GLAZED  
STONEWARE PIPES.

No. on the Plan.	Gross Estimate according to the Charges of Private Builders.	Gross Estimate if the Work be done by Contract under the Commissioners.	Annual Improvement Rate to pay the Principal and Interest in twenty years, if the Work be done by Contract under the Commissioners.	Weekly Charge to pay Principal and Interest in twenty years.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1				
2	9 7 6	6 5 0	0 9 6½	0 0 2-80
3				
4	5 14 0	3 16 0	0 5 9½	0 0 1¼-34
5	6 9 9	4 6 6	0 6 7¼	0 0 1½-09
6	6 9 9	4 6 6	0 6 7¼	0 0 1½-09
7	5 4 0	3 9 4	0 5 3¼	0 0 1-86
8	5 4 0	3 9 4	0 5 3¼	0 0 1-86
9	5 4 0	3 9 4	0 5 3¼	0 0 1-86
10			} already drained.	
11				
12				
13				
14				
15				
16	4 5 8	2 17 1	0 4 4¼	0 0 1-03
17	5 4 0	3 9 4	0 5 3¼	0 0 1-86
18	5 4 0	3 9 4	0 5 3¼	0 0 1-86
19	5 4 0	3 9 4	0 5 3¼	0 0 1-86
20	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
21	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
22	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
23	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
24	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
25	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
26	6 6 11	4 4 7	0 6 5¼	0 0 1¼-94
27	6 14 9	4 9 10	0 6 10	0 0 1½-30
28	6 14 9	4 9 10	0 6 10	0 0 1½-30
29	6 14 9	4 9 10	0 6 10	0 0 1½-30

ESTIMATES for the HOUSE-DRAINAGE of JENNINGS' BUILDINGS with GLAZED  
STONEWARE PIPES—*continued.*

No. on the Plan.	Gross Estimate according to the Charges of Private Builders.	Gross Estimate if the Work be done by Contract under the Commissioners.	Annual Improvement Rate to pay the Principal and Interest in twenty years, if the Work be done by Contract under the Commissioners.	Weekly Charge to pay Principal and Interest in twenty years.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
30	6 14 9	4 9 10	0 6 10	0 0 1½-30
31	6 14 9	4 9 10	0 6 10	0 0 1½-30
32	4 4 2	2 16 11	0 4 3¼	0 0 0¾-94
33	5 7 3	3 11 6	0 5 5¼	0 0 1¼-01
34	5 7 3	3 11 6	0 5 5¼	0 0 1¼-01
35	5 7 3	3 11 6	0 5 5¼	0 0 1¼-01
36	5 7 3	3 11 6	0 5 5¼	0 0 1¼-01
{ 37 38 }	5 7 3	3 11 6	0 5 5¼ } one house.	0 0 1¼-01
39	5 7 3	3 11 6	0 5 5¼	0 0 1¼-01
40	6 14 3	4 9 6	0 6 9½	0 0 1½-26
41	5 1 9	3 4 6	0 4 11	0 0 1-53
42	4 5 6	2 17 0	0 4 4¼	0 0 1-01
43	4 5 6	2 17 0	0 4 4¼	0 0 1-01
44	4 5 6	2 17 0	0 4 4¼	0 0 1-01
45	4 5 6	2 17 0	0 4 4¼	0 0 1-01
46	3 5 0	2 3 4	0 3 3¾	0 0 0¾-05
47	3 5 0	2 3 4	0 3 3¾	0 0 0¾-05
48	3 5 0	2 3 4	0 3 3¾	0 0 0¾-05
49	3 5 0	2 3 4	0 3 3¾	0 0 0¾-05
50	3 10 0	2 6 8	0 3 6½	0 0 0¾-26
51	3 10 0	2 6 8	0 3 6½	0 0 0¾-26
52	3 10 0	2 6 8	0 3 6½	0 0 0¾-26
53	3 10 0	2 6 8	0 3 6½	0 0 0¾-26
54	4 19 6	3 6 4	0 5 0½	0 0 1-65
55	4 19 6	3 6 4	0 5 0½	0 0 1-65
56	4 19 6	3 6 4	0 5 0½	0 0 1-65
57	4 19 6	3 6 4	0 5 0½	0 0 1-65
58	4 19 6	3 6 4	0 5 0½	0 0 1-65



ESTIMATES for the HOUSE-DRAINAGE of JENNINGS' BUILDINGS with GLAZED  
STONEWARE PIPES—*continued.*

No. on the Plan.	Gross Estimate according to the Charges of Private Builders.	Gross Estimate if the Work be done by Contract under the Commissioners.	Annual Improvement Rate to pay the Principal and Interest in twenty years, if the Work be done by Contract under the Commissioners.	Weekly Charge to pay Principal and Interest in twenty years.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
59	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
60	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
61	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
62	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
63	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
64	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
65	3 10 0	2 6 8	0 3 6½	0 0 0¼-26
66	5 1 9	3 4 6	0 4 11	0 0 1-53
67	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
68	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
69	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
70	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
71	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
72	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
73	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-48
74	1 11 2¼	1 0 9½	0 1 7	0 0 0¼-46
75	6 7 3	4 4 10	0 6 5½	0 0 1¼-96
75a	3 6 9	2 4 6	0 3 4¾	0 0 0¾-13
76	0 15 0	0 10 0	0 0 9¼	0 0 0-71
77	0 15 0	0 10 0	0 0 9¼	0 0 0-71
78	12 1 3	8 0 10	0 12 3	0 0 2¾-30
79	5 13 2¾	3 15 5½	0 5 9	0 0 1¼-30
80	5 13 2¾	3 15 5½	0 5 9	0 0 1¼-30
81	5 13 2¾	3 15 5½	0 5 9	0 0 1¼-30
82	5 13 2¾	3 15 5½	0 5	0 0 1¼-30
83	2 9 1½	1 12 9	0 2 6	0 0 0½-30
84	2 9 1½	1 12 9	0 2 6	0 0 0½-30
85	2 9 1½	1 12 9	0 2 6	0 0 0½-30
86	2 9 1½	1 12 9	0 2 6	0 0 0½-30

ESTIMATES for the HOUSE-DRAINAGE of JENNINGS' BUILDINGS with GLAZED  
STONEWARE PIPES—*continued.*

No. on the Plan.	Gross Estimate according to the Charges of Private Builders.	Gross Estimate if the Work be done by Contract under the Commissioners.	Annual Improvement Rate to pay the Principal and Interest in twenty years, if the Work be done by Contract under the Commissioners.	Weekly Charge to pay Principal and Interest in twenty years.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
87	2 9 1½	1 12 6	0 2 6	0 0 0½-30
88	2 9 1½	1 12 6	0 2 6	0 0 0½-30
89	2 9 1½	1 12 6	0 2 6	0 0 0½-30
90	2 9 1½	1 12 6	0 2 6	0 0 0½-30
91	2 9 1½	1 12 6	0 2 6	0 0 0½-30
92	2 9 1½	1 12 6	0 2 6	0 0 0½-30
93	5 5 0	3 10 0	0 5 4¼	0 0 1-94
94	5 5 0	3 10 0	0 5 4¼	0 0 1-94
95	5 5 0	3 10 0	0 5 4¼	0 0 1-94
96	5 5 0	3 10 0	0 5 4¼	0 0 1-94
97	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
98	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
99	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
100	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
101	1 18 2½	1 5 5½	0 1 11¼	0 0 0¼-78
102	1 18 2¼	1 5 5½	0 1 11¼	0 0 0¼-78
103	6 4 1½	4 2 9	0 6 3½	0 0 1¼-80
104	6 4 1½	4 2 9	0 6 3½	0 0 1¼-80
105	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
106	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
107	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
108	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
109	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
110	1 18 8¼	1 5 5½	0 1 11¼	0 0 0¼-78
Totals	427 18 1¾	284 14 5	21 13 8	0 8 3¾-67

EDWARD GOTTO,

*Assistant Surveyor.*



## Metropolitan Sewers.

## REPORT

ON

TUBULAR DRAINAGE, &amp;c.

FOR

JENNINGS' BUILDINGS, KENSINGTON

WITH

DISTRIBUTION OF CHARGES OVER TWENTY  
YEARS.BY MR EDWARD GOTTO,  
*Assistant Surveyor.*

APRIL 25TH, 1849.