REPORT

ON THE

SUPPLY OF WATER,

DRAINAGE AND IMPROVEMENT

OF THE

CITY OF OTTAWA.

BY GEORGE H. PERRY, C. E.,

VICE-PRESIDENT ASSOCIATION OF PROVINCIAL LAND SURVEYORS AND INSTITUTE OF CIVIL ENGINEERS OF CANADA.

OTTAWA CITY:

PRINTED AT THE "TRIBUNE" BOOK PRINTING ESTABLISHMENT.

1861.

REPORT

ON THE

SUPPLY OF WATER,

DRAINAGE AND IMPROVEMENT

OF THE

CITY OF OTTAWA.

BY GEORGE H. PERRY, C. E.,

VICE-PRESIDENT ASSOCIATION OF PROVINCIAL LAND SURVEYORS AND INSTITUTE OF CIVIL ENGINEERS OF CANADA.

OTTAWA CITY:

PRINTED AT THE "TRIBUNE" BOOK PRINTING ESTABLISHMENT.

1861.

ENGINEER'S OFFICE,

OTTAWA, May 10, 1861.

SIR,

I have to hand you the accompanying Report on the Drainage, Macadamization, and Water Supply of the City.

From the necessarily large amount of figures involved, it occupied more time printing than was anticipated. An enumeration of the Plans, Sections and Drawings accompanying this Report, will be found therein.

There are also, copies of four Plans ordered by the Committee, viz.: one Plan of the City by Royal Engineers, date 1831; two ditto, by P. L. S. McDermott, dated 1845 and 1851, and one by J. S. Dennis, P.L.S., dated 1859.

I have the honor to be Sir,

Your obedient servant,

GEORGE H. PERRY, C.E.

JAS. SKEAD, Esq.,

Alderman, &c.,

Chairman of Water Works Committee.

REPORT.

THE Geographical position of the City of Ottawa has fitted it to fulfil the conditions of the high destiny awaiting the capital of the, as yet, undeveloped British American Empire. Situated at the confluence of two of the most important tributaries of the Ottawa River, on a commanding position of that stream, the day is not distant when the commerce of half a continent must be concentrated in the port of this city. The staple trade of the Province already centres there, and the development of the immense manufacturing power and mineral resources of the valley of its noble river can be safely predicated upon as accessories to that importance in commercial affairs it is destined to accomplish, and whose establishment can hardly be called a work of time. The natural beauty and advantages of the site on which the city has been built, attracts alike the attention of the statesman, the soldier, the merchant, the manufacturer, the man of science, as well as the sentimental lover of the picturesque. The City was founded about the year 1827, by the construction of a military necessity—the Rideau Canal—the cause of which this City has been the effect—has no doubt had much to do in its selection as the future capital of British North America.

The City of Ottawa is seated on bold limestone cliffs rising abruptly from the shores of that great River from which its name is derived. Its limits are defined on the East by the river Rideau, to that point at which the line which divides Lots E and F, in Concession C and D, in the Township of Nepean, leaves that river. This line forms its southern boundary, and passes across lot No. 40 in the same Township, to the line dividing it from Lot 39. It then turns northwardly along that

line to the line dividing Concession A and the first Concession, and in Concession A, embracing the whole of the broken Lot No. 39, to the Ottawa River, including all the islands to the southerly end of the Union Bridge. Thence following the course of the Ottawa, in the centre of the channel, to the western branch of the waters of the river Rideau, and thence up stream to the point before named, where the dividing line between E and F leaves the River.

This area, so enclosed, contains 1774·0·14 acres, and the islands 36·0·20 acres, about one-third of which is partially built over.

It was incorporated as a town on the 28th of July, 1847, by Acts 10 and 11 Vic., cap. 43.

It could not be expected that a City which dates its existence from thirty-five years ago, should be in every respect as well prepared to receive the honours awaiting her as the Seat of the Government of the British dependencies in North America, as other cities whose matured age has given them the benefit of greater and more substantial improvement. Still, as a general rule, the advantages enjoyed naturally are such as in a great measure to compensate for the want of those artificial additions which a dense population and a large commerce requires. The increasing demands of the constantly accumulating population, and the necessity existing for preparing the City for the high position it has been selected to occupy, has called for some general and comprehensive measure by which the extent of the improvements needed could be ascertained and their actual cost accurately defined. The first step towards obtaining this necessary knowledge was that of having an actual survey of the City prepared in the most careful and elaborate manner, and this had become the more imperative because no actual plan of the City existed. It is true there were a goodly number of *paper plans* (*i. e.*, lines of projection defining lot boundaries) in existence, but such a topographical plan as was actually necessary to define *things as they are*, had never been made. Well aware of the necessity by previous professional experience, of having

this omission supplied in the year 1859, I addressed a communication to E. McGillivray, Esq., the Mayor of this City, pointing out what I thought should be done in a matter of this importance. As it was late in the season, (towards the close of September,) I did not press the matter on the Council, because it was not a proper time to commence a survey of the description required. Although the subject was brought before the Council several times, no action was taken thereon till the month of August, 1860, when a contract for a survey of the City with a view to its Drainage, Macadamization, and a Supply of Water, was accorded to me. This survey had been rendered imperatively necessary by an application being made to Parliament for an Act to legalize a survey of a portion of the City, (late Ordnance property) by J. S. Dennis, Esq., P. L. S., of which notice will be taken in the proper place, as well as for the purposes before mentioned. Fully alive to the importance of the great work committed to my charge, and having determined that it should be done to the best of my professional power and ability, I did not wait for the contracts to be signed, but at once proceeded with the preliminary operations. I had decided on a Trigonometrical survey of the City, because it possesses many advantages over any other method, as it reduces the possibility of error to a minimum, and furnishes so many mechanical checks on its Theoretical and Calculated elements, that no idea of an error of any consequence could be entertained. The City supplies twenty-five Trigonometrical points, and the shores of the north side of the Ottawa River and islands in the same, fourteen, making a total of thirty-nine stations, a series of eight observations on the average at each station, from which every point in sight was taken, furnished a mass of data from which the frame-work of Triangles for field use and proof were constructed, and on which the detail work was based. The extreme accuracy of this method may be illustrated by stating that the greatest difference between the calculated distance and that actually measured never exceeded a decimal of one-tenth of one foot in two thousand feet, and the calculations carried through the whole series of Triangles from West by North-east and South, to the same line again, would close tot he same decimal.

This network of Triangles formed, as before stated, the base of operations on which the details were founded, and the position of those details were ascertained by actual measurement of lines run between points on the various lines connecting each Trigonometrical station, thus necessitating the measurement of those lines and compelling an actual check to be placed on the calculated distances. Off lines, so chained, the positions of houses and all other details, were fixed also by actual measurement, and that operation has been performed on every Structure, Fence, House or Lot, in the City, as it stood up to 1st November, 1860. The true position of all details having been ascertained, lines of Levels were run through all the streets then open, and contour lines, beginning at the highest point of the hill immediately to North of the Episcopal Cemetery, along the edge of the Rideau River, to that point at which the City boundary leaves it on the South, to the head of the Bay at the Chaudiere. The survey was then laid down on a scale of 66 feet to one inch, and it covers 300 sq. feet of drawing paper. The sections of the streets cover 560 square feet of the same material, and have numbers representing the heights marked on all the ordinates.

The plans would have been finished at an earlier date, but a portion of surface contained between high and low water, at the foot of the cliffs, of the utmost importance to the City at a future day, as furnishing sites for wharves, etc., could not be accurately got at till a few days ago.

The datum for all the sections is the sill of the lowest lock (guard lock) on the Rideau Canal, and the records of the rise and fall of the waters in the Ottawa River, which has been kept for a series of years by the officers of the Ordnance Department, will be available for determining actual high and low water.

OBJECTS WHICH THE SURVEY HAS ACCOMPLISHED.

The very accurate Topographical survey of the City now laid before you demonstrates the necessity which existed for a measure of this description. A glance at it will suffice to point out the difference between the actual alignment of the streets and the

theoretical straight lines so prominent on all hitherto existing plans, while the disposition of the houses and structures shows a departure from the principles on which the streets are supposed to have been originally projected. In many cases the actual encroachment of houses and fences on the streets is plainly visible, but till this survey was completed, no remedy could be either devised or carried into effect.

Through the kindness of Colonel Coffin, I have been able to comply with the direction of the Water Works Committee, and have copied a plan placed at my disposal by that gentleman, made by J. S. Dennis, P. L. S., and sought to be legalized during the present session of Parliament.

I would recommend that measures be taken by the Council to establish the alignment of the streets, by, in the first place, having the survey now submitted legalized, and, secondly, by having proper boundary marks of *cast iron* placed at the intersection of every street, to the lines between which, the front of all houses should in future be restricted, and not even as much as a moulding should be allowed to project beyond. In the meantime, it would be advisable to allow such frame or other wooden houses as are now on the street to remain till removed by decay or otherwise. This, of course, only applies to cases where the houses are only three or four feet over the line and where the encroachment has not been recent. In placing the cast-iron boundary marks, they should be located on the outer edge of the sidewalk so as to be alike free from the obstruction of projecting house fronts and from the danger of being built over. In comparing the results of our survey with that made by Mr. Dennis, a deviation of some feet is apparent at the lower end of Cumberland Street, commencing on the West side of that street at the junction of St. Patrick's Street and running to the intersection of Cathcart Street.

Taking all the circumstances of the case into consideration, I am of opinion that the interests of the City will be best served by having a consultation between parties selected to act for the Corporation and the Crown Lands Department, or whomsoever they may delegate, for the purpose of settling the

alignment of the streets, and that the lines so determined on may be legalized; at the same time, such questions affecting private property as may be involved therein, can be quietly settled. But the great problem which this survey has solved, is that affecting those improvements demanded by the altered circumstances of the City. Foremost amongst them is the primary one on which they must be based—

THE DRAINAGE OF THE CITY.

Ottawa may be described as situated on bold limestone cliffs sloping towards the Eastward, till, at a point where King Street intersects Rideau Street, it attains its maximum of depression, at an elevation of 70 feet above low water in the Ottawa River. It ascends from that point to the summit of the ridge of sand hills immediately overhanging the Rideau River, when it attains a maximum elevation of 114 feet above low water. It will thus be seen that the axis of depression takes the line of King Street, and governs the natural drainage of the whole City. The true principle involved in the consideration of the plan by which such an extensive system of drainage compelling the construction of expensive works, should be conducted, is that of making all the natural resources of the surface contour available. In pursuance of this purpose I would recommend the adoption of the natural depression mentioned as the best site for the main sewer of that system of drains which must pervade the City. Starting from a point on Hugh Street, 200 feet, to the south of the present Crown Timber Office, the direction of the main sewer will follow the line of Albert Street to the Basin at the Rideau Canal, under the bottom of which it passes at a sufficient depth for security, and following the course of the present By-wash down Mosgrove Street to its junction with Rideau Street, thence to the junction of King Street, along that street to the foot of Cathcart Street, and up that street to the intersection of Dalhousie Street, the line of which latter street it follows, crossing McKay Street and through the grounds of John McKinnon, Esq., to the final outlet into the Ottawa. Into this main sewer

the whole drainage of the City will be passed, except that portion to the westward of the Concession line between B and C, Wellington Street, and the area between it and the River, together with the district known as Le Breton's Flats, those portions finding their natural outlet through the ravine at the latter place.

The superficial area on which the City of Ottawa stands is equal to 1829·0·19 acres, divided into five Wards, namely:

Ottawa Ward contains,	228·1·32	acres.
By Ward do.,	202·0·35	"
St. George's Ward contains,	484·1·25	"
Wellington Ward do.,	652·2·03	"
Victoria Ward do.,	261·2·14	"

There is thus a total area of 1810·0·34 acres and 18·3·25 of water within the City Limits, from which the natural drainage has to be conducted; and if to this is added the sewage furnished by a population of 90,500 souls, or at the rate of 50 persons to the acre, we have a total quantity of 430,925,282 cubic feet per annum, equal to nearly 819 per minute, to pass through the artificial outlets which must be provided to meet the exigencies of the case.

The method usually pursued in providing for similar contingencies is to assume that the rain fall over the whole area is equal to 39 inches per annum, and of this quantity 24 inches has to be disposed of as superfluous, the remaining 15 inches being (as ordinarily assumed) disposed of by evaporation. This rule is not of universal application, nor can it hold good amidst a dense population, simply because the area of *Pondage* is diminished, and therefore while two feet may be the average contribution of rural districts to the rivers and streams, that furnished by cities and towns must more nearly approach three feet. In well drained cities, very little is absorbed by evaporation, and the true rule which should be adopted is to adjust the area of the sewers to dispose of the whole quantity, plus the sewerage contribution of the whole population, and in addition, to provide for contingencies

arising from sudden discharges owing to atmospheric aberation. In considering this subject, I have supposed that such a circumstance would occur as a rain fall of two inches in 24 hours, and have adapted the sewers so as to accommodate that quantity as fast as delivered. The main sewers as described, will be of the lengths and dimensions as follows: From Hugh Street to Basin 2,900 feet; Basin to Lock on Bywash, 845 feet; Lock to Rideau Street, 500 feet; Rideau to intersection of King Street, 1,900 feet; equal to 6,145 feet, with an average outfall of 35.23 feet per mile. The area drained by this portion of the sewer equals 893·0·52 acres, and with the population as assumed (50 souls to an acre), the sewerage would equal 155 feet per minute, while the natural drainage would be 237 feet per minute. The dimensions of this part of the main drain 2′.6″ × 3′.6″ will discharge with a depth in the drain of 2′.3″ = 1536 cubic feet per minute. For the proposed length of main, the accompanying sketch, plan No. 1, will show the design.

From the point where King Street intersects Rideau Street, to the foot of Cathcart Street, a distance of 2,680 feet, an enlargement of the sectional area is requisite. Because the rate of fall per mile is reduced, while the superficial area is increased to 1180·3·07 acres, the outfall being only equal to 14.43 ft. per mile. The section of this drain shews an area of 3.6 × 5.0, and with a depth of 2.6 head in drain, the discharge is equal to 2352·35 cubic feet per minute. The sewerage due to the population is equal to 205 cubic feet per minute, and area 293 cubic feet, equal to 498 cubic feet per minute. Sketch plan No. 2 gives the design for this portion of the main sewer.

From the intersection of Cathcart and Dalhousie Streets, the main sewer, to its final embouchure at low water in the river, has a total length of 3,217 feet. The average outfall is 14 feet per mile, the capacity of the main drain has been enlarged to 4′.0″ × 5′.6″, as the superficial area has also considerably increased, the drainage from an area of 1322·1·11 acres, and sewerage from corresponding population, equals a gross amount of 787 cubic feet per minute.

From the cliffs below Mr. McKinnon's house to a point below low water mark, it will be necessary to build the sewer down an incline of 40 feet in 100, and as the discharge of sewage from so large a population must necessarily be offensive, it will be requisite to construct that part of the sewer with especial care; it should be set in cement, and carried down to a point below the surface of low water.

One of the great objects gained by delivering the sewerage of the City at the point indicated, will be that of having it carried away at once by the current; the evil arising from allowing it to gyrate for weeks in the various eddies sure to be encountered at any other point are avoided, and in a sanitary point of view, the importance of removing the filth of a large city cannot be over-rated.

The capacity of the last portion of the main drain will be equal to the discharge of 3071·20 cubic feet per minute.

The rain fall due to the whole area to be drained, would only reach 356 cubic feet per minute, while a population of 65,000 souls, at an average of 30 gallons sewerage matter per head per day, would furnish 431 cubic feet, making a total of 787 cubic feet per minute, or $\frac{1}{4}$ the capacity of the sewer.

STREET DRAINAGE.

The main sewer forming the natural axis of the surface drainage, the leading street drains are lateral to it, consequently the greatest length attained by any of these drains will not much exceed 3,000 feet, all the parallel streets will thus have the smaller drains, as the disposition of the surface compels draining in the direction of the greatest outfall, the intersection of the lateral streets cutting up those parallel to King Street, into small blocks. Assuming a length of 4,000 feet as the greatest to be drained continuously, and the width of street 66 feet, and of lots on both sides 99 feet, = 264 feet, which sum multiplied by 4,000, will give an area 1,056,000 square feet area, at 50 souls to the acre, the population would equal 1,210, rain fall of 39 inches would give a discharge of 6½

cubic feet per minute; sewerage at 30 gallons per head per diem, equal 4½ cubic feet per minute, thus giving a total of 11 cubic feet per minute to be disposed of. The dimensions of the longer street drains being equal to 2 feet by 3 feet, with a depth of water equal to 2 feet, will discharge with a fall of 10 feet per mile 599 cubic feet per minute. For the cross drains, a much smaller size will suffice, the dimensions according to drawing, will be 1'.6" ⋈ 2'.4".

The form adopted for the sewers is that commonly known as egg-shaped, because it combines the advantages of great strength and resistance to vertical pressure, as well as allowing the utmost scouring capacity, and consequently preventing the deposit of sediment. It is advisable to build the main sewer in stone to the springing of the upper arch, the bottom and sides of the sewer to that point being composed of single brick, lying as shewn in drawings. The upper arch or crown of the drain being of double brick.

The smaller sewers, street drains, manholes being built of brick set in cement, all the brick work should be set in cement. Gutter drains and house drains should be earthenware pipes, 6 inches in diameter. The gutter drains should be put in at 500 feet apart or to suit the blocks into which the city is divided. The manholes in the main sewer are to be 1,000 feet apart, and should serve as gutter sewers also.

Before closing my observations on this subject of drainage, I would wish to enforce the necessity which exists for one uniform and comprehensive system as necessary to the sanitory condition of an increasing population, as it is imperatively demanded for the success and preservation of the works requisite to insure commercial intercourse.

The drainage of that part of the City known as the Lower Town is naturally defective, and the attempts which have been made to improve it are failures, because no proper outfall has been established for the desultory and ineffective measures undertaken. For the upper portion of this division of the City, an out-

fall might be had by draining into the Rideau River, but all eastward of Dalhousie Street is under the influence of that stream at high water, and drainage to any beneficial extent could not be secured. The condition of the Rideau River itself is such as to ignore the idea of any attempted drainage in that direction, which could only result in converting it into an immense cess-pool. As the portion of the City lying along that river is little better than a swamp, and northward of Rideau Street it is the most densely populated portion of the City, the condition of its inhabitants can be surmised, but it requires actual experience to appreciate the discomfort endured in wet weather from its almost unknown depth of mud, and the effluvia arising from its frequent stagnant pools of water. The fearful prevalence of the smallpox during the last season is one of the many evils of a similar description due as much to the unhealthiness of a locality without efficient drainage, as to the epidemical character of the disease. The funds of the Corporation have been wasted from time to time in desultory efforts at drainage, ridiculous in design, and totally inapplicable to the purposes intended, as well as utterly useless in the prospects of any general system hereafter to be adopted. So absurd is the manner in which the drains hitherto constructed in this city, have been designed and built, that a system of *open sewers* would be far preferable for all useful purposes. It could only arise from gross ignorance of the effects produced by the concentration of the sewerage of a densely populated neighborhood that drains built of loose stone covered with cedar, and without sufficient outfall would be allowed to be constructed at all, as the inevitable result must have been to destroy the cellarage of the City in a little while, and to convert the houses into receptacles for the worst kind of miasmas. In addition, the designs for those drains are the worst possible, a rectangular form being best adapted for silting up by the deposit of the heavier material held in suspension by the sewerage water, and it is only stating a well-known fact to assert that nearly all those drains at present constructed are now silting up to a considerable extent. The conclusion which must be forced on the public mind is that a general system of drainage must be adopted; that the first step in that di-

rection must be taken by constructing a main sewer, and that it will be more economical to undertake those improvements demanded by the altered condition of this City simutaneously, so that the laying of the pipes for water supply can be accomplished while the sewerage excavation is refilling, and the surplus being employed to grade the streets, the macadamization may be completed immediately after.

STREET PAVING AND MACADAMIZATION.

The next subject for consideration will be the Improvement of the Streets and Highways of the City. It is a well known rule that good roads are as necessary to trade and commerce as good markets, and it might be added that one of these conditions generally makes the other. At the basis of any system of street improvement, the thorough drainage must lie, because it is ridiculous to witness the efforts made to macadamize in what is literally a sea of mud, and the available assets of the Corporation are expended in fruitless endeavours to construct roads through a morass, from the surface of which they disappear the first wet day. The condition of some of our leading streets is proof positive of this matter. It is a great mistake to suppose that a quantity of broken shale thrown over a thoroughfare is the proper method of construction. It is a mere perversion of terms to call such a proceeding macadamization. This at best is but squandering uselessly funds which judiciously employed would be a beneficial investment for the City. As remarked before, the first operation must be the provision for thorough drainage; the road bed should be then graded and soled. This last operation consists in covering it with stiff clay to a depth of three inches; over that a layer of small boulders from three to five inches in diameter, should be placed, and the broken stone for macadamization to a depth of eighteen inches in the centre, sloping to twelve inches at the gutter, should be laid. The road bed should be cast higher in the centre, at the rate of twelve inches in fifty feet, so as to allow a slope for the surface water to run off freely. Advantage should

be taken of the inclination of the surface to construct the side drains with such an inclination to the nearest gutter drain as to prevent the possibility of overflowing; and the macadamization should follow the contour of the transverse section of the road bed, which outline should be carefully preserved in all subsequent repairs. The material used in construction should be *hard stone;* the limestone of this neighbourhood is too soft and friable, filled with shale, easily disintegrated by atmospheric action, and crushed into plastic mud by a few days' traffic. The Nepean Sandstone appears to be a hard and durable material, and, if of the value asserted in the Commissioners of Public Works' Report, might be rendered available for the required purpose; but I should not like to recommend its use till after fair trial. But the common Syenite or Gneiss is incomparably the best material, and would be the cheapest, because the most durable. Still, macadamization is inadmissable where a large traffic exists, and other methods must be resorted to. The experience of all cities is against the adoption of macadamization as applied to great leading thoroughfares, and efforts have been made in many places to find a substitute in Asphalt, Wood Paving, Brick, and even Cast Iron, as a remedy for the inconvenience arising from clouds of dust or unlimited quantities of fine mud. After fair and sufficient trial, each of those experiments were discarded in turn as failures, and the common stone block pavements of those road-makers of the ancient world—the old Romans—resorted to as the nearest approach to perfection, thus illustrating the sage observation of the wise king, that "there is nothing new under the sun." The method followed by the ancient conquerors of the civilized world, after a lapse of two thousand years, commands our admiration, because they appear to have viewed their Public Works as being built for the benefit of their successors, and therefore took every precaution to make them as imperishable as the material of which they were constructed. The use of wheel carriages not being as extensive as in our day, there was no necessity for observing the rules which govern modern road-making in so far as the inclination was concerned; but great care was observed in the construction. Although the grades might be inadmissable, still the structure

was without fault. It was in all respects a raised causeway, regularly graded, the bottom of the road bed formed of boulders varying from six to eight inches in diameter; over this was laid a bed of concrete, in which the rough blocks were firmly embedded. At this day, when portions of roads so constructed have to be removed for railway cuttings, the only method available is blasting, precisely in the same manner as of rock in *situ*, and portions of it come away, or are displaced, which must again be drilled and blasted before they are manageable.—Modern practice in this matter of formation, has been modified for two reasons:—In the first place, the expense of setting in concrete would be very great; secondly, because the extensive use of wheel carriages, the consequent economy of animal power allowing heavier loads than the ancients ever dreamed of, by the limitation to easy rates of inclination, involve an amount of wear and degradation by actual mechanical means, which the ancient roads had not to encounter, and compelling the comparatively frequent renewal of the modern ones. Those reasons rendered it necessary to substitute for the concrete some less adhesive material, so that the repairs needed might be accomplished without interfering with the integrity of the whole surface, and at the same time an efficient road bed in which the blocks would sit firmly, could be obtained. The usual method of building such roads at present is to place over the clay soling six inches of coarse sand, and on this to lay blocks of stone one foot in depth at least, and of as regular a shape as possible. In some cities those blocks are usually cut to a perfect cube of one foot; but my own experience does not lead to the conclusion that such a course is at all necessary. My specification for the construction of such a roadway would run thus: "The road bed to be "regularly formed as usual with an inclination from the centre, "of one foot in 25, soling of three inches in stiff clay, smoothly "and fairly laid, six inches of coarse gravel spread over the "soling, and the stone blocks to be evenly and neatly laid in "same; one row through the centre of the width to be paved, "to be laid first—the outer rows on each side, next laid, so as to "act as curb stones, and the remainder of the block to be laid

"between, beginning from the centre and each side, so as to "leave one row as keystones. Care should be taken to keep the "upper surface as close to the sectional contour as possible, and "the true grade of the road on Longitudinal section, should be "preserved." The superficial area of such blocks should not be greater than two feet square, larger stones being liable to get out of position and to injure the general structure.

I would recommend that from Union Bridge, through Duke, George, Wellington, and Rideau Streets to Rideau Bridge, this style of road making be adopted for a width of 20 feet in the centre of the road, as shewn in drawing No. 7. From the intersection of Sussex Street, to foot of Bridge at New Edinburgh, a similar construction is desirable. The remainder of those streets should be macadamized with broken gneiss, and good gutters formed at the sides. The cost involved in this measure, although necessarily great, will not be useless, because a roadway properly constructed after the proposed design, will last for many years, and will only require partial repairs. The difference of cost between it and the miserable attempt at macadamization resorted to at present, is so small as to make it a matter of very little importance in the consideration of this subject. I would propose that the remainder of the thoroughfares of the City should be macadamized with broken gneiss; but in no case should the native limestone be used. The construction of gutters as shown on Section No. 10, is necessary; they should be formed of stones set edgewise. Curb stone, next street, should be at least 2 feet deep; and great care should be taken in the construction to build the gutter with all the attributes of an inverted arch. I would also recommend that flagged sidewalks be substituted in all the main thoroughfares for the present wooden apologies; and in all others, that gravel sidewalks be built, as shown in drawing No. 10. Those walks should be formed in the usual way of preparing a macadamized road: the bottom should be composed of boulders to a depth of six inches, over this coarse gravel should be placed and levelled, while the whole should be *blinded* with fine sand. At the outer edge a heavy curb-stone should be placed, on edge of not less than two feet in depth by eight inches in width. The

sidewalk should have a surface inclination towards the gutter of six inches in twelve feet. The cost will not be much greater than the present nuisances, and the advantages in comfort and a sanatory point of view, beyond all comparison. The great objects to be attained by a comprehensive measure of this description, are cleanliness, facility for traffic, and positive freedom from the calamities of annual epidemics, and with a proper supply of water, comparative immunity from fire.

The plans proposed for effecting those objects are in accordance with the natural facilities afforded by the situation of the City, and therefore at the minimum of cost the disposition of the main sewer enables three-fourths of its length to be constantly flushed by the waste of the Canal; and the By-wash, instead of being a source of disease and a nuisance to the low-lying portions of the City, will be made available as a medium of cleanliness. The smaller sectional area of the main drain westward of the Canal, its great outfall, and the facilities which it affords for ordinary flushing operations, renders the consideration of artificial means to that end of only secondary importance. The Longitudinal sections of the streets will show that every advantage has been taken of the natural surface to prevent expensive excavation, and the best and most effective system of macadamization has been recommended as in the end the most economical.

I look upon the opening of Wellington Street and the erection of a new bridge as a substitute for the existing one, (known as Sappers Bridge) to be absolutely necessary. This would involve a large amount of excavation from the end of Elgin Street to the foot of the new bridge, and would necessitate the levelling of the whole area between Wellington and Sparks Street, at the point of junction. This Bridge should have sixty feet of width between the roadways, and according to sketch shown in No. 9, should be one hundred feet span. It should be an Iron Lattice Bridge with Stone Abutments and Wing Walls.—Sketch No. 11 shows the plan proposed to adapt it to to Sparks and Wellington Streets. I would also advise the erection of a new Bridge, according to design in sketch

No. 8, across the Rideau at the foot of Rideau Street.—Instead of passing on the site of the present Bridge, it would be advisable to pass the new structure over the foot of the Island, and elevate it considerably: it should be of three spans of 180 feet each. I would also recommend a similar Bridge to be erected at the foot of St. Andrew's Street, passing on to the large Island in the Rideau, and across that to the Eastern channel, over which a single span will carry it to the eastern shore. The erection of the Bridge at the foot of Rideau Street will involve some excavation on the end of that street, which is provided for in the estimates, and will have the effect of lessening the ascent. The reason for the bridge at Park Street is to allow ready access to the Wharf and Railway Station. It is a mistaken notion to suppose that confining the traffic of a county to a certain street in its market town is necessarily the best means of extending or rendering such traffic beneficial to the interests of all concerned.

The Report on Water Supply for the City has been prepared for some time, but from causes beyond my control, has not been submitted to the Council. It is now incorporated in this general measure, because it is in reality a part of it, and the construction of the necessary works can be effected more economically in conjunction than separately. One very heavy item of expense in laying the water pipes (viz., the cost of excavation,) can be altogether avoided by laying them during the progress of the drainage. I have to direct the attention of the Council to the fact that no answer to the application to the Government for the location of the Reservoir on Barrack Hill has been received, although three months have elapsed since the date of such application. It would be advisable that the Council take immediate action in this matter, and also in procuring a grant of the reserved lots West of Pooley's Bridge, as the site of the proposed Water Works.

SUPPLY OF WATER.

The last, but not the least, of those measures demanded for the health, convenience, and comfort, of the inhabitants, and by the altered circumstances and prospects of this City, is the supply of a sufficient quantity of water for all purposes of domestic economy, cleanliness, ornament, or as an agent in the preservation of property from the ravages of fire.—The consideration of the means whereby this want could be supplied has been deferred till now, because, without a thoroughly efficient system of Drainage, an abundant supply of water would be a mistake of the first magnitude, having the effect of converting a morass into a quagmire, and adding largely to the natural evils which affect the low-lying portions of the City. But while the consideration of the means whereby this desirable object could be attained, has naturally followed the more immediately important measure of Drainage, it does not necessarily postpone the execution of the requisite works when the time arrives for putting the whole plan into actual operation. As intimated before, all those works should be carried on simultaneously, as well from their actual connection as parts of the same system as from motives of economy, because by so doing the saving of at least $70,000 will be effected in excavation for laying the water pipes.

The position of the City of Ottawa naturally confines the consideration of a water supply within the limits of the simple application of natural motive power for that end. Seated on bold limestone cliffs, commanding the plains to the East and South, separated from the West and North by a large River, the question of a supply by gravitation—if the means existed for such a measure—would present features of no ordinary difficulty. But the very reasons which militate against the application of the best and simplest of all powers for ministering to the necessities of mankind in this particular, enables the desired end to be attained by the application of machinery.

The City of Ottawa is founded on a delta formed by the junction of the Rideau River, the River Ottawa, and the boundary line which joins both Rivers on the south side of the City, defining its limits, thus forming a scalene Triangle, of which the longest side is that bounded by the Ottawa River. A short distance below the point at which the Southern boundary of the City leaves that River, its volume is precipitated over a limestone ledge, forming the cele-

brated and beautiful Chaudiere Falls, which furnishes an inexhaustible supply of motive power, as well as abundance of pure water.

The Rideau River occupies the apex of the Triangle on which the City is built. It comes from the southward and dashes over the cliffs from a height of 50 feet, to its junction with the main river. It forms at this point a most magnificent cascade, strongly resembling at a distance a beautiful white curtain: hence its name. Its waters—derived from numberless marshes and swamps, subject to frequent freshets from a clay surface highly charged with decomposed vegetable substances—is totally unfit for storage or distribution to supply the wants of a large population. It is also insignificant in volume, and its motive power within reasonable distance is absorbed by manufactories. In the consideration of a subject of such magnitude as the supply of water to an increasing population, four elements are necessary to the success of the measure—Practicability, Quality, Quantity, and Cost. From the peculiar circumstances of this case, the question of practicability is reduced to the very simple one of applying the motive power furnished by the Chaudiere Falls to the purpose of pumping the water supplied by the River to a Reservoir for distribution.

The difference of level between the lowest water above the Falls and the same pitch below, is about 40 feet, while the same difference between the level of extreme high water at both places is reduced to 24 feet; in other words, extreme high water above the Falls rises to a height of 8 feet above the lowest summer level—below it, to a height of 24 feet. This singular difference is due to the width of the River being reduced from over 1½ miles to 2600 feet, and also from the vast volume of water passed into this comparatively narrow channel by the Gatineau, Rideau, Blanche, La Lievre, and North and South Nation Rivers, as well as the closing of the Chenaux Cartier, at Hawkesbury.

It is evident, then, that an immense amount of motive power is concentrated at the Chaudiere Falls, and its application to the desired purposes is one of mere mechanical skill and detail.

The range of cliffs on which Ottawa is founded leaves the waters of that river at the head of Wellington Street, turning sharply to the south, and continuing marked and distinct to the point at which they are crossed by the line forming the City limits, between lots 39 and 40. From the foot of these cliffs a large tract intervenes be-

tween them and the river. This is known as Le Breton's Flats, and with the islands adjacent constitute the manufacturing portion of the City. A large portion of this District is under the level of the waters at the head of the Chaudiere, from which it is separated by a ridge of limestone rock of no great elevation, through the eastern end of which the high floods of the Ottawa occasionally find their way to the lower level.

Indeed, this ridge is hardly 15 feet above the low water level of the Ottawa at the Bay, and gives additional proofs that before the limestone ledge which forms the Chaudiere Falls was degraded to its present height, the river flowed over the whole of the Flats. From the head of the Bay, where the Concession Line B and C now touches the water, a ravine extends up to the foot of the cliffs at Pooley's Bridge, covered at high water to a depth of 10 or 11 feet; and its course to the extreme east corner of the Bay at the head of the falls is clearly defined. During occasional floods, the waters of the Ottawa find their way through this ravine, but in no great volume.

The course of the Ravine from the head of the Bay is nearly south. It turns sharply at right-angles, to the Eastward, before it reaches Pooley's Bridge, and again assumes a southerly direction to the Bay at the head of the Chaudiere. It is with its eastern Traverse we have to do, as between its southern bank and the junction of Duke and Queen Streets an open space reserved by Government for public purposes, furnishes an admirable site for the erection of the buildings and machinery necessary to make the natural motive power supplied by the river available. An excavation of 2000 feet in length through Queen Street to the foot of the Bay at head of the Chaudiere falls, forming at once a mill lead and conduit for supply will enable advantage to be taken of the actual fall necessary for motive power, without fear of back water or any of these contingencies which might arise from the peculiar character of the river. At the same time, this disposition obviates the necessity for excavating a tailrace by using that portion of the Ravine lying between Pooley's Bridge and the lower Bay for a purpose to which it is especially adapted.

A further consideration of the question of practicability resolves itself into the application of the necessary machinery and pumping apparatus to the motive power, and the location of a reservoir for storage purposes. Having provided for the necessary motor, the

question of lifting the supply of water to the requisite height resolves itself into one of simple Mechanics. I propose to erect two vertical iron water wheels, of 20 feet diameter, working on the gravitation principle, and 15 feet in width; four pumps, of four feet stroke each, with the necessary connections, air vessels, &c., and a rising main pipe of 18 inches diameter, leading to a reservoir placed at or near the site of the Military Hospital on Barrack Hill. The length of this main will be about 3,600 feet. The reservoir should be a parallelogram 250 feet by 200 feet, of a depth of 30 feet; and in its construction the only real difficulty in carrying out this portion of the general design will be encountered. As before stated, Ottawa is seated on cliffs of Trenton limestone—unfortunately not on the superior beds, but on the lower strata of that formation; and, as is well known, from upheaval or other disturbances, such beds are broken, and traversed by fisures of every description, as well as filled with alternate layers of soft shale, the chance of finding a perfectly tight and sound bottom for a reservoir is small indeed. It follows as a matter of necessity that such a structure must be carefully constructed in all its parts, not the least important of which must, in this case, be the bottom. It will be necessary, therefore, to excavate over the whole of that area to a depth of at least 10 feet, and regularly build from that depth upwards. As I advise that this reservoir should have 30 feet of water therein, and as that height should stand above the present level of the surface, some idea of the magnitude of the proposed structure can be formed; and when its cost is set down at $169,173, it is as small a sum as could be predicated upon with any chance of rendering it a serviceable structure for its intended purpose. To elevate a column of water 160 feet high and 18 inches in diameter, will require an engine of 58 horse power. To meet that, we have a pair of water wheels of 20 feet diameter by 15 feet wide, each furnishing 145 horse power —a force capable of elevating the whole contents of the cistern in 24 hours to its proper height. Once placed there the question of distribution is one of mere detail, as its position would dominate by nearly 40 feet all other points in the city. Assuming the size of the reservoir as 250 × 200 feet, and allowing the gross area to be = 50,000 sq. feet, we have to deduct from its storage capacity the space occupied by its circumscribing walls, which will leave an area of 36,000 sq. feet, at 30 feet depth, equal to a capacity of 1,000,000 cubic feet, or about 7,000,000 gals. As the pumps, when working to their greatest useful effort, should deliver 75 gals. of water each at a

stroke, and as they will make 12 strokes per minute, or 900 gals. delivered per minute, it would require 130 hours to fill the reservoir with a single pump, working a pair, the same object could be attained in less than 80 hours. At a velocity of 90 feet per minute, the power required would be equal to that of 58 horses, reckoning the dynamic unit at 33,000 lbs. each horse power. With a velocity of 5 feet per second, and 16 feet of effective fall, each wheel would be equal to nearly 145 horse power. Having demonstrated the perfect practicability of the projected supply, the next consideration is the quality of the water and its adaptibility to domestic purposes. The River Ottawa furnishes an unfailing supply of pure water, unchanged in quality by freshets, and preserving its purity for a long period, deriving its source from and traversing a region of crystalline rocks; it is singularly free from taint by decayed vegetable matter, while the large and extensive lakes it traverses act as natual filters for the deposit of any sediment it may have held in solution. It thus reaches the City so pure that the question of infiltration need not be entertained. Personal experience has demonstrated its palatable and healthy qualities, as well as its thorough applicability to all domestic purposes, while the aid of the chemist enables us to perceive and appreciate the reasons of its superior qualities. In colour it is of a pale yellow amber, and its chemical composition is as follows:

Carbonate of Lime,	0·2480
" Magnesia,	·6696
Silicia,	·2060
Chloride of Potassum,	·0160
Sulphate of Potash,	0122
" Soda,	0188
Carbonate of Soda,	0410
Alumina and Oxyde of Iron Traces,	
Manganese and Phosphorous do.,	
	0·6116

As none of the sewerage of the City will be discharged into the River above the falls, the water can be taken from the Bay, and with a little precaution, without the intervention of a supply pipe, from the mill-lead at the wheel-house.

The next question for consideration is that of quantity. A supply of 30 gallons per head per diem for a population of 25,000, would equal 750,000 gallons. Allowing 250,000 gallons more for the use of the Parliament Building and for the City, to be employed for purposes of cleanliness or embellishment, we have a total of

1,000,000 (one million) gallons per diem to be supplied, giving the Reservoir a storage capacity for seven days. A single pump will deliver over one and one quarter million gallons in 24 hours, and as there is provision made for four pumps, casualties arising can be provided against and a constant supply kept up. But it is a question deserving the serious attention of the Corporation, whether it would not be advisable to obtain by purchase or otherwise a site for another Reservoir of similar capacity. Such site is available on the Sherwood property. I would earnestly advise the City authorities to obtain the site marked on the accompanying plan, on which the relative positions of the Reservoirs, Wheel-house, Mill-lead, and rising Main, are marked. It would be as well to observe that the proposed working power could be made available to its fullest extent, so that the question of quantity to be supplied is not of any serious consideration: with the power at hand it would be a mere affair of expense.

The last element necessary to the success of this great measure is that of cost, and it cannot be said to be a very heavy matter when the prospective and peculiar position of the City is to be taken into consideration. Its greatest item, as before stated, is the construction of the Reservoir, but that is an unavoidable outlay it would be impossible to dispense with. I have made the calculations on an increase of population to 25,000, and with an additional Reservoir the works will be capable of supplying water to double that number at least. I have estimated what I know to be ample sums for the construction of those works, and I hold tenders from mechanical Engineers in this City who are prepared to contract for the machinery and water pipes at the prices given by me. The advantage of having all the machinery constructed in this City is sufficiently obvious, and should not be overlooked, as it is one of the benefits likely to arise from an extensive measure of this kind, calculated to develop the manufacturing capabilities of this City, and to establish amongst us that mechanical superiority which our material resources demand, and which the progress of events assuredly requires.

The Estimates for the completion of this measure will be found appended, and it behoves the people of this City to see what the actual demand on their resources will be in connection therewith. As before stated, they are amply sufficient to meet the requirements of the design placed before the Council, and are not in excess of the demand. It is a subject of serious consideration for the people of

this City, that it be prepared to take the high position awaiting it, and that no mistaken economy will interfere to prevent the inauguration of measures imperatively demanded by the exigencies of this case. With the example before us of the cities of Great Britain and the continent of Europe, the founders of those new seats of empire on the American continent, have an incitement and a precedent to guide them in adopting a different mode of procedure. Now is the time to establish an efficient system of improvements calculated to promote the comfort and sanitory condition of the people and facilitate the development of the commercial and manufacturing interests of the country.

COST OF CONSTRUCTION, AND DESCRIPTION OF WORKS.

The leading thoroughfare through the City is from Union Bridge to the Bridge over the Rideau River at the foot of Rideau Street. From East end of Suspension Bridge to West end of Bridge over Mill leads and Lumber Slide channels,—a distance of 332 feet,—this street must be paved twenty feet wide in the centre with blocks of gneiss laid on six inches of sand. The remainder of the width, forty-six feet, should be macadamized. The substratum being rock, will not require any of the conditions demanded by other streets; and the situation of this portion of the City being on an island, no necessity exists for taking its drainage into consideration. The length of the Bridge connecting it with Bridge Street, is 480 feet. It is a wooden structure built on stone piers with an average width of 18 feet, and should be replaced by a wider structure; in fact, all those bridges should be 40 to 60 feet wide, but as it is in good repair, it does not seem necessary to include a new structure in the Estimates. From East end of Bridge to junction of Duke and Bridge Street, a distance of 460 feet, with a width of 60 feet, the paving, as described, being 20 feet wide; two flagged sidewalks of 12 feet each; macadamization of 16 feet. Duke Street has a length of 872 feet and a width of 60 feet, to junction of Queen Street; Queen Street from Duke Street to foot of Pooley's Bridge, 220 ft. length, 60 ft. width. Within 32 ft. of the East end of Pooley's Bridge, a house used as a blacksmith's shop appears by the boundaries to be on this street. Pooley's Bridge, a wooden structure 145 feet long and 24 feet wide; it is built on *bents*,

and is in moderately good repair. The roadway is about 30 feet above the bed of the Ravine over which the Bridge crosses. I would advise that this Ravine be filled with the debris coming from the excavation of the cliffs, a culvert of three feet diameter placed in the centre of the Ravine, and the surface levelled southward for 200 feet.

A street called Perkins Street is shown on some of the City maps as running from this point southward to Broad Street, neither of those streets are open, but the line of the Ravine through which Perkins Street runs, is the key of the drainage of the Flats and all that surface contained west of Concession B and C which cannot be effected by the main sewer. The area of this surface will be 348·3·15 acres, discharge from which will be 94 cubic feet per min., and from 17,000 inhabitants, 60 c. f. : total—154 cubic feet. It is proposed to drain through this street into a sewer 2 × 3, and an outfall of ten feet per mile will give its discharging capacity, at a depth of two feet in drains, as 599 cubic feet per minute. This sewer is to reach to the head of the Bay, where a sluice is to be constructed to secure ample flushing power and an embankment drawn across the head of this Ravine.

Immediately adjoining the North East corner of this Bridge, a house has been built within the last three years.—Existing boundaries show this house to be on Queen Street, previous to its junction with George's Street; but it is for the Council to ascertain what authority placed those boundary stones in position, or of what value they may be. As the house now stands, it is a nuisance, simply because it compels a turn at right angles on a steep descent, and must be removed either by purchase or other means, before the thoroughfare can be fairly said to be open. The house stands 65 feet from the end of the Bridge, and it leaves the approach thereto only 62 feet wide. From the Bridge to George Street, a distance of 65 feet—from thence to end of Wellington Street, 785 feet, the average width of the present street is 42 feet, but it must be widened to 66 feet at least. Wellington Street has open a length of 3680 feet, measuring from Dr. Hill's house to East side of line of intersection of Elgin Street and from thence to foot of proposed Bridge over

Canal and River 400 feet to be opened. The average width is 96 feet, of which 20 feet is to be paved and 52 feet macadamized. Flagged sidewalks for the whole length are advisable, and I propose to raise the present surface of the street between Bank and Hugh Streets, on the average twelve inches. A similar elevation will be necessary between Metcalfe and Elgin Streets. From the Eastern side of the latter street it is proposed to excavate, as shown on Section No. 1, to head of proposed Bridge, and to adapt that Bridge to suit the traffic between both sides of the City, through Sparks Street and Wellington Street. The grade, as shown on Section, will give an inclination of 6·7 in 100 feet, the length of the structure constituting the Bridge will be 260 feet, and the embankment or filling to foot of present Sappers' Bridge shows an inclination of 5.5 feet in 100.— The cost of this structure, with a Bridge span of 100 feet of Iron, Abutments of stone, Wing Walls, etc., etc., and filling, has been estimated. The total length is 320 feet. The length of Rideau Street from present gate at foot of Sappers' Bridge to end of Rideau St., is 6125 ft.; width 96 ft., and 66 at lower end. Several obstructions occur in this street. On the West side of Nelson St., North of Rideau, at the junction, a portion of the fence of a lot owned by Mr. A. McGibney, appears to be on the street, and from that point the true alignment of the street has been intruded on by houses and fences. It is proposed to pave 20 feet of the width of this street, macadamize 52 feet, and flag sidewalks to junction of King Street. From the end of Rideau Street to present Rideau Bridge, a distance of 460 feet, the roadway must be widened and excavated, as shown in Section No. 1. A new bridge should be thrown across the River at this point, elevated considerably above the level of the present Bridge, so as to reduce the ascent. The cost of this is also estimated. This excavation should extend from the head of the Bridge to Wirtemberg Street, and the rate of inclination should be 4′.7″ in 100 feet. The present surface should be excavated to an average depth of 2′.6″ from Cobourg to Gloucester Street, and filled from thence to King Street, an average depth of 18 inches, from that street to Ottawa Street, a filling of the same depth will be required. This is shown on Street Section No. 1.

The cost of all those improvements will be shown in the following details, and I am convinced are amply sufficient for the purpose.

DESCRIPTION OF STREETS TO BE IMPROVED.

Sussex Street.

This street joins Rideau Street nearly at its north-western termination and runs for a distance of 2937 feet in a northerly direction, to a point at which it is intersected by Bolton Street, opposite the site of the Soap Manufactory. Its width is 66 feet, and it is the most westerly of the streets of Lower Town parallel with the anticlinal axis of the City at King Street. As far as its drainage will be concerned, it may be said to be adapted to the purpose of a catchment drain, or rather a series of such drains of small length, its natural outlets being the lateral streets east of King Street. It is the natural highway to what must become the future port of this City, and the Railway Terminus, as a consequence a thoroughfare of great importance, and must be paved and improved as provided for in the Estimates. In connection with this subject of Paving, I would recommend that all street crossings be paved with blocks similar to that recommended for street paving. The sidewalks should be flagged. The plan proposed will not materially interfere with the present level of the streets or its alignment. The proposed sewer will be at an average depth of ten feet below the surface of the street, affording ample drainage, and its dimensions should be 1'.6" ⋈ 2'.6", as shown in drawings, with earthenware pipes of six inches diameter inserted opposite each house and at each gutter trap. Such traps should not be less than 500 feet apart, and should be constructed to suit the climate. The existing grades of this street will not be materially interfered with.

Metcalfe Street.

Metcalfe Street runs from the north end of Sussex Street in an easterly direction to the Rideau River. Its total length is 2,590 feet and its width 60 feet. At the Eastern end it will require heavy filling, but this operation can be cheaply effected by the spoil of the main sewer which crosses it under Dalhousie Street. It is proposed to pave, macadamize, and flag the sidewalks of this street. From its limited area its drainage will be effected by the small sized sewer. It is hardly built upon, and its principal importance is derived from the Railway Terminus being at present located at its southern

end. It is the second outlet the city possesses in an Easterly direction.

McKay Street.

This street is 870 feet long and 60 feet wide. It joins Metcalfe Street on its Northern side and terminates at the cliffs over the Ottawa River. It appears to be the extreme Northern termination of Lower Town, is not properly opened, and can hardly become of sufficient importance to make it a subject of special care. There is provision for macadamizing and supplying it with gravel sidewalks. Its draining will only require the smaller sewers.

Baird Street.

Baird Street extends from the north end of Carleton Street, in a westerly direction, to the Ottawa River. It is only open to Anglesea Square—a length of 797 feet, with a width of 60. The calculations for macadamizing and improving this street will be found in the proper place. Its drainage will be effected by the small sewer.

Redpath Street

Extends from the undivided space on the west bank of the Rideau, between King and Carleton Streets, to the south end of Anglesea Square. A house stands nearly in the middle of this street, which must be removed. The length of this street is 1337 feet, width 66 feet. It is contemplated to macadamize and drain it as proposed. For cost, see the estimate. Its small superficial area will only require the small drain.

McTaggart Street.

The Ottawa and Prescott Railway occupies the centre of McTaggart Street. Both sides of this street must be improved. Its width of 66 feet will permit 20 feet of clear space being left to the Railway, which will leave 23 feet to each side of the street available for roadway. Its length from the Bridge to Terminus of Railway on Metcalf Street, is 2080 feet. Its western end towards the river is not opened. The side-walks on this street will be 10 feet wide. There should be a good, substantial post and rail fence placed along the Railway, separating it from the street on each side. As the main drain nearly bisects this street, its sewage will only require one of the smaller drains to discharge it.

Boteler Street.

Boteler Street starts from the west bank of the Rideau, and runs to the cliffs over the Ottawa, intersecting King, Carleton, Dalhousie

and Metcalf Streets. Its western end, beyond the latter street, is not opened. Its length to Metcalf Street is 2266, with a width of 66 feet. Between Dalhousie and Metcalf Streets a good deal of filling will be required, and can be easily obtained by depositing the spoil from the main sewer where necessary. Provision is made in the estimates for macadamizing and improving this street. Sewerage of the smaller class, as it has the same relation to the main sewer as McTaggart Street.

Bolton Street.

Bolton Street, from the open space on the west bank of the Rideau to its point of intersection at the junction of Sussex and Metcalf Streets, measures 2532 feet in length, by 66 feet in width. It intersects King, Carleton and Dalhousie Streets, and will be improved as proposed in estimates. Its drainage will be effected by the smaller sized sewers.

Cathcart Street,

From the west bank of the Rideau to the point of intersection with Sussex Street, measures 2638 feet, by a width of 66 feet. Its alignment is interfered with by houses being built on the street, as can be seen by reference to plan. Its southern side appears to be the boundary of the late Ordnance property in the city. Provision has been made for the improvement of this street by macadamization. Its drainage will be effected by the main sewer, which passes for 1100 feet along its lower end, and by the smaller sized drains above and below the part where that sewer leaves King Street. This street intersects King, Cumberland, passes along the south end of Cathcart Square, and intersects Dalhousie and Sussex Streets. Its upper end, beyond the latter street, is not open.

Bolton Street.

This is the second street of the same name in this end of the city. It is the first on the late Ordnance property, and extends from King to Sussex Streets—a distance of 2400 feet. Its present width is 62 feet, although it appears to have been originally laid out much wider. There are strong reasons for supposing that the original boundaries of this street have been removed within a very short time, and the alignment of the street altered thereby. It is also alleged that the lot boundaries or lines are also altered; but from whatever cause it has arisen, the alignment of the street—especially on the North side—has not been preserved. If these houses on the south side are built on the original line, the true alignment of the street is preserved on that side; but it is evident on the north side

this is not the case. The boundary stone on the north-west corner of this street has been (as alleged) removed 2½ or 3 feet eastward of its original position, and four feet southward. There is also a house at the north-east corner of this street, at its junction with King Street, which is nearly 10 feet on the street, and also on King Street.

The improvements contemplated in this street are comprised in its macadamization and drainage: for the first a provision is made in the estimates, and for the latter a sewer of 2 ⋈ 3 feet will be amply sufficient.

St. Andrew's Street.

From Sussex street to King street, a distance of 2178 feet, St. Andrew's street, with a main width of 62 feet, is in every respect similar to Bolton street, with the exception that the actual alignment of the street has been preserved. The singular appearance of the block bounded on the south by Rideau street, on the east by King street, on the west by Sussex street, and on the north by Cathcart street, cannot fail to attract attention, as much from the diversity of the widths of the streets as want of uniformity in the dimensions of the lots. The frequent complaints made of changes in boundaries, and the uneasiness felt by the owners of the property thereon, as well as the extraordinary appearance it presents, leads to the conviction that some great blunder had been perpetrated in the original surveys. The only way in which any dispute which may arise from this state of things can be settled is by reference to original plans, if such exist, or by compromise, in which public and private interests will be conserved by mutual concessions.

Provision has been made in the estimates for improving this street by macadamizing it and by draining. This latter object will be effected by a sewer of the dimensions of 2 feet by 3 feet.

Park Street.

Park street is merely a continuation of St. Andrew's street, from King street to the Rideau River. It is 1871 feet in length, with a width of 62 feet. It is to be macadamized, and drained by a sewer 2 feet by 3 feet. I have proposed to erect a bridge from the end of this street to the Island in the Rideau, and make a road over it, with another bridge over the eastern channel—thus adding another outlet to the Lower Town.

Church Street.

Church street, from King street to Sussex street, measures 2188

feet. Its width is 62 feet, and it requires to be macadamized and drained. The necessary provision is made in the estimate. The sewerage will be 2 by 3 feet.

St. Patrick Street.

From its intersection of King street, St. Patrick street measures to Sussex street 2183 feet, with a width of 62 feet. It is similar to all the streets before enumerated in physical aspect, but presents a more densely populated neighborhood. It is generally in a wretched condition, in consequence of the want of drainage—an evil which affects the whole district under consideration. Provision is made in the estimate for the necessary improvements. The drainage will require a sewer of 2 ⋈ 3 feet.

Ottawa Street.

Ottawa street is a prolongation of St. Patrick's street, from King street to the Rideau. Its length is 2820 feet, and width 66 feet. It furnishes presumptive evidence of the conclusion arrived at when describing St. Andrew's street, and induces the suspicion that those streets had been originally laid out at a width of 66 feet. The population on this street is sparse, and it presents all the features of a suburban street. The estimates detail the cost of its improvements. It will require a sewer of 2x3 feet.

Murray Street.

From Sussex to King streets, a distance of 2183 feet, Murray street measures 66 feet in width. It intersects Dalhousie and Cumberland streets, and will not require much surface change. It is to be macadamized and drained. For the latter operation, a sewer 2 feet by 3 will be requisite.

Clarence Street.

Clarence street measures 2183 feet in length, from Sussex street to King street. It is 63 feet wide and will require the usual improvements. Its drainage demands a sewer of 2 ⋈ 3 feet. Parry street is a continuation of this street, and from King street to west side of Anglesea Square is 1363 feet long, and 64½ wide. It will require similar improvements, and a drain 2 ⋈ 3 feet, as it is in a neighborhood of no great elevation above King street.

York Street.

From its junction with Sussex street to King street, York street measures 2180 feet, with a width of 132 feet. It will require the

improvements detailed in estimates, and the capacity of its sewers must be equal to a drain of 2 ⋈ 3 feet.

Some of the lots on the lower end of this street appear to be in a confused state; and it is alleged that they are more complicated by recent surveys.

George's Street.

George's street is 1690 feet in length. It extends from Sussex street to Cumberland street, and has a width of 125 feet. It intersects Dalhousie street, and is disfigured by an Engine House which stands in the centre, opposite Mosgrove street. The waste water of the Rideau Canal is carried down this street in an open channel some 10 or 12 feet wide to Dalhousie street, where it is passed under a bridge and through several lots into York street, near its junction with King street. George street requires a drain of 2 feet by 3 feet for its sewerage.

Dalhousie Street.

From Rideau street to McKay street, Dalhousie measures 4213 feet, with an average width of 58 feet. Its course nearly north and south, and parallel to Sussex street, being situated on the slope of that hill to which Sussex street may be said to act as a catchment drain. The improvement of Dalhousie street is by no means a difficult task, as all the lateral drains between King street and Sussex street have sewers of comparatively large area; and as those streets intersect Dalhousie street, all portions of it south of Cathcart street will only require a drain of 1.6 ⋈ 2.6 feet. North of Cathcart street, the remainder of Dalhousie is occupied with the main sewer.

The contemplated improvement in addition is macadamization.

Cumberland Street.

Cumberland street measures, from Rideau street to Cathcart Square, 2614, with a width of 58 feet. Its general outline is level, as it lies nearly at the foot of that elevation of which Dalhousie street occupies the slope, and Sussex street the crest. Its drainage from Rideau street to York will be effected by a drain of 2 ⋈ 3 feet. From that to its termination at Cathcart Square, drains of 1.6 ⋈ 2.6 feet will be sufficient. It is to be macadamized and improved as provided in the estimates.

King Street.

The anticlinal axis between the cliffs overhanging the Ottawa, and the range of sand hills above the Rideau River, from the western

bank of that river a short distance above the Falls, holds a southerly course to Rideau street. Along the bottom of this valley King street has been laid out; but the range of heights bordering it on the east sweeps around to the westward, and are prolonged till merged in the cliffs overhanging Le Briton's Flats, below the junction of Maria street with Concession B C. King street, from its junction with Rideau street to the banks of the Rideau River, measures 3926 feet, with a width of 132 feet. Its improvements will consist in macadamization and drainage. This last will be effected by the main sewer to the junction of Cathcart street, and from that point by a sewer 1.6 × 2.6 feet.

This street commands the drainage of the whole city, and particularly that portion of it contained between Rideau street and the delta formed by it and the Rideau and Ottawa Rivers.

The whole of the district within these lines require effective drainage, because the lower and more densely populated portions are without sufficient outfall. It is a curious fact, that the low lying portions of every city are always most densely peopled—as if miasmatic influence possessed attractions which were irresistable.—Whatever may be the cause of this strange anomaly, it is certain that the fact to be dealt with is one of the utmost importance in a sanitary point of view; and that is, the effective drainage and improvement of this part of the city cannot with safety be postponed any longer, and the construction of this main sewer should be undertaken as soon as possible—because every month is adding to the accumulation of filth in and about those low lying districts, and the state of the streets and thoroughfares is a disgrace to any community. No remedy short of thorough and effective drainage will suffice to rectify this state of matters.

Carleton Street.

Carleton street may be said to leave Cumberland street at the junction of Cathcart street, forming with the latter the east and south sides of Cathcart square. Its length to Metcalf street is 1820 feet, with a width of 66 feet. Its improvements consist in macadamization and drainage. For the latter, a drain of 2 × 3 feet will be required.

St. Paul Street.

St. Paul street extends from the east bank of the Rideau Canal to Nicholas street—a length of 912 feet, by 58 feet in width. It is to be macadamized and drained. The sewer should be 1'.6" ft. × 2'.6"

Besserer Street.

Besserer street, from the east side of Nicholas street to the bluff over the Rideau River, measures 5300 feet in length, by 58 feet in width. It intersects Ottawa, Cumberland, King, Nelson, Gloucester, Chapel, Agusta, Cobourg, Charlotte and Wurtemburg streets. Its natural outfall is towards King street, although from the intersection of that street it is located on a plain at a considerable elevation above it. To grade this street properly there will be a good deal of cutting and filling, which is provided for in the estimates. Its drainage can be effected by sewers of 1.6 ⋈ 2.6 feet.

Daly Street.

From Nicholas to bluff over the Rideau, Daly street will measure 4880 feet. From its position on the crest of the plain on which Besserer street is situated, the improvements of Daly street will be much easier effected. It intersects the same streets as Besserer, and its drainage will demand the same sized sewers, 1.6 ⋈ 2.6 feet.

Stewart Street.

Stewart street measures, from Ottawa street, 4680 feet to bluff over Rideau. It is 56 feet wide, and in every respect similar to Daly street

Wilbrod Street

Wilbrod street measures, from Ottawa street, 4160 feet; is 58 feet wide, and similar to Stewart street.

Theodore Street.

Theodore street, from junction of Nicholas street and Gloucester Road to bluffs over the Rideau, measures 4440 feet; is 66 feet wide, and similar to Wilbrod street in improvements. The population of these streets are very much scattered, but they cannot fail attracting inhabitants as other parts of the city becomes filled up. The size of sewers for this street will be 1.6 ⋈ 2.6.

Gloucester Road.

The Gloucester Road runs from the junction of Nicholas and Theodore streets to the City limits, a length of 2985 feet, with a width of 45 feet. It should be well macadamized, and drained by open water-tables or side-drains running into the ravine at the dam near the City limits. The road bed should be raised at this point, for which provision is made.

Nelson Street.

Nelson street, from Rideau street to Ottawa street, measures 1523 feet; is 58 feet wide, and requires macadamization and drainage.—Its outfall is in direction of Ottawa street, and it is intersected by Parry street. A drain of 1.6 ⋈ 2.6 feet will suffice for this street.

Gloucester Street.

From Rideau to Ottawa streets, a distance of 1526 feet, Gloucester street is 65 feet wide. Its improvements consist in thorough drainage and macadamization. It is governed by the same law that prescribes the size of drains for Nelson street.

Chapel Street, Augusta Street, Cobourg Street, Charlotte Street, and Wurtemberg Street are not yet opened. It is not necessary taking them into account, because they belong to the same general design, and are governed by the same laws as to improvements and drainage outfall. In fact, the cost of a rod of macadamization or drainage in any of these streets east of King street will accurately measure the cost in the next street, and in every street so situated.

Streets South of Rideau.

The peculiarity of surface which makes King street the anticlinal axis of the City of Ottawa where that axis changes at the juncion of Rideau street, compels a similar natural division of the streets extending laterally from Rideau street, parallel to and beyond King street, so that the distinction into south of Rideau street may be understood as a natural rather than an arbitrary division, especially when the same streets are named on both sides of that thoroughfare.

From the eastern end of Rideau street to the point at which King street intersects, the natural drainage of the great plain on which the streets parallel to Rideau street are located, is to be found down these streets through the lateral streets. Beginning at the extreme eastern end of Rideau street, we have Augusta street to the south, extending from Theodore street, and intersects Wilbrod, Stewart, Daly and Besserer streets. Its length, 1374; width, 66 feet.—Drainage demands a sewer 2 feet by 3 feet.

Chapel Street.

From Rideau to Theodore streets, length 1372 feet; width 66 feet; requires to be macadamized and drained. Sewers 2 ⋈ 3 feet.

Gloucester Street.

From Rideau to Theodore street, length 1367 feet; width 65 feet; to be macadamized and drained. Sewers 2 ⋈ 3 feet.

Nelson Street.

Length 1372 feet; width 58 feet. Improvements similar in every respect.

King Street.

Length 1374 feet; width 66 feet. Improvements similar.

Cumberland Street.

Length, from Rideau to Theodore street, 1365 feet; width 58 feet. Improvements, macadamization and drainage. Sewers 2 ⋈ 3 feet.

Ottawa Street.

Rideau to Theodore street, the length of Ottawa street would be 1383 feet. Improvements, macadamization and drainage. Sewers to be 2 ⋈ 3 feet.

Nicholas Street.

From Rideau street to junction of Theodore street and Gloucester road, Nicholas street measures 1384 feet, and is 58 feet wide. Improvements, macadamization and drainage. Sewers 2 ⋈ 3 feet.

The excavation or filling for these streets is amply provided for in the estimates.

Mosgrove Street.

Mosgrove street is some 400 feet in length from St. Paul to Rideau streets, and 198 feet to the north of the latter street. It is 60 feet wide, and should be macadamized and drained. Sewers 1.6 ⋈ 2.6.

Little Sussex Street.

Little Sussex street, from St. Paul street to Rideau street, measures 367 feet in length by 33 feet in width. It should be macadamized and drained. Sewers 1.6 ⋈ 2.6.

William Street.

From Rideau to George streets 198 feet long, 38 feet wide. Macadamized and drained. Sewers 1.6 ⋈ 2.6. An extension of this street is desirable, from the north side of George street to the south side of York street.

Sparks Street.

Sparks street, from the Sapper's Bridge to George's street, measures 4158 feet in length, 58 feet wide. Between O'Connor and

Bank streets the grading will require to be raised; and from Bay street to George's street a heavy rock excavation will be necessary to open the street. Both of these measures are provided for in the estimates. As Sparks street occupies the side of a hill, its natural drainage outfall is in the direction of the lateral streets, southward, or towards the upper length of the main sewer. As it will, therefore, be drained through Elgin, Metcalf, O'Connor, Bank, Hugh, Sally and Bay streets, a sewer of the smaller dimensions will suffice for its necessities—1.6 ⋈ 2.6.

Queen Street.

The length of Queen street now open is equal to 2962 feet, with a width of 58 feet. It will require considerable improvement. As it is parallel to the main sewer, its drainage will be delivered through the lateral streets intersecting it, and the dimensions of its sewer will be 1.6 ⋈ 2.6.

Maria Street.

From the east side of Concession B and C, at the junction of the Richmond Road to the limits of the Canal property, a distance of 4960 feet, Maria street is only partially opened. Its width varies from 30 to 66 feet; and as it is parallel to the main sewer, its drainage will be delivered through the lateral streets. This limits its sewer to an area of 1.6 ⋈ 2.6. Its other improvements consist of macadamization.

Biddy Street.

The length of Biddy street now open from Concession B C to Bank street, is 2458 feet; its width is 35 feet. As the property is not laid out in town lots, its improvements must be confined for the present to macadamization. Its drainage outfall is towards Bank street, and its sewerage will demand a drain 2 ⋈ 3.

Centre Street.

The length of Centre street now open is 4195, by 35 feet wide. It is in every respect similar to Biddy street, and will require a corresponding system of improvement and drainage.

Elgin Street.

From Wellington to Queen streets, Elgin street measures 530 feet by a width of 56 feet. As it will carry a portion of the drainage of Sparks street, it will be necessary to construct its sewers with a view to that object; and, therefore, from its junction with Sparks street its sewers will be 2 ⋈ 3.

Metcalfe Street.

This street, from Wellington to Maria streets, measures 1330 feet, by a main width of 60 feet. It will require heavy grading to pass it over the low ground between it and Maria street. Its improvements have been provided for—a large portion of its filling being derived from the spoil of the main drain. Its sewerage—as it will take a portion of Sparks street, and also a portion of that collected at and beyond Maria street—will be equal to a sewer 2 ⋈ 3.

O'Connor Street

Is in every respect similar to Metcalfe street. Its length is 1320 feet, width 61 feet. Its drainage and general improvments will be similar.

Bank Street.

Extending from the City limits to Wellington street, a distance of 3050 feet, Bank street does not possess a natural outfall for drainage, but an artificial inclination can be had without any extra expense, because its ground surface is comparatively level. It is designed to conduct its drainage into the main sewer; and as it will be the recipient of the drainage of a large area, the size of its sewers will be 2 ⋈ 3. The northern end will also be of the same dimensions.

There is a remarkable deflexion in the line of this street, commencing at Maria street and extending to Queen street. It will be necessary to widen this street; its present width below Maria street not being over 35 feet.

Hugh Street.

From Wellington to Maria streets, a distance of 1296 feet, Hugh street presents a width of 58 feet. It crosses the head of the main sewer of the City at where Albert street is projected to intersect; and its improvements are simply macadamization and drainage. As it is intended to carry the same area of drainage as other lateral streets, the capacity of its sewers must be of the dimensions of 2 ⋈ 3.

Sally Street

Extends from Sparks street to Maria street. Its improvements will be macadamization and drainage. Its outfall will be towards the projected line of Albert street, through which a drain of 2 ⋈ 3 feet will carry its waters into the main sewer. Its length is 1028 feet; width 60 feet.

Bay Street.

Bay street, from Wellington to Maria steeets, measures 1276, by 58 feet wide. It will follow the conditions of Sally street, as far as its improvements are concerned, the drainage outfall from intersection of Queen street lying through Albert street. Its drain may be 2 ⋈ 3.

Richmond Road.

From City limits to Concession B C, at junction of Maria street, the length of Richmond Road is 3337 feet; its width is 66 feet. It is the Concession line between A and the First Concession, in the Township of Nepean; and from the line dividing Lots 39 and 40, it forms the City boundary to its junction with the line dividing 38 and 39. It will require to be opened at the easterly end, where heavy rock cutting is necessary. Its drainage will be effected by Broad street, into Perkins street, and down the ravine into the proposed tailrace, below the present site of Pooley's Bridge. It will require a drain 2 ⋈ 3 feet.

Albert Street.

That portion of Albert street between B C and the Richmond Road finds its outlet for draining through the latter thoroughfare. It is 1010 feet in length, and 58 feet in width. It will require a drain of 1.6 ⋈ 2.6.

Victoria Terrace.

Victoria Terrace extends from Richmond Road at its junction with Broad street, to Pooley's Bridge. It measures 2000 feet, by 58 feet in width. It requires only the usual improvements, and a drain of 1.6 ⋈ 2.6. The outfall will be to Perkins street.

George's Street.

George's street, from the end of Pooley's Bridge, is 780 feet long, by 45 feet wide. At present it is formed by escarping the cliffs under which it runs, and forming the road by partly embanking. It requires to be widened, and its improvements are included in the estimates for the main thoroughfare. Its drainage area is limited, and need not have a sewer larger than 1.6 ⋈ 2.6.

Concession B C.

This line crosses the City limits at the line dividing E and F from Lot Forty. It holds a northerly course till its junction with the Richmond Road and Maria street, where it may be said to terminate

at present on the edge of the cliff. Its length is 2770 feet, width 45 feet. The contemplated improvements consist in simply macadamizing this road. Its drainage outlet will be through Bank street, along the City limits. But as this portion of the City has not been laid out in streets, a consideration of its details are unnecessary, especially if any future contemplated extension of the City limits should include Lot 39 in the first Concession, its natural drainage would be in that direction to Richmond Road, through Perkins street to the ravine where the tailrace for the proposed water-works will discharge.

Wellington Street.

Occupying the slope of the Government Reserves called the Barrack Hill, on its southern face, and the cliffs on which the Episcopal Church stands, on the northern face, the drainage of Wellington street is governed by its peculiar location and its natural outfall, which is towards the river, at the upper end of this street; and its drainage should be delivered into the Ottawa nearly on the line of Concession B and C. Its length and width will not materially affect the question of drainage, because its fall is so great that a drain of 2 × 3 is more than ample.

The streets to the northward of it will be drained partly into it and partly into Victoria street, which will find an outlet through John street into the Ottawa River. The whole of this drainage will be—Victoria street, 1220 feet; John street, 327 feet; about 200 feet of Hugh, Sally, and Bank streets will be drained into Victoria street, and the balance into Wellington street. The dimensions of the drain for Victoria street will be 2 × 3 feet. The improvements on Victoria street will consist in excavating the eastern end, and raising it to a uniform grade from Hugh to Bank streets.

Le Britton's Flats.

With the exception of Queen and Duke streets, none of the thoroughfares are more than partially open. In this distance its drainage is governed by the outfall through Duke street to the river. Queen street is the proposed line of the Conduit for Water Works, and provision has been made in the estimates for improving all these streets.

The various Islands need not be taken into consideration, because they have drainage outfall in every direction.

In closing this description of the streets, it is evident that a thorough and comprehensive system of drainage is a first necessity, —that this system should follow the natural contour of the surface, and that it should be rendered as effective as possible by the capacity of the sewers and the outfall given thereto. I have so arranged that the drains will be at a minimum depth of ten feet below the surface of the street, thereby allowing fully a six foot cellar, and providing amply for outfall from house sinks, drains, &c. I would advise the adoption of effective sewer-traps in all street sewers, so arranged as to prevent gravel, sand, or other surface material, finding its way into the sewers. And, in conclusion, I think the necessity for commencing the main sewer during the present season is sufficiently apparent, and called for by the circumstances in which the city is placed. It is a mistaken idea to suppose that the desultory and miserable efforts heretofore made can be persisted in—too much money has been already wasted by this means, and the experience of last season points to the evils likely to be entailed on our increasing population by inattention to the first rules of social life.

ESTIMATE OF COST OF DRAINAGE.

Main Drain from Hugh Street to Rideau Street, at junction of King Street.

Dimensions, 2.6 ⋈ 3.6.

6145	feet Masonry,	at $4.00.....	$24580 00	
6145	do Brickwork,	2.00.....	12290 00	
4245	do Rock Excavation,	3.00.....	12735 00	
1900	do Clay do	85c.....	1615 00	
				51220 00

King Street to Cathcart.

Drain 3.6 ⋈ 5.6.

2680	feet Masonry,	at $5.00.....	$13400 00	
2680	do Brickwork,	2.25.....	6030 00	
2680	do Excavation,	1.25.....	3350 00	
				22780 00

Cathcart to Dalhousie, and Dalhousie to Low Water of the Ottawa.

2777	feet Masonry,	at $6.50.....	$18050 50	
2777	do Brickwork,	3.00.....	8331 00	
1165	do Clay Excavation,	1.50.....	1747 50	
1612	do Rock do	13.00.....	20956 00	
440	do Masonry,	6.50.....	2860 00	
440	do Brickwork,	3.00.....	1320 00	
440	do Rock Excavation,	13.00.....	5720 00	
				58985 00
				$132985 00

McKay Street.

Drain 1.6 ⋈ 2.6.

Including refilling, and connections for house and street drainage.

840	feet of Sewer,	at $1.25.....	$1050 00	
840	do Rock Excavation,	2.00.....	1680 00	
				2730 00

Metcalfe Street.

Sewer 1.6 ⋈ 2.6. Including refilling and connections, &c.

2590	feet of Sewer,	at $1.25.....	$3237 50	
2590	do Rock Excavation,	2.00.....	5180 00	
				8417 50
		Carried forward.....		$144132 50

Brought forward.....		$144132 50
Baird Street.		
Sewer 1.6 ⋈ 2.6.		
797 feet of Sewer, at $1.25.....	$996 25	
797 do Excavation, 50c.....	398 50	
		1394 75
Redpath Street.		
Sewer 1.6 ⋈ 2.6.		
1337 feet of Sewer, at $1.25.....	$1671 25	
1337 do Excavation, 50c.....	668 50	
		2339 75
McTaggart Street.		
Sewer 1.6 ⋈ 2.6.		
2080 feet of Sewer, at $1.25.....	$2600 00	
2080 do Excavation, 50c.....	1040 00	
		3640 00
Boteler Street.		
Sewer 1.6 ⋈ 2.6.		
2266 feet of Sewer, at $1.25.....	$2832 50	
2266 do Excavation, 50c.....	1133 00	
		3965 50
Bolton Street.		
Sewer 1.6 ⋈ 2.6.		
2532 feet of Sewer, at $1.25.....	$3165 00	
2532 do Excavation, 50c.....	1266 00	
		4431 00
Cathcart Street.		
Sewer 1.6 ⋈ 2.6.		
1473 feet of Sewer, at $1.25.....	$1841 25	
1473 do Excavation, 50c.....	736 50	
		2577 75
Bolton Street.		
Sewer 2 ⋈ 3.		
2400 feet of Sewer, at $2.25.....	$5400 00	
2400 do Excavation, 50c.....	1200 00	
		6600 00
Carried forward.....		$169081 25

Brought forward.....		$189081 25
St Andrew's Street.		
Sewer 2 ⋈ 3.		
2187 feet of Sewer, at $2.25.....	$4920 75	
2187 do Excavation, 50c.....	1093 50	
		6014 25
Park Street.		
Sewer 2 ⋈ 3.		
1871 feet of Sewer, at $2.25.....	$4209 75	
1871 do Excavation, 50c.....	935 50	
		5145 25
Church Street.		
Sewer 2 ⋈ 3.		
2188 feet of Sewer, at $2.25.....	$4923 00	
2188 do Excavation, 50c.....	1094 00	
		6017 00
St. Patrick Street.		
Sewer 2 ⋈ 3.		
2183 feet of Sewer, at $2.25.....	$4911 75	
2183 do Excavation, 50c.....	1091 50	
		6003 25
Ottawa Street.		
Sewer 2 ⋈ 3.		
2820 feet of Sewer, at $2.25.....	$6345 00	
2820 do Excavation, 50c.....	1410 00	
		7755 00
Murray Street.		
Sewer 2 ⋈ 3.		
2183 feet of Sewer, at $2.25.....	$4911 75	
2183 do Excavation, 50c.....	1091 50	
		6003 25
Clarence Street.		
Sewer 2 ⋈ 3.		
2183 feet of Sewer, at $2.25.....	$4911 75	
2183 do Excavation, 50c.....	1091 50	
		6003 25
Carried forward.....		$212022 50

Brought forward.....			$212022 50
Parry Street.			
Sewer 2 ⋈ 3.			
1363 feet of Sewer,	at $2.25.....	$3066 75	
1363 do Excavation,	50c.....	681 50	
			3748 25
York Street.			
Sewer 2 ⋈ 3.			
2180 feet of Sewer,	at $2.25.....	$4905 00	
2180 do Excavation,	50c.....	1090 00	
			5995 00
George Street.			
Sewer 2 ⋈ 3.			
1690 feet of Sewer,	at $2.25.....	$3802 50	
1690 do Excavation,	50c.....	845 00	
			4647 50
Rideau Street.			
Sewer 2 ⋈ 3.			
4500 feet of Sewer,	at $2.25.....	$10125 00	
4500 do Excavation,	75c.....	3375 00	
			13500 00
Cumberland Street.			
Sewer 1.6 ⋈ 2.6.			
2614 feet of Sewer,	at $1.25.....	$3267 50	
2614 do Excavation,	50c.....	1307 00	
			4574 50
Carleton Street.			
Sewer 1.6 ⋈ 2.6.			
1820 feet of Sewer,	at $1.25.....	$2275 00	
1820 do Excavation,	50c.....	910 00	
			3185 00
King Street.			
Sewer 1.6 ⋈ 2.6.			
1246 feet of Sewer,	at $1.25.....	$1557 50	
1246 do Excavation,	50c.....	623 00	
			2180 50
Carried forward.....			$249853 25

Brought forward.....		$249853 25
Nelson Street.		
Sewer 1.6 ⋈ 2.6.		
1523 feet of Sewer, at $1.25.....	$1903 75	
1523 do Excavation, 50c.....	761 50	
		2665 25
Gloucester Street.		
Sewer 1.6 ⋈ 2.6.		
1526 feet of Sewer, at $1.25.....	$1907 50	
1526 do Excavation, 50c.....	763 00	
		2670 50
SOUTH OF RIDEAU STREET.		
Augusta Street.		
Sewer 2 ⋈ 3.		
1374 feet of Sewer, at $2.25.....	$3091 50	
1374 do Excavation, 50c.....	687 00	
		3778 50
Chapel Street.		
Sewer 2 ⋈ 3.		
1372 feet of Sewer, at $2.25.....	$3087 00	
1372 do Excavation, 50c.....	686 00	
		3773 00
Gloucester Street.		
Sewer 2 ⋈ 3.		
1369 feet of Sewer, at $2.25.....	$3080 25	
1369 do Excavation, 50c.....	684 50	
		3764 75
Nelson Street.		
Sewer 2 ⋈ 3.		
1372 feet of Sewer, at $2.25.....	$3087 00	
1372 do Excavation, 50c.....	686 00	
		3773 00
King Street.		
Sewer 2 ⋈ 3.		
1374 feet of Sewer, at $2.25.....	$3091 50	
1374 do Excavation, 50c.....	687 00	
		3778 50
Carried forward.....		$274056 75

Brought forward.....		$274056 75
Cumberland Street.		
Sewer 2 ⋈ 3.		
1365 feet of Sewer, at $2.25.....	$3071 25	
1365 do Excavation, 50c.....	682 50	
		3753 75
Ottawa Street.		
Sewer 2 ⋈ 3.		
1385 feet of Sewer, at $2.25.....	$3116 25	
1385 do Excavation, 50c.....	692 50	
		4808 75
Nicholas Street.		
Sewer 2 ⋈ 3.		
1384 feet of Sewer, at $2.25.....	$3114 00	
1384 do Excavation, 50c.....	692 00	
		3806 00
Mosgrove Street.		
Sewer 2 ⋈ 3.		
400 feet of Sewer, at $2.25.....	$900 00	
400 do Excavation, 50c.....	200 00	
		1100 00
Little Sussex Street.		
Sewer 1.6 ⋈ 2.6.		
367 feet of Sewer, at $1.25.....	$458 75	
367 do Excavation, 2.00.....	734 00	
		1192 75
St Paul Street.		
Sewer 1.6 ⋈ 2.6.		
912 feet of Sewer, at $1.25.....	$1140 00	
912 do Excavation, 1.00.....	912 00	
		2052 00
Besserer Street.		
Sewer 1.6 ⋈ 2.6.		
5300 feet of Sewer, at $1.25.....	$6625 00	
5300 do Excavation, 50c.....	2650 00	
		9275 00
Carried forward.....		$300045 00

Brought forward.....			$300045 00
Daly Street.			
Sewer 1.6 ⋈ 2.6.			
4880 feet of Sewer,	at $1.25.....	$6100 00	
4880 do Excavation,	50c.....	2400 00	
			8540 00
Stewart Street.			
Sewer 1.6 ⋈ 2.6.			
4680 feet of Sewer,	at $1.25.....	$5850 00	
4680 do Excavation,	50c.....	2340 00	
			8190 00
Wilbrod Street.			
Sewer 1.6 ⋈ 2.6.			
4160 feet of Sewer,	at $1.25.....	$5200 00	
4160 do Excavation,	50c.....	2080 00	
			7280 00
Theodore Street.			
Sewer 1.6 ⋈ 2.6.			
4440 feet of Sewer,	at $1.25.....	$5550 00	
4440 do Excavation,	50c.....	2220 00	
			7770 00
Wellington Street.			
Sewer 2 ⋈ 3.			
3680 feet of Sewer,	at $2.25.....	$8280 00	
3680 do Excavation,	2.00.....	7360 00	
			15640 00
Elgin Street.			
Sewer 2 ⋈ 3.			
530 feet of Sewer,	at $2.25.....	$1192 50	
530 do Excavation,	2.00.....	1060 00	
			2252 50
Metcalfe Street.			
Sewer 2 ⋈ 3.			
1330 feet of Sewer,	at $2 25.....	$2992 00	
1330 do Excavation,	2.00.....	2660 00	
			5652 00
Carried forward.....			$355369 50

Brought forward.....		$355369 50

O'Connor Street.

Sewer 2 ⋈ 3.

1320 feet of Sewer, at $2.25.....	$2970 00	
1320 do Excavation, 2.00.....	2640 00	
		5610 00

Bank Street.

Sewer 2 ⋈ 3.

3050 feet of Sewer, at $2.25.....	$6862 50	
3050 do Excavation, 1.25.....	3812 50	
		10675 00

Hugh Street.

Sewer 2 ⋈ 3.

1296 feet of Sewer, at $2.25.....	$2916 00	
1296 do Excavation, 75c.....	972 00	
		3888 00

Sally Street.

Sewer 2 ⋈ 3.

1028 feet of Sewer, at $2.25.....	$2313 00	
2028 do Excavation, 1.00.....	1023 00	
		3341 00

Bay Street.

Sewer 2 ⋈ 3.

1276 feet of Sewer, at $2.25.....	$2871 00	
1276 do Excavation, 2.00.....	2552 00	
		5423 00

Richmond Road.

Sewer 2 ⋈ 3.

3337 feet of Sewer, at $2.25.....	$7508 25	
3337 do Excavation, 1.00.....	3337 00	
		10845 25

Maria Street.

Sewer 2 ⋈ 3, and 1.6 ⋈ 2.6.

1800 feet of Sewer, at $2.25.....	$4050 00	
1800 do Excavation, 1.25.....	2250 00	
3160 do Sewer, 1.25.....	3950 00	
3160 do Excavation, 75c.....	2370 00	
		12620 00
Carried forward.....		$407771 75

Brought forward.....		$407771 75
Albert Street.		
Sewer 1.6 ⋈ 2.6.		
1010 feet of Sewer, at $1.25.....	$1262 50	
1010 do Excavation, 2.00.....	2020 00	
		3282 50
Victoria Terrace.		
Sewer 2 ⋈ 5.		
2000 feet of Sewer, at $2.25.....	$4500 00	
2000 do Excavation, 1.00.....	2000 00	
		6500 00
George Street.		
Sewer 1.6 ⋈ 2.6.		
780 feet of Sewer, at $1.25.....	$975 00	
780 do Excavation, 1.00.....	780 00	
		1755 00
Dalhousie Street.		
Sewer 1.6 ⋈ 2.6.		
2602 feet of Sewer, at $1.25.....	$3252 00	
2602 do Excavation, 75c.....	1951 50	
		5203 50
Bank Street, North of Wellington.		
Sewer 1.6 ⋈ 2.6.		
275 feet of Sewer, at $1.25.....	$343 75	
275 do Excavation, 2.00.....	550 00	
		893 75
Hugh Street.		
Sewer 1.6 ⋈ 2.6.		
585 feet of Sewer, at $1.25.....	$731 25	
585 do Excavation, 50c.....	292 50	
		1023 75
Sally Street.		
340 feet of Sewer, at $1.25.....	$425 00	
340 do Excavation, 50c.....	170 00	
		595 00
Carried forward.....	.....	$427025 25

Brought forward.....			$427025 25
Victoria Street and John Street.			
Sewer 2 ⋈ 3.			
1547 feet of Sewer, at $2.25.....		$3480 75	
1547 do Excavation, 2.00.....		3094 00	
			6574 75
Queen Street, on the Flats.			
Sewer 1.6 ⋈ 2.6.			
1190 feet of Sewer, at $1.25.....		$1487 50	
1190 do Excavation, 2.00.....		2380 00	
			3867 50
Duke Street.			
Sewer 2 ⋈ 3.			
872 feet of Sewer, at $2.25.....		$1962 00	
872 do Excavation, 2.00.....		1744 00	
			3706 00
Bridge Street.			
Sewer 1.6 ⋈ 2.6.			
620 feet of Sewer, at $1.25.....		$775 00	
620 do Excavation, 2.00.....		1240 00	
			2015 00
Sherwood Street.			
Sewer 1.6 ⋈ 2.6.			
698 feet of Sewer, at $1.25.....		$872 50	
698 do Excavation, 2.00.....		1396 00	
			2268 50
Bridge Street.			
Sewer 2 ⋈ 3.			
332 feet of Sewer, at $2.25.....		$747 00	
332 do Excavation, 2.00.....		664 00	
			1411 00
Lloyd Street.			
Sewer 1.6 ⋈ 2.6.			
1213 feet of Sewer, at $1.25.....		$1516 25	
1213 do Excavation, 1.00.....		1213 00	
			2729 25
Carried forward.....			$449597 25

Brought forward.....			$449597 25
Sparks Street.			
Sewer 1.6 ⋈ 2.6.			
4158 feet of Sewer,	at $1.25.....	$5197 50	
4158 do Excavation,	1.50.....	6237 00	
			11434 50
Queen Street.			
Sewer 1.6 ⋈ 2.6.			
2962 feet of Sewer,	at $1.25.....	$3702 50	
2962 do Excavation,	1.00.....	2962 00	
			6664 50
Perkins Street.			
Sewer 2 ⋈ 3.			
The drain through this street extends to the Bay, with power of flushing therefrom.			
2719 feet of Sewer,	at $2.25.....	$6117 75	
2719 do Excavation,	2.00.....	5438 00	
			11555 75
Sussex Street.			
Sewer 1.6 ⋈ 2.6.			
2937 feet of Sewer,	at $1.25.....	$3671 25	
2937 do Excavation,	90c.....	2643 30	
			6314 55
Total.....			$485566 55

COST OF WATER WORKS.

Conduit.

Excavation from Queen Street to foot of Bay, distance 2,000 feet, 23 feet wide and 15 average depth.

	$ c.
25,925 yards Rock, at $1	25,925 00
2,000 feet Arch, 22 x 2, at $3	6,000 00
4,000 feet Side-walls, 12 x 2, at $2	8,000 00
Cistern, 60 x 20 x 12 = 533, at $4	2,132 00
Wheel-house, 90 x 40	10,000 00
	$52,057 00

Machinery.

Two Water Wheels, 20 feet diameter and 15 feet wide	20,000 00
Four Pumps, each 2 feet diameter and 4 feet stroke, Connecting Rods, &c	2,000 00
Three Air Vessels, Connections, Pipes, Valves, Gearing, &c.	4,000 00
	$26,000 00

Reservoir.

250 feet in length by 200 feet wide.

FEET SUPERSTRUCTURE.

	C. yds.	
Exterior Wall,	900 x 35 x 5 = 5,833 at $8	46,664 00
Puddle,	864 x 32 x 4 = 4,096 at $1	4,096 00
Interior Wall,	810 x 35 x 4 = 4,200 at $6	25,200 00
Parapet,	900 x 5 x 6 = 1,000 at $10	10,000 00
40 Buttresses,	35 x 8 x 3 = 1,244	12,440 00

FOUNDATIONS.

	C. yds.	
Exterior Walls,	900 x 7 x 10 = 2,334 at $3	7,002 00
Interior do	810 x 6 x 10 = 1,800 at $3	5,400 00

EXCAVATION.

50,000 x 10 = 18 518 cubic yards, at 50c. 9,259 00

PUDDLE.

50,000 x 4 = 7,407 cubic yards, at $1 7,407 00

Carried forward $127,468 00

Brought forward	$127,468 00
CONCRETE.	
50,000 x 3 = 5,555 cubic feet, at $3	16,665 00
CUT STONE BOTTOM.	
38,350 x 2 = 2,840 cubic yds., at $6	17,040 00
	$161,173

Service and Distribution.

Rising Main—18 diameter 3,600 feet by 1″ = 185·3 lbs. per foot = 667·080 at 2½c.	16,677 00
Distribution—8,000 ft. 12″ x ⅞ = 110·6 p. f. 884·800 at 2½c.	22,120 00
75,000 feet 6 x ¾ = 49·4 = 3.705,000 at 2½c.	92,625 00
	$131,422 00
Hydrants, Stop Cocks, &c.	10,000 00
	$141,422 00

Summary.

Cost of Conduit and Wheel-house	52,057 00
Machinery	26,000 00
Reservoir	161,173 00
Service	141,422 00
	$380,652 00
Contingencies, 10 per cent.	38,065 20
	$418,717 20

LIST OF STREETS.

	LENGTH.	WIDTH.
McKay Street	870	60
Metcalf Street	2,590	60
Baird Street	797	60
Redpath Street	1,330	66
McTaggart Street	2,087	66
Boteler Street	2,266	66
Bolton Street	2,532	66
Cathcart Street	2,638	66
Bolton Street	2,400	62
St. Andrews Street	2,187	62
Church Street	2,188	62
St. Patrick Street	2,183	60
Park Street	1,871	62
Ottawa Street	2,820	66
Sussex Street	2,937	66
Murray Street	2,183	66
Clarence Street	2,183	63
Parry Street	1,363	64
York Street	2,180	132
George Street	1,690	125
Rideau Street	5,854	96 & 66½
To Rideau Bridge	460	35
Bridge	660	18
St. Paul	912	58
Besserer	5,300	58
Daly	4,880	58
Stewart	4,680	58
Wilbrod	4,160	58
Theodore	4,440	66
Gloucester Road	2,985	45
Dalhousie Street	4,213	58
Cumberland	2,614	58
Carleton	1,820	66
King	3,926	132
Nelson	1,523	58
Gloucester	1,526	65
Chapel	1,535	66
Augusta	1,538	66
Coburg	1,543	60
Charlotte	1,550	60
Wurtemburg	1,400	59

South of Rideau Street.

	LENGTH.	WIDTH.
Augusta	1,374	66
Chapel	1,372	66
Gloucester	1,369	65
Nelson	1,372	58
King	1,374	66
Cumberland	1,365	58
Ottawa	1,385	64
Nicholas	1,384	58
Mosgrove	400	60
Little Sussex	367	33
William	198	38
Upper Town.		
Wellington Street, to be opened from Canal to Elgin Street	400	96
From Elgin to Hill's house	3,680	96
Sparks Street	4,158	58
Queen	2,962	58
Maria	4,960	66
Biddy	2,458	35
Centre	4,195	35
Elgin	530	56
Metcalfe	1,330	60
O'Connor	1,320	61
Bank	3,050	40
Hugh	1,296	58
Sally	1,028	60
Bay	1,276	58
Richmond Road	3,337	66
Albert Street	1,010	58
Victoria Terrace	2,000	58
George Street	780	45
Concession B C	2,770	45
Ashburnham Street	620	38
Percy	625	35
Nepean	768	32
Gloucester	1,098	35
Streets North of Wellington.		
Bank	275	66
Hugh	585	60
Sally	340	62

	LENGTH.	WIDTH.
Victoria	1,220	60
John	327	37
Bay	180	48
Flats.		
Pooley's Bridge	145	24
Approach to	60	60
Queen Street	1,190	60
Duke Street	872	60
Bridge	620	60
Sherwood	698	70
Bridge	332	"
Bridge over Slides	480	18
Lloyd Street	1,213	50

COST OF IMPROVING THE MAIN THOROUGHFARES.

	FEET.
From Union Bridge to Head of Wooden Bridge over Slides	332
From Wooden Bridge to Duke street	460
Length of Duke street	872
" Queen street to Pooley's Bridge	220
" (Bridge) to George street	65
" (Bridge) to be filled in	145
" George street to Wellington	785
" Wellington to head of New Bridge	4,080
" Approaches to New Bridge	330
" Rideau street	6,125
" to Rideau Bridge	460
	13,874

To paving 13,874 feet, at $2 per foot	$27,748
" Macadamizing 2,879 feet 26 feet wide, at $1 per foot	2,879
" " 10,995 " 52 " $2 "	21,990
" Excavation Rock, 7,267 yds, at $1	7,267
" Sand, Clay and Filling, 22,740 yds, at 20c	4,548
" Flagging 9,578 feet, 24 feet wide, at $2	19,156
" Side Gutters, 27,088 feet, at 25c. per foot	6,772
" Bridge over Rideau River, 540 feet, at $10	5,400
" Iron Bridge over Canal, 100 feet, at $105	10,500
	$106,260

Brought forward..... $106,260 00

COST OF PAVING AND MACADAMIZING.

Sussex Street.

Paving,	2,957 feet, at $2.....	$5,914 00	
Macadamizing,	2,957 = 22 ft. wide, at 80c.....	2,356 60	
Filling,	7000 yards, at 25c.....	1,750 00	
Side Gutters,	5,874 feet, at 25c.....	1,468 50	
			$11,489 10

Metcalfe Street.

Paving,	2,595 = 20 ft. wide, at $2.....	5,190 00	
Macadamizing,	2,595 = 16 do 75c.....	1,946 25	
Filling,	21,500, at 20c.....	4,300 00	
Excavation,	550 yards rock, at $1.....	550 00	
Side Flagging,	2,595 = 24 feet wide, at $2.....	5,190 00	
Gutters,	5,190, at 25c.....	1,297 50	
			18,473 75

McKay Street.

Macadamizing,	870 = 36 ft. wide, at $1.50			1,305 00	
Gravel Sidewalks,	1,740 = 12	do	70c.	1,218 00	
Stone Curbing,	1,740	do	25c.	435 00	
Gutters,	1,740	do	25c.	435 00	
					3,393 00

Baird Street.

Macadamizing,	797 = 36 ft. wide, at $1.50			1,195 50	
Filling,				1,000 00	
Gravel Sidewalks,	797 = 24 ft. wide, at $1.40			1,115 80	
Stone Curbing,	1,594	do	25c.	398 50	
Gutters,	1,594	do	25c.	398 50	
					4,108 30

Redpath Street.

Macadamizing,	1,337 = 42 ft. wide, at $1.60			2,139 20	
Gravel Sidewalks,	1.337 = 24	do	$1.00	1,337 00	
Stone Curbing,	2,674	do	25c.	668 50	
Gutters,	2,674	do	25c.	668 50	
					4,813 20

Carried forward..... $148,537 35

Brought forward..... $148,537 35

McTaggart Street.

(Ottawa and Prescott Railway occupies the centre of this street, a width of 20 feet clear should be allowed to this Railway,—leaving 46 feet for roadway and sidewalks, or 27 feet to each side, 10 for sidewalk, and 14 for roadway, allowing 3 feet for gutter.)

Macadamizing,	2,080 = 28 ft.	wide, at	$1.10	2,288 00	
Gravel Sidewalks,	2,080	do	$1.10	2,288 00	
Stone Curbing,	4,160	do	25c.	1,040 00	
Gutters,	4,160	do	25c.	1,040 00	
					6,656 00

Boteler Street.

Macadamizing,	2,266 = 43 ft.	wide, at	$1.60	3,625 60	
Gravel Sidewalks,	2,266 = 24	do	1.00	2,266 00	
Stone Curbing,	4,532	do	25c.	1,133 00	
Gutters,	4,532	do	25c.	1,133 00	
					8,157 60

Bolton Street.

Macadamizing,	2,532 = 42 ft.	wide, at	$1.60	4,051 20	
Gravel Sidewalks,	2,532 = 24	do	$1	2,532 00	
Stone Curbing,	5,064	do	25c.	1,266 00	
Gutters,	5,064	do	25c.	1,266 00	
					9,115 20

Cathcart Street.

Macadamizing,	2,638 = 42 ft.	wide, at	$1.60	4,220 80	
Gravel Sidewalks,	2,638 = 24	do	$1	2,638 00	
Stone Curbing,	5,276	do	25c.	1,319 00	
Gutters,	5,276	do	25c.	1,319 00	
					9,496 80

Bolton Street.

Macadamizing	2,400 = 38 ft.	wide, at	$1.50	3,600 00	
Gravel Sidewalks,	2,400 = 24	do	$1	2,400 00	
Stone Curbing,	4,800	do	25c.	1,200 00	
Gutters,	4,800	do	25c.	1,200 00	
					8,400 00

Carried forward..... $190,362 95

Brought forward.....					$190,362 95
St. Andrew Street.					
Macadamizing,	2,187 = 38 ft. wide, at		$1.50	3,280 50	
Gravel Sidewalks,	2,187 = 24	do	$1	2,187 00	
Stone Curbing,	4,374	do	25c.	1,093 50	
Gutters,	4,374	do	25c.	1,093 50	
					7,654 50
Church Street.					
Macadamizing,	2,188 = 38 ft. wide, at		$1.50	3,282 00	
Gravel Sidewalks,	2,188 = 24	do	$1	2,188 00	
Stone Curbing,	4,376	do	25c.	1,094 00	
Gutters,	4,376	do	25c.	1,094 00	
					7,658 00
St. Patrick Street.					
Macadamizing,	2,183 = 36 ft. wide, at		$1.45	3,165 35	
Gravel Sidewalks,	2,183 = 24	do	$1	2,183 00	
Stone Curbing,	4.366	do	25c.	1,091 50	
Gutters,	4,366	do	25c.	1,091 50	
					7,531 35
Park Street.					
Macadamizing,	1,871 = 38 ft. wide, at		$1.50	2,806 50	
Gravel Sidewalks,	1,871 = 24	do	$1	1,871 00	
Stone Curbing,	3,742	do	25c.	935 50	
Gutters,	3,742	do	25c.	935 50	
					6,548 50
Ottawa Street.					
Macadamizing,	2,820 = 42 ft. wide, at		$1.60	4,512 00	
Gravel Sidewalks,	2,820 = 24	do	$1	2,820 00	
Stone Curbing,	5,640	do	25c.	1,410 00	
Gutters,	5,640	do	25c.	1,410 00	
					10,152 00
Murray Street.					
Macadamizing,	2,183 = 42 ft. wide, at		$1.60	3,492 80	
Gravel Sidewalks,	2,183 = 24	do	$1	2,183 00	
Stone Curbing,	4,366	do	25c.	1,091 50	
Gutters,	4,366	do	25c.	1,091 50	
					7,858 80
Carried forward.....					$237,766 10

Brought forward.....					$287,766 10
	Clarence Street.				
Macadamizing,	2,183 = 39 ft. wide, at		$1.55	3,383 65	
Gravel Sidewalks,	2,183 = 24	do	$1	2,183 00	
Stone Curbing,	4,366	do	25c.	1,091 50	
Gutters,	4,366	do	25c.	1,091 50	
					7,749 65
	Parry Street.				
Macadamizing,	1,363 = 40½ ft. wide, at		$1.50	2,126 28	
Gravel Sidewalks,	1,363 = 24	do	$1	1,363 00	
Stone Curbing,	2,726	do	25c.	681 50	
Gutters,	2,726	do	25c.	681 50	
					4,852 28
	York Street.				
Macadamizing,	2,180 = 108 ft. wide, at		$4.10	8,938 00	
Gravel Sidewalks,	2,180 = 24	do	$1	2,180 00	
Gutters,	4,360	do	25c.	1,090 00	
Curbing,	4,360	do	25c.	1,090 00	
					13,298 00
	George Street.				
Macadamizing,	1,690 = 101 ft. wide, at		$3.97	6,709 30	
Gravel Sidewalks,	1,690 = 24	do	$1	1,690 00	
Gutters,	3,380	do	25c.	845 00	
Curbing,	3,380	do	25c.	845 00	
					10,089 30
	St. Paul Street.				
Macadamizing,	912 = 34 ft. wide, at		$1.40	1,276 80	
Gravel Sidewalks,	912 = 24	do	$1	912 00	
Gutters,	1,824	do	25c.	456 00	
Curbing,	1,824	do	25c.	456 00	
					3,100 80
	Besserer Street.				
Macadamizing,	5,300 = 34 ft. wide, at		$1.40	7,420 00	
Gravel Sidewalks,	5,300 = 24	do	$1	5,300 00	
Gutters,	10,600	do	25c.	2,650 00	
Curb Stones,	10,600	do	25c.	2,650 00	
Cutting and filling	22,222 cubic yards, at		20c.	4,444 40	
					22,464 40
Carried forward.....					$299,320 53

Brought forward..... $299,320 63

Daly Street.

Macadamizing,	4,880 =	34 ft. wide, at	$1.40	6,832 00	
Gravel Sidewalks,	4,880 =	24 do	$1.00	4,880 00	
Gutters,	9,760	do	25c.	2,440 00	
Curb Stones,	9,760	do	25c.	2,440 00	
Cutting 6,222 yds.			10c.	622 20	
					17,214 20

Stewart Street.

Macademizing,	4,680 =	34 ft. wide, at	$1.40	6,552 00	
Gravel Sidewalks,	4,680 =	25 do	$1.00	4,680 00	
Gutters,	9,360	do	25c.	2,340 00	
Curb Stones,	9,360	do	25c.	2,340 00	
					15,912 00

Wilbrod Street.

Macademizing,	4,160 =	34 ft. wide, at	$1.40	5,824 00	
Gravel Sidewalks,	4,160 =	24 do	$1.00	4,160 00	
Gutters,	8,320	do	25c.	2,080 00	
Curb Stones,	8,320	do	25c.	2,080 00	
					14,144 00

Theodore Street.

Macadamizing,	4,440 =	42 ft. wide, at	$1.60	7,104 00	
Gravel Sidewalks,	4,440 =	24 do	$1.00	4,440 00	
Gutters,	8,880	do	25c.	2,220 00	
Curb Stones,	8,880	do	25c.	2,220 00	
					15,984 00

Gloucester Road.

Macadamizing,	2,985 =	34 ft. wide, at	$1.40	4,179 00	
Water tables,	5,970 =		5c.	298 50	
Filling,				1,000 00	
					5,477 50

Dalhousie Street.

Macadamizing,	4,213 =	34 ft. wide, at	$1.40	5,898 20	
Gravel Sidewalks,	4,213 =	24 do	$1.00	4,213 00	
Gutters,	8,426	do	25c.	2,106 50	
Curb Stones,	8,426	do	25c.	2,106 50	
					14,324 20

Carried forward..... $382,376 43

Brought forward..... $382,376 43

Cumberland Street.

Macadamizing,	2,614 = 34 ft. wide, at		$1.40	3,659 60	
Sidewalks,	2,614 = 24	do	$1.00	2,614 00	
Gutters,	5,228	do	25c.	1,307 00	
Curb Stones,	5,228	do	25c.	1,307 00	
Filling 21,455 C. yards, at 10c. on this street and Carleton,				2,145 50	
					11,033 10

Carleton Street.

Macadamizing,	1,820 = 42 ft. wide, at		$1.60	2,912 00	
Sidewalks,	1,820 = 24	do	$1.00	1,820 00	
Gutters,	3,640	do	25c.	910 00	
Curb Stones,	3,640	do	25c.	910 00	
					6,552 00

King Street.

Macadamizing,	3,926 = 108 ft. wide, at		$4.10	16,096 60	
Sidewalks,	3,926 = 24	do	$1.00	3,926 00	
Gutters,	7,852	do	25c.	1,963 00	
Curb Stones,	7,852	do	25c.	1,963 00	
Filling 58,100 yds. at 10c.				5,810 00	
					29,758 60

Nelson Street.

Macadamizing,	1,523 = 34 ft. wide, at		$1.40	2,132 20	
Gravel Sidewalks,	1,523 = 24	do	$1.00	1,523 00	
Gutters,	3,046	do	25c.	761 50	
Curb Stones,	3,046	do	25c.	761 50	
					5,178 20

Gloucester Street.

Macadamizing,	1,526 = 41 ft. wide, at		$1.60	2,441 60	
Gravel Sidewalks,	1,526 = 24	do	$1.00	1,526 00	
Gutters,	3,052	do	25c.	763 00	
Curb Stones,	3,052	do	25c.	763 00	
					5,493 60

Carried forward..... $440,391 93

Brought forward..... $440,391 98

SOUTH OF RIDEAU STREET.

Augusta Street.

Macadamizing,	1,374 = 42 ft.	wide, at	$1.60	2,198 40	
Sidewalks,	1,374 = 24	do	$1.00	1,374 00	
Gutters,	2,748	do	25c.	687 00	
Curb Stones,	2,748	do	25c.	687 00	
					4,946 40

Chapel Street, South of Rideau.

Macadamizing,	1,372 = 42 ft.	wide, at	$1.60	2,195 20	
Gravel Sidewalks,	1,372 = 24	do	$1.00	1,372 00	
Gutters,	2,744	do	25c.	686 00	
Curb Stones,	2,744	do	25c.	686 00	
					4,939 20

Gloucester Street.

Macadamizing,	1,369 = 41 ft.	wide, at	$1.60	2,190 40	
Gravel Sidewalks,	1,369 = 24	do	$1.00	1,369 00	
Gutters,	2,738	do	25c.	684 50	
Curb Stones,	2,738	do	25c.	[684 50	
					4,928 40

Nelson Street.

Macadamizing,	1,372 = 34 ft.	wide, at	$1.40	1,920 80	
Gravel Sidewalks,	1,372 = 24	do	$1.00	1,372 00	
Gutters,	2,744	do	24c.	686 00	
Curb Stones,	2,744	do	25c.	686 00	
					4,664 80

King Street.

Macadamizing,	1,374 = 42 ft.	wide, at	$1.60	2,198 40	
Gravel Sidewalks,	1,374 = 24	do	$1.00	1,374 00	
Gutters,	2,748	do	25c.	687 00	
Filling,				1,000 00	
Curbing 2,748 ft. at 25c.				687 00	
					5,946 40

Carried forward..... $465,817 18

Brought forward..... $465,817 13

Cumberland Street, South of Rideau,

Macadamizing,	1,365 = 34 ft.	wide, at	$1.40	1,911 00	
Gravel Sidewalks,	1,365 = 24	do	$1.00	1,365 00	
Gutters,	2,730	do	25c.	682 50	
Curb Stones,	2,730	do	25c.	682 50	
					4,641 00

Ottawa Street.

Macadamizing,	1,385 = 40 ft.	wide, at	$1.60	2,216 00	
Gravel Sidewalks,	1,385 = 24	do	$1.00	1,385 00	
Gutters,	2,770	do	25c.	692 50	
Curb Stones,	2,770	do	25c.	692 50	
Filling,				1,000 00	
					5,986 00

Nicholas Street.

Macadamizing,	1,384 = 34 ft.	wide, at	$1.40	1,937 60	
Gravel Sidewalks,	1,384 = 24	do	$1.00	1,384 00	
Gutters,	2,768	do	25c.	692 00	
Curb Stones,	2,768	do	25c.	692 00	
					4,705 60

Mosgrove Street.

Macadamizing,	400 = 36 ft.	wide, at	$1.45	580 00	
Gravel Sidewalks,	400 =	do	$1.00	400 00	
Gutters,	800	do	25c.	200 00	
Curb Stones,	800	do	25c.	200 00	
					1,380 00

Little Sussex Street.

Macadamizing,	367 = 21 ft.	wide, at	70c.	256 90	
Gravel Sidewalks,	367 = 12	do	50c.	183 50	
Gutters,	734	do	25c.	183 50	
Curb Stones,	734	do	25c.	183 50	
					807 40

William Street:

Macadamizing,	200 = 24 ft	wide, at	70c.	140 00	
Gravel Sidewalks,	200 = 18	do	75c.	150 00	
Gutters,	400	do	25c.	100 00	
Curb Stones,	400	do	25c.	100 00	
					490 00

Carried forward..... $483,827 13

Brought forward..... $483,827 13

UPPER TOWN.

Sparks Street.

Macadamizing,	4,158 = 34 ft. wide, at		$1.40	5,821 20	
Gravel Sidewalks,	4,158 = 24	do	$1.00	4,158 00	
Gutters,	8,316	do	25c.	2,079 00	
Curb Stones,	8,316	do	25c.	2,079 00	
Excavation Rock at upper end, to Bay Street, 21,900 yards,			at $1.00	21,900 00	
					36,037 20

Queen Street.

Macadamizing,	2,962 = 34 ft. wide, at		$1.40	4,146 80	
Gravel Sidewalks,	2,962 = 24	do	$1.00	2,962 00	
Gutters,	5,924	do	25c.	1,481 00	
Curb Stones,	5,924	do	25c.	1,481 00	
					10,070 80

Maria Street.

Macadamizing,	4,960 = 42 ft. wide, at		$1.60	7,936 00	
Gravel Sidewalks,	4,960 = 24	do	$1.00	4.960 00	
Gutters,	9,920	do	25c.	2,480 00	
Curb Stones,	9,920	do	25c.	2,480 00	
Excavation,				5,000 00	
					22,856 00

Biddy Street.

Macadamizing,	2,458 = 33 ft. wide, at		$1.40	3,441 20	
Water tables,	4,916		5c.	245 80	
					3,687 00

Centre Street.

Macadamizing,	4,195 = 33 ft. wide, at		$1.40	5,873 00	
Water tables,	8,390		5c.	419 50	
					6,292 50

Elgin Street.

Macadamizing,	530 = 36 ft. wide, at		$1.45	768 50	
Gravel Sidewalks,	530 = 24	do	$1.00	530 00	
Gutters,	1,060	do	25c.	265 00	
Curb Stones,	1,060	do	25c.	265 00	
					1,828 50

Carried forward..... $564,599 13

Brought forward..... $564,599 13

Metcalf Street.

Macadamizing,	1,330 = 36 ft.	wide, at	$1.45	1,928 50	
Gravel Sidewalks,	1,330 = 24	do	$1.00	1,330 00	
Gutters,	2,660	do	25c.	665 00	
Curb Stones,	2,260	do	25c.	665 00	
					4,588 50

O'Connor Street.

Macadamizing,	1,320 = 37 ft.	wide, at	$1.45	1,914 00	
Gravel Sidewalks,	1,320 =	do	$1.00	1,320 00	
Gutters,	2,640	do	25c.	660 00	
Curb Stones,	2,640	do	25c.	660 00	
					4,554 00

Bank Street.

Macadamizing,	3,050 = 42 ft.	wide, at	$1.60	4,880 00	
Gravel Sidewalks,	3,050 = 24	do	$1.00	3,050 00	
Gutters,	6,100	do	25c.	1,525 00	
Curb Stones,	6,100	do	25c.	1,525 00	
					10,980 00

Hugh Street.

Macadamizing,	1,296 = 34 ft.	wide, at	$1.40	1,814 40	
Gravel Sidewalks,	1,296 = 24	do	$1.00	1,296 00	
Gutters,	2,592	do	25c.	648 00	
Curb Stones,	2,592	do	25c.	648 00	
					4,406 40

Sally Street.

Macadamizing,	1,028 = 36 ft.	wide, at	$1.45	1,490 60	
Gravel Sidewalks,	1,028 = 24	do	$1.00	1,028 00	
Curb Stones,	2,056	do	25c.	514 00	
Gutters,	2,056	do	25c.	514 00	
					3,546 60

Bay Street.

Macadamizing,	1,276 = 34 ft.	wide, at	$1.40	1,786 40	
Gravel Sidewalks,	1,276 = 24	do	$1.00	1,276 00	
Curb Stones,	2,552	do	25c.	638 00	
Gutters,	2,552	do	25c.	638 00	
					4,338 40

Carried forward..... $597,013 03

Brought forward.....					$597,013 03
	Richmond Road.				
Macadamizing,	3,337 = 42 ft. wide, at			5,339 20	
Gravel Sidewalks,	3,337 = 24	do	$1.00	3,337 00	
Gutters,	6,674	do	25c.	1,668 50	
Curb Stones,	6,674	do	25c.	1,668 50	
					12,013 20
	Albert Street.				
Macadamizing,	1,010 = 34 ft. wide, at			1,414 00	
Gravel Sidewalks,	1,010 = 24	do	$1.00	1,010 00	
Gutters,	2,020	do	25c.	505 00	
Curb Stones,	2,020	do	25c.	505 00	
					3,434 00
	Victoria Terrace.				
Macadamizing,	2,000 = 34 ft. wide, at			2,800 00	
Gravel Sidewalks,	2,000 = 24	do	$1.00	2,000 00	
Gutters,	4,000	do	25c.	1,000 00	
Curb Stones,	4,000	do	25c.	1,000 00	
					6,800 00
	George Street.				
Macadamizing,	780 = 21 ft. wide, at			624 00	
Gravel Sidewalks,	780 = 24	do	$1.00	780 00	
Gutters,	1,560	do	25c.	390 00	
Curb Stones,	1,560	do	25c.	390 00	
					2,184 00
	Concession B and C.				
Macadamizing,	2,770 = 21 ft. wide, at			2,216 00	
Gravel Sidewalks,	2,770 = 24	do	$1.00	2,770 00	
Gutters,	5,540	do	25c.	1,385 00	
Curb Stones,	5,540	do	25c.	1,385 00	
					7,756 00
	Ashburnham Street.				
Macadamizing,	620 = 26 ft. wide, at			558 00	
Gravel Sidewalks,	620 = 12	do	50c.	310 00	
Gutters,	1,240	do	25c.	310 00	
Curb Stones,	1,240	do	25c.	310 00	
					1,488 00
Carried forward.....					$630,688 23

Brought forward..... $630,688 28

Percy Street.

Macadamizing,	625 = 23 ft.	wide, at	86c.	537 50	
Gravel Sidewalks,	626 = 12	do	50c.	312 50	
Gutters,	1,250	do	25c.	312 50	
Curb Stones,	1,250	do	25c.	312 50	
					1,475 00

Nepean Street.

Macadamizing,	768 = 20 ft.	wide, at	80c.	614 40	
Gravel Sidewalks,	768 = 12	do	50c.	384 00	
Gutters,	1,536	do	25c.	384 00	
Curb Stones,	1,536	do	25c.	384 00	
					1,766 40

Gloucester Street.

Macadamizing,	1,098 = 23 ft.	wide, at	83c.	911 34	
Gravel Sidewalks,	1,098 = 12	do	50c.	549 00	
Gutters,	2,196	do	25c.	549 00	
Curb Stones,	2,196	do	25c.	549 00	
					2,558 34

NORTH OF WELLINGTON STREET.

Bank Street.

Macadamizing,	275 = 42 ft.	wide, at	$1.60	440 00	
Gravel Sidewalks,	275 = 24	do	$1.00	275 00	
Gutters,	550	do	25c.	137 50	
Curb Stones,	550	do	25c.	137 50	
Filling,				200 00	
					1,190 00

Hugh Street.

Macadamizing,	585 = 36 ft.	wide, at	$1.45	848 25	
Gravel Sidewalks,	585 = 24	do	$1.00	585 00	
Gutters,	1,170	do	25c.	292 50	
Curb Stones,	1,170	do	25c.	292 50	
					2,018 25

Carried forward..... $639,696 22

Brought forward..... $639,696 22

Sally Street.

Macadamizing,	340 =	38 ft. wide, at	$1.47	499 80	
Gravel Sidewalks,	340 =	24 do	$1.00	340 00	
Gutters,	680	do	25c.	170 00	
Curb Stones,	680	do	25c.	170 00	
					1,179 80

Victoria Street.

Macadamizing,	1,220 =	36 ft. wide, at	$1.45	1,769 00	
Gravel Sidewalks,	1,220 =	24 do	$1.00	1,220 00	
Gutters,	2,440	do	25c.	610 00	
Curb Stones,	2,440	do	25c.	610 00	
					4,209 00

John Street.

Macadamizing,	145 =	25 ft. wide, at	87c.	126 15	
Gravel Sidewalks,	145 =	12 do	$1.00	145 00	
Gutters,	290	do	25c.	72 50	
Curb Stone,	290	do	25c.	72 50	
					416 15

Queen Street (from Duke Street).

Macadamizing,	1,030 =	36 ft. wide, at	$1.45	1,493 50	
Gravel Sidewalks,	1,030 =	24 do	$1.00	1,030 00	
Gutters,	2,060	do	25c.	515 00	
Curb Stones,	2,060	do	25c.	515 00	
					3,553 50

Bridge Street.

Macadamizing,	620 =	36 ft. wide, at	$1.45	899 00	
Gravel Sidewalks,	620 =	24 do	$1.00	620 00	
Gutters,	1,240	do	25c.	310 00	
Curb Stones,	1,240	do	25c.	310 00	
					2,139 00

Carried forward..... $651,193 67

Brought forward..... $651,193 67

Sherwood Street.

Macadamizing,	698 = 46 ft. wide, at		$1.70	1,186 60	
Gravel Sidewalks,	698 = 24	do	$1.00	698 00	
Gutters,	1,396	do	25c.	349 00	
Curb Stones,	1,396	do	25c.	349 00	
					2,582 60

Lloyd Street.

Macadamizing,	1,213 = 26 ft. wide, at		90c.	1,091 70	
Gravel Sidewalks,	1,213 = 24	do	$1.00	1,213 00	
Gutters,	2,426	do	25c.	606 50	
Curb Stones,	2,426	do	25c.	606 50	
					3,517 70
Total.....					$657,293 97

SUMMARY OF COST.

Drainage	$485,556 55
Water Works	380,652 00
Macadamization	657,293 97
	$1,523,502 52
Contingencies and Superintendence, at 10 per cent.	152,350 25
Total	$1,675,852 77

The interest on this sum, at six per cent. per annum, would be $100,551 12, and, taking the present value of rateable property within the City Limits as equal to $303,942, an assessment to meet that yearly demand for interest would be equal to 33¼ cents in the dollar, or six and eight pence in the pound. It would not be necessary however, to provide for this large outlay at once; the work should be undertaken by instalments, and completed within a period of four years. The advantages of this mode of proceeding will be that the expenditure for those necessary works should be equalized on the progressive value of property, and the necessity of adding materially to the public burthen of the present inhabitants avoided. A consideration of the financial arrangements by which the great objects of this measure are to be attained, properly belongs to the City Council, and it is beyond all question that their action will be sustained by the rate-payers, in the effort to secure for the city full value in permanent and useful works of public improvement, for the outlay demanded. Every day's experience tends to prove the value of united action, operating by means of a known and comprehensive system in the accomplishment of works of such magnitude, as the wants of this city demand, because eventually, such a mode of procedure is far less expensive than the desultory, costly, inefficient and unsatisfactory measures hitherto employed for that purpose. The city is largely indebted for works of drainage, macadamization, and general improvements, and its streets are swamps, its sidewalks in the last stage of dilapidation, and its few drains stench traps or cess pools, where the sewage matter is carefully collected for the ex-

clusive benefit of the citizens. It would be no exaggeration to declare that the proposed outlay for this city during the present year, is utterly wasted, and of no use to the public interests.

As it is not advisable to commence all these works simultaneously, such portions as form the base of the system, should be selected as the first to be undertaken, and the construction of the main drain, main thoroughfare, and the Reservoir for the Water Works should be sufficient for the first year. The Estimates for those works would be as follows:

Main drain from Hugh Street to Ottawa River, as shewn in detailed estimates. Page 44.....	$132,985 00
Cost of improving main thoroughfares Page 59.....	106,260 00
Macadamizing King Street. Page 65.....	29,758 60
Cost of constructing Reservoir for Water Works. Pages 55, 56.....	161,173 00
	$130,176 60
Contingencies and Superintendence, at 10 per cent.....	43,017 66
Total.....	$173,194 26

The works undertaken for the second year, should be Sussex Street, Metcalf Street, York Street, Clarence, Murray and Patrick Streets, with the remainder of the Water Works. The Estimates would be as follows:

Cost of draining	Sussex Street.	Page 54.....	$5,314 55
do	Metcalf	Page 44.....	8,417 50
do	York	Page 47.....	5,995 00
do	Clarence	Page 46.....	6,003 25
do	Murray	Page 46.....	6,003 25
do	Patrick Street,	"	6,003 25
Cost of draining.....			$38,736 80

Cost of Macadamizing Sussex Street.		Page 60.....	$11,489 10
do	Metcalf	"	18,473 75
do	York	Page 63.....	13,298 00
do	Clarence	"	7,749 65
do	Murray	Page 62.....	7,858 80
do	St. Patrick	"	7,531 35
Total.....			$66,400 65

Water Works.

Cost of Conduit, Wheel-house, Rising Main, Service, and Distribution. Page 56	$219,479 00
Drainage	38,736 80
	$324,615 45
Contingencies, Superintendence, &c., at 10 per cent.....	32,461 64
Total	$357,077 09

The outlay for the third year should embrace the leading thoroughfares as the Richmond Road, the Gloucester Road, Cumberland, Dalhousie, George, Church, St. Andrew, Bolton, Cathcart, Boteler, Carleton, Redpath, McTaggart and Baird Streets.

Draining Richmond Road.		Page 51.....	$10,845 25
do	Cumberland St.	Page 47.....	4,574 50
do	Carleton	"	3,185 00
do	Dalhousie	Page 52.....	5,203 50
do	George	Page 47.....	4,647 50
do	Church	Page 46.....	6,017 00
do	St. Andrew's	Page 46.....	6 014 25
do	Bolton	Page 45.....	6,600 00
do	Cathcart	"	2,577 75
Carried forward.....			$49,664 75

	Brought forward		$19 664 75
Draining Bolton Street.	Page 45		4,431 00
do Redpath	"		2 339 75
do McTaggart	"		3 640 00
do Baird	"		1,394 75
Total			$61 470 25

Cost of Macadamizing Richmond Road..		Page 70.....	$12,013 20
do	Cumberland St.	Page 65.....	11,053 10
do	Carleton "	"	6,552 00
do	Dalhousie "	Page 64.....	14,524 20
do	George "	Page 63.....	10 089 30
do	St. Andrew's "	Page 62.....	7,654 50
do	Church "	"	7,658 00
do	Bolton "	Page 61.....	8,400 00
do	Cathcart "	"	9,496 80
do	Bolton "	"	9,115 20
do	Redpath "	Page 60.....	4,813 20
do	McTaggart "	Page 61.....	6,656 00
do	Baird "	Page 60.....	4,108 30
do	Gloucester Road,	Page 64.....	5,477 50
Total			$117,391 30

Drainage	$61,470 25
Macadamization	117,391 30
Total	$178 861 55
Superintendence and Contingencies, 10 per cent	17,886 15
Cost of third year's operations	$196 747 70

The balance to be expended for the fourth year will be large, and may probably be divided over 2 or 3 years. As the first three year's operations are directed to the completion of such works as are most needful, it will not much affect the general interest, if the balance, amounting to $648.833 72 of the whole estimate is not laid out for a much longer period, all the streets upon which this sum should be expended are, with the exception of Sparks Street, comparatively of little importance, not extensively built upon, and naturally occupying such positions as would render the immediate application of measures of improvement unnecessary. One of the chief considerations which have influenced my decision in the appropriation of these sums, arises from the absolute necessity of applying prompt remedies to the evils under which the low lying portions of the city are suffering, as well as to prevent the wasteful, useless and outrageous expenditure of public money on mischeivous and worthless works.

Accompanying this Report is the large Plan of the city, fourteen sheets of longitudinal sections of streets, two sheets of designs, and general plan. I would respectfully recommend to the Committee, that all care be taken of the large Plan—that it may not be open to every person, as such a course would infallibly insure its destruction—and that tracings be made of it for general use, as soon as possible. As it shews the actual position and description of every street, house and structure in the city up to November 1860, its value as a record is abundantly apparent, and the Council will find it necessary to have the location of every new house or other structure hereafter to be erected, accurately placed in its true position on that plan, as well a matter of Municipal economy as necessary for the execution of such works as may subsequently be undertaken by the city. The table of grades appended, are referred to the sill of the Guard Lock on the Rideau Canal.

In concluding this Report, I would not be doing my duty to my fellow citizens if I did not strongly point out to the Council, the necessity for taking action thereon with the least possible delay. The health, prosperity and future growth of this city must depend in a great measure on the energy, ability and prudence of its leading men; and this is always measured by the extent of public improvements and the facilities for cleanliness and comfort which prudent measures of administration secures. It is not necessary to look to other cities where extravagent speculation in public improvements

has been the rule, but the actual want of those social and commercial facilities afforded by good roads, drainage and water supply is so apparent here, that it does not require any far fetched theory to decide on the extent of improvement, or the amount of population it is meant to accommodate. The circumstances of the city requires this outlay; every month it is delayed adds to its future expensiveness, as well as prevents the property of the citizens from attaining its full value.

All which is nevertheless respectfully submitted.

GEORGE H. PERRY, C. E.

LIST OF STREETS AND GRADES.

STREET.	FROM	Height above lower sill of Guard Lock on Rideau Canal.	TO	Height above lower sill of Guard Lock on Rideau Canal	Length.	Inclination.
Metcalf	Sussex	68.03	Dalhousie	68.18	1020	Horizontal.
	Dalhousie	68.18	Bridge	59.85	999	0.73 in 100 feet.
Dalhousie	Rideau	82.57	York	81.76	645	0.09 do
	York	81.76	Clarence	72.39	355	2.64 do
	Clarence	72.39	St. Patrick's	69.61	500	0.63 do
	St. Patrick's	69.61	Cathcart	64.45	1100	0.43 do
	Cathcart	64.45	McTaggart	67.76	845	0.09 do
	McTaggart	67.76	Redpath	69.56	313	0.57 do
	Redpath	69.56	McKay	65.31	500	0.82 do
Clarence	Sussex	88.19	Dalhousie	72.39	1100	1.43 do
	Dalhousie	72.39	King	69.10	1100	0.29 do
Parry	King Street	69.10	Gloucester	71.55	900	0.27 do
	Gloucester	71.55	Augustin	79.56	1100	0.72 do
Wellington	George	82.50	Bay	97.20	425	3.45 do
	Bay	97.20	Sally	107.37	403	2.52 do
	Sally	107.37	Hugh	113.37	564	1.06 do
	Hugh	113.37	Bank	114.70	632	0.21 do

No. 1. No. 5. 08

	Bank	114.70	O'Connor	133.82	526	3.63 in 100 feet.
	O'Connor	133.82	Metcalf	139.25	529	1.02 do
	Metcalf	139.25	Elgin	139.00	521	0.05 do
	Elgin	139.00	Proposed Bridge	117.84	336	6.30 do
	Bridge	117.8	Bridge	117.84	361	Horizontal.
Rideau	Bridge	117.84	Sussex	96.38	389	5.54 in 100 feet.
	Sussex	96.3	Mosgrove	85.89	417	2.48 do
	Mosgrove	85.89	Ottawa	81.51	1000	0.43 do
	Ottawa	81.51	King	70.15	850	1.38 do
	King	70.15	Nelson	80.60	600	1.74 do
	Nelson	80.60	Gloucester	88.27	400	1.91 do
	Gloucester	88.2	Chapel	96.00	400	1.94 do
	Chapel	96.0	Augusta	101.50	500	1.10 do
	Augusta	101.50	Coburg	105.80	300	1.43 do
	Coburg	105.80	Charlotte	110.60	500	0.96 do
	Charlotte	110.60	Wurtemburg	111.71	355	0.48 do
	Wurtemburg	111.71	Bridge	74.00	905	4.16 do
Sparks	Bridge over Canal	117.8	Elgin	127.00	435	2.33 do
	Elgin	127.00	Metcalf	131.87	459	1.06 do
	Metcalf	131.87		130.7	500	0.88 do
		130.72	Bank	112.22	900	0.94 do
	Bank	112.22	Bay	113.92	1720	0.09 do
	Bay	113.92	George	79.56	745	4.61 do
Sally	Victoria	96.05	Wellington	107.37	400	2.84 do
	Wellington	107.37	Queen	119.00	700	1.76 do
	Queen	119.00	Maria	117.20	700	0.25 do

LIST OF STREETS AND GRADES.—*Continued.*

STREET.	FROM	Height above lower sill of Guard Lock on Rideau Canal.	TO	Height above lower sill of Guard Lock on Rideau Canal.	Length.	Inclination.
O'Connor	Wellington	133.82	Queen	111.88	450	4.88 in 100 feet.
	Queen	111.88	Maria	112.40	877	0.06 do
Metcalf	Wellington	139.25	Sparks	131.87	290	2.54 do
	Sparks	131.87	Queen	122.50	205	4.56 do
	Queen	122.50	Maria	107.40	842	1.79 do
Elgin	Wellington	139.00	Sparks	127.00	242	4.95 do
	Sparks	127.00	Queen	114.00	258	3.48 do
	Queen	118.00	Maria	103.10	900	1.65 do
Queen	Sally	119.00	O'Connor	111.80	1800	0.45 do
	O'Connor	111.80	Metcalf	122 50	565	1.89 do
	Metcalf	122.50	Elgin	118.00	790	0.57 do
Maria	Concession B and C	141.34	Percy	120.00	400	5.33 do
	Percy	120.00	O'Connor	112.40	2800	0.27 do
	O'Connor	112.40	Canal Bank	96.78	2048	0 76 do
George	Wellington	82.50	Sparks	79.56	400	0.70 do
	Sparks	79.56	Queen and Duke	49.57	1012	2.96 do

Duke	Duke and Queen	49.57	Bridge	53.57	930	0.45 in 100 feet.	
York	Sussex	86.99	Dalhousie	81.76	1100	0.47	do
	Dalhousie	81.76	Cumberland	72.56	620	1.48	do
	Cumberland	72.56	King	69.40	406	0.74	do
Cumberland	Rideau	77.25	Clarence	70.69	940	0.67	do
	Clarence	70.69	St. Patrick	68.67	610	0.33	do
	St. Patrick	68.67	Cathcart	65.64	1050	0.27	do
Carleton	Cathcart	65.64	McTaggart	66.25	820	0.07	do
	McTaggart	66.25	Redpath	70.60	645	0.67	do
	Redpath	70.60	Baird	63.49	450	2.60	do
St. Paul	Canal Bank	89.63	Mosgrove	96.13	336	1.93	do
	Mosgrove	96.13	Nicholas	86.72	764	1.23	do
Besserer	Nicholas	86.72	Ottawa	85.68	450	0.23	do
	Ottawa	85.68	Cumberland	85.87	500	0.06	do
	Cumberland	85.87	King	93.00	570	1.18	do
	King	93.00	Gloucester	97.24	941	0.48	do
	Gloucester	97.24	End of Street	111.57	2769	0.50	do
Daly Street	Bank over Rideau	107.68	King	107.68	3456	Horizontal	
	King	107.68	Cumberland	94.40	444	2.95 in 100 feet.	
	Cumberland	94.40	Ottawa	94.23	400	0.04	do
	Ottawa	94.23	Nicholas	92.14	516	0.49	do
Hugh	Rear	88.42	Wellington	113.37	600	4.23	do
	Wellington	113.37	Sparks	112.80	300	0.19	do
	Sparks	121.80	Queen	116.50	250	1.48	do

No. 14. | No. 12. | 10. |

LIST OF STREETS AND GRADES.—*Continued.*

STREET.	FROM	Height above lower sill of Guard Lock on Rideau Canal.	TO	Height above lower sill of Guard Lock on Rideau Canal.	Length.	Inclination.
Bank	City Limits	113.00	Centre	114.71	1373	0.12 in 100 feet.
	Centre Street	114.71	Maria	113.45	300	0.10 do
	Maria	113.45	Queen	113.80	878	0.04 do
	Queen	113.80	Sparks	112.22	322	0.18 do
	Sparks	112.22	Wellington	114.70	300	0.82 do
	Wellington	114.70	Victoria	114.00	294	0.23 do
Victoria	Bank	114.00	Hill	107.30	360	1.86 do
	Hill	107.30	Hugh	96.13	305	3.66 do
	Hugh	96.13	Sally	96.05	600	0.01 do
King St. W. of Rideau	Rideau	70.15	Daly	107.68	677	5.54 do
	Daly	107.68	Theodore	106.32	700	0.19 do
George	Sussex	91.80	Dalhousie	82.19	1104	0.86 do
	Dalhousie	82.19	Cumberland	75.00	600	1.19 do
Theodore	Nicholas	106.32	Bank over Rideau	106.32	4326	Horizontal.
Nicholas	Rideau	83.85	Theodore	106.32	1430	1.57 in 100 feet.

No. 10. — No. 3.

Gloucester Road	Nicholas	106.32	Point on road	108.36	1374	0.14 in 100 feet.	No. 3.
	Point on road	108.36	City Limits	95.52	1541	0.83 do	
St. Andrew's	Sussex	84.24	Foot of Incline	69.19	400	3.76 do	No. 7.
	Incline	69.1	Dalhousie	66.86	700	0.33 do	
	Dalhousie	66.86	King	66.86	1088	Horizontal.	
Park	King	66.86	Rideau River	66.86	2000	do	
Church	Sussex	87.06	Dalhousie	68.32	1185	1.58 in 100 feet.	
	Dalhousie	68.32	King	67.23	1100	0.01 do	
King	McTaggart	65.67	Rideau	70.15	3531	0.12 do	
Ottawa	Theodore	106.20	Stewart	102.78	600	0.57 do	No. 8.
	Stewart	102.78	Rideau	80.51	780	2.85 do	
Wilbrod	Ottawa	103.92	Cumberland	104.44	536	0.08 do	
	Cumberland	104.44	King	106.60	464	0.31 do	
	King	106.60	End	114.46	3200	0.24 do	
Stewart	Rideau River	114.26	King	107.20	3200	0.25 do	
	King	107.2	Ottawa	102.78	1083	0.88 do	
Bay	Wellington	97.26	Sparks	113.92	276	6.05 do	No. 6.
	Sparks	113.92		122.74	500	1.76 do	
	Point on road	122.74	Maria	113.60	600	0.79 do	
Richmond Road	Broad Street	74.72	Albert	81.21	1300	0.49 do	
	Broad	74.72	Fence at Malloch's	70.54	832	0.50 do	

LIST OF STREETS AND GRADES.—*Continued.*

STREET.	FROM	Height above lower sill of Guard Lock on Rideau Canal.	TO	Height above lower sill of Guard Lock on Rideau Canal.	Length.	Inclination.
George	Pooley's Bridge	70.26	Hill Street	78.97	1000	0.87 in 100 feet.
Victoria Terrace	Hill	78.97	Broad	74.72	1330	0.32 do
Nelson	Rideau	80.50	Besserer	95 11	220	6.64 do
	Besserer	95.11	Daly	107.6	300	4.22 do
	Daly	107.68	Stewart	108.45	2 0	0.28 do
	Stewart	108.45	Wilbrod	107.86	340	0.18 do
	Wilbrod	107.83	Theodore	106.32	245	0.49 do
Gloucester	Rideau	88.27	Besserer	97.24	275	3.26 do
	Besserer	97.24	Daly	107.68	400	2.60 do
	Daly	107.68	Stewart	109.45	200	0.88 do
	Stewart	109.45	Wilbrod	109.03	300	0.14 do
	Wilbrod	109.03	Theodore	106.32	200	1.35 do
Lloyd	Victoria Terrace	77.67	Ottawa	51.92	500	5.15 do
	Ottawa	51.92	Queen	54.88	160	1.85 do
	Queen	54.88	Duke	52.00	552	0.52 do
Augusta	Rideau	105.01	Besserer	101.74	280	1.16 do

1 4. 1

Augusta	Besserer	101.74	Daly	107.68	240	2.47 in	100 feet.
	Daly	107.68	Stewart	111.06	280	1.20	do
	Stewart	111.06	Wilbrod	111.14	290		
	Wilbrod	111.14	Theodore	106.32	353	1.36	do
Coburg	Theodore	106.32	Wilbrod	111.91	280	2.00	do
	Wilbrod	111.91	Stewart	111.98	240		
	Stewart	111.98	Daly	107.68	280	1.53	do
	Daly	107.68	Besserer	104.24	280	1.22	do
	Besserer	104.24	Rideau	106.20	297	0.66	do
Queen	Duke	49.57	Lloyd	54.88	250	2.12	do
	Lloyd	54.88	Bridge	57.90	150	2.13	do
	Bridge	57.90	Sherwood	59.00	280	0.42	do
	Sherwood	59.00	Broad	57.60	370	0.37	do
	Broad	57.60	Bay	57.60	528		
Wurtemburg	Rideau	111.71	End of Street	106.30	1053	0.51	do
	End of Street	106.30	Ottawa	67.00	650	6.00	do
Sussex	Rideau	96.38	York	86.99	700	1.34	do
	York	86.99	St. Patrick	89.61	850	0.30	do
	St. Patrick	89.61	Near St. Andrew's	85.68	450	0.87	do
	Near St. Andrew's	85.68	Metcalf and Bolton	68.32	937	1.85	do
St. Patrick	Sussex	89.61	Foot of Hill	69.43	800	2.24	do
	Foot of Hill	69.42	King	68.10	1490	0.09	do
Ottawa	King	68.10	Coburg	69.00	2318	0.03	do
	Coburg	69.00	Rideau River	67.00	492	0.40	do

No. 9. — No. 13.

LIST OF STREETS AND GRADES.—*Continued.*

STREET.	FROM	Height above lower sill of Guard Lock on Rideau Canal.	TO	Height above lower sill of Guard Lock on Rideau Canal.	Length.	Inclination.
Cathcart	Sussex	74.00	Dalhousie	64.45	1200	0.79 in 100 feet.
	Dalhousie	64.45	King	66.39	1100	0.18 do
Gloucester	Rideau	74.43	Foot of Hill	75.61	300	4.22 do
	Foot of Hill	75.61	St. Patrick	68.08	1232	0.58 do

No. 13.

OTTAWA:

PRINTED AT THE "TRIBUNE" BOOK AND JOB PRINTING ESTABLISHMENT,

Corner of York and Sussex Streets.