

THE STREETS OF NEW YORK CITY

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Colorado

NEW YORK CITY has 2677 miles² of streets, comprised within an area of less than 327 square miles.³ The value of this land with its improvements is \$9,469,000,000,⁴ a value nearly as great as one-half of the 512,660,306 acres⁵ of farm land and property west of the Mississippi River, or one-fourth as great as the entire 878,798,000 acres of farm land in the United States. If these streets were placed end to end they would extend nearly 50 feet wide from New York to San Francisco. Throughout this distance there would be on each sidewalk a constant line⁶ of people every 6 feet apart, and at the busiest portions of this street during the ten rush hours of the day 1400 vehicles⁷ would pass a given point each hour. When it is considered that about one-twelfth of this tiny plot of land (New York) is given over to the streets, it becomes evident that the street problem is of the highest social, economic and political significance.

Here persons of all ages and all tastes go to meet one another, to talk over the affairs of the day, to be entertained, to eat, to drink, to inspect shop windows, to do marketing, to buy and sell merchandise, and to perform a thousand offices which the exigencies of city life make profitable, healthful, or agreeable.⁸

If the main arteries of traffic are misplaced or are too narrow thousands of hours are lost each day. If the residential streets are too wide and which should have been used for buildings, parks or playgrounds is unnecessarily sacrificed and the taxpayers are compelled to pay for paving and maintaining an unnecessary surface of the streets. This cost of paving, maintaining and cleaning the streets forms one of the heaviest burdens of taxation and so automatically creates high rents.

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² Reports from the different departments having charge of the streets.

³ *Report of the Commissioners of Taxes and Assessments*, 1912, p. 25.

⁴ *Report of the Commissioners of Taxes and Assessments*, 1912, pp. 11 and 12. This amount includes the real estate taxable, \$7,861,898,890; and exempt city, state and national, \$1,607,105,809; total, \$9,469,004,699.

⁵ *Bulletin Thirteenth Census*, 1910, abstracted, "Farms and Farm Property by States," pp. 1-7.

⁶ From estimated population given by board of health.

⁷ Dr. Clifford Richardson, *Popular Science Monthly*, August, 1912.

⁸ Quotation from Dr. Soper in Beard's *American City Government*, p. 242.

The governmental and political significance of the problem lies in the necessity for determining through charter provisions the interrelationship of the several departments dealing with the streets: The borough president, the department of highways, the street cleaning department, the board of health, and the department of water supply, gas and electricity, and finally the local boards, in the various districts. The charter must define which of these bodies must lay out, pave and keep up the streets. It must also indicate who shall bear the initial cost and the up-keep, and who shall determine upon the amount of money to be spent for each part of the work. It should also provide for a body empowered to see that the work is properly done and that the appropriations are spent to advantage. In all of these questions the public has a vital interest. It must determine which offices shall be merely administrative and which political and determine whether or not political or business methods shall prevail. The problem is, therefore, complex in the extreme and can only be solved through trial and experiment.

According to the charter of Greater New York, the city is divided into five boroughs, Manhattan, Bronx, Brooklyn, Queens, and Richmond. Each of these boroughs has a president who has control over the streets in his borough, who has power to appoint and dismiss a commissioner of public works, who may discharge all of the administrative powers of the president of the borough relating to streets, sewers, public buildings, and supplies. The charter provides for no separate department of public works, but the administrative officers under the jurisdiction of the commissioner are commonly referred to as the department of public works. This department is divided into several bureaus, the most important of which is the bureau of highways. The chief engineer who heads this bureau, is appointed by the borough president, and the bureau is provided with the necessary engineering, inspecting, and clerical forces. This bureau has charge of existing pavements, the construction of new ones and the removal of obstructions and encumbrances from off the streets.

The city is also divided for local purposes into twenty-five districts in each of which is a body, composed of the aldermen of the district and the borough president acting as president. Every resolution that this board passes must receive the approval of the borough president. Among the powers of these boards are those of initiating proceedings to open, close, widen, extend, and pave the streets in their districts.

The borough of Manhattan presents greater difficulties in regard to the streets than any of the other boroughs, because of its immense population—an average density of 182.10, and a maximum density of 1103.10 to the acre⁹—the high value of land, the great number of self propelled vehicles,

⁹ *Report Department of Street Cleaning*, 1911, p. 6.

both for pleasure and business, and the vast volume of traffic in the business districts. The difficulties involved in caring for the streets of Manhattan are best seen in the work accomplished in the last three years.

In this borough are 460 miles of streets, all of which are paved except about 17 miles in the northern part of the island, in the section built up since the opening of the subway.¹⁰

When the present administration came into power the complaints against the conditions of the streets were loud and numerous, particularly with regard to the sheet asphalt pavements. Not only was the surface of these pavements in bad condition, but the foundations were defective. There were more miles of this type of pavement than any other and as they formed the main thoroughfares of the city, the breaks, hollows, and uneven surfaces were painfully apparent. At the time of the construction of these pavements loads were much lighter and there were few if any self-propelled vehicles, consequently there was not the imperative need for extra firm foundations. The increased weight of the present day vehicle, however, and the greater loads that they carry have made stable foundations more necessary than formerly. The tendency of self-propelled vehicles to slip, causing a scraping action which scoops out the pavement under the drive wheel requires also a much more durable surface. This is especially so when chains are used.

One of the greatest difficulties that the present bureau of highways met with was the fact that the former administrations had kept no accurate statistics as to the age and condition of the streets. When this data was finally collected the results were astounding. It is a well established fact in engineering that good pavements are impossible without solid foundations. The statistics, however, revealed the fact that up to June, 1911, there were 190 miles of 30-foot roadway laid upon the existing old stone roads as foundations. Of this pavement ten miles were more than twenty years old and over 60 miles were over fifteen years old. When it is considered that the average life of a pavement in New York City is only about twelve years and in the very busy sections much less, the reasons for the bad condition of the streets becomes evident. For some unaccountable reason this faulty method of construction was continued even after the time when the different types of vehicles and the greater loads made sound foundations essential. In 1903, 30 miles of this pavement with poor foundations were laid in one year, and it was not until 1906 that the practice of laying sound concrete foundations became general throughout the borough.

Because of the flimsy construction and the old age of the pavements the cost of up-keep was enormous. It soon became evident that the

¹⁰ Special report for writer furnished by E. V. Frothingham, commissioner of public works gives most of the facts regarding Manhattan.

greater part of the pavement would have to be renewed. Up to 1910 the annual appropriation for paving the streets had been about \$1,000,000. During the first year of the new administration this sum could not be increased. But in 1911, thanks to the efforts of President McAneny, the sum was raised to \$1,400,000 and in 1912 it was again raised to \$3,500,000. As a result of this expenditure 50 miles of streets were laid in 1912. This mileage added to the other work done in the last three years amounts to a 190 miles, or nearly a quarter of the entire length of the pavement in the borough. The different types of pavement laid are as follows:

	<i>Miles</i>
Sheet asphalt.....	53
Granite.....	30
Wooden block.....	14
Asphalt block.....	12

The mileage of the different types of pavement at the beginning of 1910 and the beginning of 1912 are given below. They indicate quite clearly the changes in policy regarding the applicability of various materials for certain types of streets.

	<i>January 1, 1910</i> <i>Miles</i>	<i>January 1, 1912</i> <i>Miles</i>
Sheet asphalt.....	259	246
Granite and all other materials.....	117	113
Asphalt block.....	48	54
Wooden block.....	11	25
Macadam.....	5	5
Total.....	440	443

This table shows a decrease of 13 miles in sheet asphalt and 4 miles in stone pavements, and an increase of 14 miles of wooden block and 6 miles of asphalt block. E. V. Frothingham, the commissioner of public works, gives the following reasons for the changes:

The increase of the wooden block represents the opinion of the department that this material is well fitted to certain types of streets where for any reason it is highly desirable that there shall be little noise and also where the traffic is heavy and the grade is not over $1\frac{1}{2}$ per cent.

The experience of other cities with the wooden block would seem to confirm the statement made by Mr. Frothingham. Minneapolis has not only found the wooden block satisfactory for this type of street, but believes it is the best and cheapest material for nearly all of its streets. The success of the Australian hard wood block pavements in Sydney has been rather remarkable. Queen Street, which has an estimated daily traffic of 25,000 tons, was thus paved. The wooden blocks after eight years in the streets, showed a wear of only one-sixteenth of an inch and seemed in other respects to be nearly as good as when laid. The original

cost was only \$3.05 per square yard and the annual cost of maintenance was only 2 cents per square yard. Whether the wooden blocks will stand the immense traffic of Broadway or Fifth Avenue remains to be seen after thorough experiment.

Some little objection is raised against the wooden block because of its odor and stickiness in warm weather and also because of the difficulty of keeping it clean. As the blocks become worn dust collects in the broken fibers and is very hard to dislodge.

The increase in the amount of asphalt block used was against the judgment of the department. It was due to the fact that the present administration had inherited quite a few contracts from the former administration, and also that the new contracts in the upper end of the island were determined upon by the local boards upon the petition of the property owners. All of these contracts called for the use of asphalt block. As far as the department is itself concerned, it has almost entirely discontinued the use of this material with the exception of a few streets where the grade is great and where quiet is imperative.

Whether the local boards should have power to decide on the kind of pavement in a certain locality is one of those political questions on which people will continue to disagree. It seems reasonable to suppose, however, that the commissioner of public works would have much better data on which to base his determination than the local board, and so should be given the entire power to say what type of pavement should be laid.

The decrease in the mileage of the sheet asphalt, as shown by the above table, is because wooden and stone block have been laid in its place on streets where it had been laid by former administrations with little or no reference to the kind of traffic it was to bear.

Sheet asphalt seems to be an almost ideal pavement in the residential sections where traffic is light and quiet is desirable. One desirable feature about asphalt in such sections is that it is very clean in itself and is also easily cleaned. In crowded neighborhoods where the children must play on the streets this feature makes it highly desirable.

The slight loss of the amount of stone block is explained by the fact that sheet asphalt has been substituted for it in the residential sections.

It is needless to discuss all of the factors that enter into the determination of the kind of material to be used on any given street. Some of the things that must be taken into consideration, however, are the original cost, durability, ease of repair, ease of cleaning and freedom from slipperiness. Noiselessness, freedom from odor or stickiness, and slight radiation of heat are some of the more important factors to be considered in residential streets.

The present administration is making some very interesting experiments, testing the stability and cost of different types of pavement put under

the same traffic conditions. On Broadway, between fifty-ninth Street and Seventy-eighth Street, wooden blocks are laid to test in comparison with a strip of sheet asphalt laid on the same street between Seventy-eighth Street and Ninety-second Street. As these two strips of pavement have nearly identical traffic conditions a fair test of the relative value of the two materials can be obtained. On Second Avenue strips of many different materials of about two blocks each are being laid to test the value of different materials. These different types are: two different types of asphalt block, two different types of sheet asphalt, rock asphalt, rock asphalt block, twelve different types of wooden block, granite block, and Medina sand stone. Such a test will be of great value in determining upon the future types of pavements.

The pavements were so old and in such bad condition at the time the McAneny administration began its work that the expense of up-keep was enormous. The repaving work has been especially directed to these poor pavements with the result that at the present time the cost of maintenance has been considerably lessened.

There are two main classes of maintenance work. The maintenance and repair of the stone work is done by departmental labor. The repair work of the sheet asphalt and asphalt block, in so far as it is not under the guarantee of the contractors who laid it, is done by contract, after public advertisement. Nearly all of the wooden block pavements in the borough are of such recent construction as to be still under the guarantee of the contractors doing the work.

An experienced engineer having charge of the stone work has very much reduced the expenses of repair work. This has been accomplished by eliminating men who were not necessary and demanding a high grade of work from those employed. In former administrations the pay roll for stone work had often been very heavily padded. For instance, in 1909 the pay roll for this kind of work was in round figures \$480,000 and only 206,000 square yards were repaired. The total cost for that year, including material, was \$500,000. In 1912, by the efficient management of a competent engineer, the department repaired 325,000 square yards, or an increase of 119,000 square yards over the former year. The pay roll was only \$240,000, or a decrease of nearly 50 per cent. The total cost of this year, including the extra material needed for the 119,000 extra yards done, was only \$300,000. As there was an increase of nearly 60 per cent in the amount of work done and yet a decrease of nearly 50 per cent in the total cost the figures speak for themselves.

Much has been done to improve the work of repairing the sheet asphalt and the asphalt block pavements. The cost here can not be controlled in the same way as in the case of the stone pavements because the city seems to be in the hands of a few asphalt companies having a monopoly

and whose prices show every indication of a perfect understanding between themselves. The prices of these companies have arisen very rapidly as efforts have been made to better inspection and secure compliance with contract specifications. The prices during 1910 were very low for maintenance work, ranging from 82 cents per square yard to as low as 77 cents per yard. During 1911, the prices steadily increased, varying from 97 cents to \$1.12 per square yard, and in 1912 reached the maximum price of \$1.75 per square yard.

The amount of yardage and its cost for four different years will show in a rather interesting way some of the results attained by inspection and the consequent elimination of unnecessary yardage which had been formerly laid in the interest of the asphalt companies. This report will also show how the new pavement lessens the amount of repair work.

YEAR	SQUARE YARDS OF ROADWAY DONE	COST
1909	244,000	\$285,000
1910	345,000	409,000
1911	478,000	686,000
1912	363,000	575,000

As a result of all the different elements combined the total repair work done in 1912 was at the average cost of 13 cents per square yard for pavements under maintenance as compared to 17 cents per square yard in 1911.

It is evident from the rapidly increasing price of the repair work done by the asphalt companies that the city has been badly hampered in its work of repairing the streets. Appropriations have been secured for a city asphalt plant, plans have been drawn up and the contracts for construction have been awarded. If all goes well, the plant will be in operation before the close of the present year.

Experience has demonstrated that there is no economy in repairing the streets after they get in rather bad condition. It is much better and cheaper in the long run to repave entirely. Old worn out streets are not only a heavy source of expenditure to the highways department but also greatly increase the cost of keeping the streets clean. In fact the street cleaning department is so much dependent for its efficiency on the condition of the streets that some have advocated placing them both under one head. In the boroughs of Queens and Richmond the commissioner of public works has charge of both departments and thus is able to have these two departments work in harmony with each other.

The proper grade of materials used and the manner in which they are laid is one of the most essential elements in keeping the streets in good shape. The proper materials of course can only be determined by com-

paring different materials under the same conditions. The specifications for different kinds of material have been very carefully revised in New York to meet what are now considered the essential requirements. Every wooden block must have so many rings to the inch, as it has been found that the quick growth rots much faster than the slower growth. The specifications for the preparation of the creosoted wooden blocks are very strict regarding the amount of creosote to the cubic foot, the temperature of ignition and the percentage of volatility.

The granite blocks are now cut much smoother than formerly and the joints between them are consequently much smaller. Such pavements are well suited for automobiles and at the same time are much less noisy under steel-tired wagons with heavy loads. Canal Street and Hudson Street amply demonstrate the advantages of this type of block.

Most of the causes of failure in the sheet asphalt can be overcome by the proper kind of inspection. The greatest causes of failure are due to defective foundations, having the surface too soft, the leakage of illuminating gas, and patches where the streets have been torn up for water, gas or sewer connections. In the Borough of Richmond the bureau of highways itself replaces the pavement thus torn up and charges the expense up to the company doing the work. In this way it makes certain that the new patch is laid of the proper material, at the right time and in the proper manner.

One of the features of the present administration that has attracted general attention has been the removal of the sidewalk encroachments and the widening of the streets and sidewalks.

Prior to the present administration some work was begun on Fifth Avenue. In 1911 the campaign was fairly started beginning with some important crosstown streets—Forty-Second, Thirty-Fourth, and Twenty-Third Streets. During the past year the work has been continued with splendid results. The chief object to be accomplished was to get back for public use the space that had been appropriated by private individuals with, or without a revocable license from the city. In every case the property owner was forced to move the encroachments from the street at his own expense. In some instances the entire front of very costly buildings had to be taken off. In one case it will cost a big skyscraper \$25,000 to comply with the rules. At the present time the courts are deciding whether or not the Singer Building will have to change its front.

This work has made it possible to gain from $6\frac{1}{2}$ to $7\frac{1}{2}$ feet on each side of the street without in any way decreasing the sidewalk space. In other sections the sidewalks and the streets have both been widened. The widening of Fifth Avenue, Forty-Second Street, Twenty-Third Street, Fourteenth Street and Second Avenue has made possible, despite the fact that a double car line is operated upon them, abundant room for a

line of both standing and moving vehicles, on each side of the street between the car track and the curb. The amount of land thus returned to the city, without a cent of expense, is equal to 77,000 square yards, or a plot of land fourteen times as large as the sight of the old Equitable Building. The area thus restored to the city would equal a strip of land 13 miles long and 10 feet wide.

By a new rule adopted January 1, 1911, and enforced through the bureau of buildings, encroachments of any kind, with trifling exceptions, are forbidden. This rule is regarded as proper by all interested in the beauty and welfare of the city, and if lived up to will prevent the further development of congested conditions.

The removal of encroachments will be continued throughout the present year and although the streets affected have not been as yet fully determined upon, the progress will probably include Sixth Avenue, the Bowery, a portion of Seventh Avenue, and a considerable number of streets in the lower part of the city where the sidewalk congestion is great.

Another feature that has made the streets better and more sightly has been the removal of abandoned car tracks. In most instances where the city has had the power, these car tracks have been removed. There are still tracks which serve no practical purpose but because of the franchises the city is unable to touch them. A very conspicuous instance of the removal of tracks is found on Fulton Street, one of the most important crosstown streets. On this street for years a double line of car track, extending the full length of the street, had been an eyesore and source of danger. In connection with the repaving of this street the track was entirely removed and a fine stone pavement extending from sidewalk to sidewalk and from one river to the other makes this street both safe and good to look upon.

Other cities may well take a lesson from New York and refuse franchises for street car tracks unless there is every likelihood that they will be used to good purpose. A little forethought and good regulations regarding encroachments will not only save the city the use of all its street room but will also save property owners much trouble in the end.

The problems confronting the Borough of Queens are very different in their nature from those of Manhattan. This borough, which includes a number of fine summer resorts, is about 14 miles wide and 16 miles long. It has an area equal to about 40 per cent of the entire area of Greater New York, but has a population of only 322,191, stretched along the water front and the main thoroughfares. Large tracts in the center of the island are entirely undeveloped.¹¹

¹¹ From an address given before the road builders by G. Howland Leavitt, superintendent of highways, Borough of Queens, city of New York.

When Queens County was made part of New York City in 1898 the county had 450 miles of water-bound macadam roads. This roadway, because of insufficient provisions for maintenance and because of neglect, had fallen into bad condition. As a result the city found last year that it was necessary to repave a great portion of it.

The necessary appropriation presented some difficulties. The city assumes the responsibility of keeping in proper condition the streets that were once paved and paid for by assessment. Because of the urgent need of main thoroughfares connecting the different parts of the city, this work was finally authorized by the board of estimate and apportionment. Fifteen per cent of the expense was to be borne by the county and 85 per cent by the city.

The old roadways had good foundations and so it was determined to use them as far as possible. The nature of the traffic, about 75 per cent automobiles, the kind of construction then in place, the first cost and the cost of up-keep were some of the factors to be taken into consideration.

It appeared upon first view that a bitulithic carpet placed upon the old macadam road would be inexpensive and would meet all requirements. It had been found by experience, however, that because of the kind of traffic, a light flush coat of bitumen and stone would have to be put on the streets yearly at a cost of from 10 to 15 cents per square yard. This annual cost added to the first cost of the coating would equal about \$1.25 per yard for a five-year period and would exceed the cost of a bitulithic concrete on properly constructed foundations. It was decided to use the concrete. The low bids for the new work, averaging \$1.11 with a five year guarantee amply demonstrated the correctness of the position taken. By letting the work to different companies and in fifty separate contracts and by maintaining the proper force of engineers and inspectors to see that the work progressed, 102 miles of pavement were laid in a period of a little over four months. This work was done at a cost of \$1,887,820.

The Borough of Richmond has been making some real steps in the solution of its street and street cleaning work under the presidency of George Cromwell and his efficient commissioner of public works, Louis L. Tribus and J. T. Fetherston, the superintendent of street cleaning. This borough has been fortunate in having practically the same administrative heads of departments for the last ten years and so has been able to carry on well thought-out policies. The problems connected with this borough are by no means as complicated as those of Manhattan, but the present method of attacking them seems to be correct and applicable to much larger undertakings.¹²

¹² Report of Borough President of Richmond to board of estimate and apportionment, *Suggestions to the Board of Estimate and Apportionment by the President of the Borough of Richmond*, 1912.

Mr. Cromwell is making a successful attempt to introduce lump sum appropriations for the different departments in the borough instead of the highly segregated budget. In a letter to the board of estimate and apportionment, he summarizes his plans as follows:

1. Lump sum departmental or office appropriations shall be authorized when founded upon unit cost data and work requirements.

2. In any department or office where such cost data are available, several salary grades for the same class of work shall be established by the board of estimate and apportionment, so that the head of a department or office may increase or decrease wages within specified limits, basing such action upon predetermined standards of work and efficiency records.

3. Each head of a department or office in which fundamental cost data are available shall have direct responsibility in the expenditure of appropriations, the result to be checked by some independent authority such as the mayor, acting through the commissioners of account or the comptroller.¹³

Such a system would seem to be much more conducive to efficiency than the old segregated budget system. Each head of a department would in this way be able to conduct his department as a business enterprise. He could control his men, rewarding those who did good work and reducing the pay of those whose work was not up to the standard. Such a system, if carefully worked out, gives a scientific basis for determining the amount of appropriation instead of the system, all too general at the present time, of basing the appropriation for the present year upon the amount given during the preceding year. With such a system however, it would be necessary to work out a plan whereby every factor of cost was taken into consideration.

A good way to get these different factors is to establish first a unit basis, for instance the square yard. Then determine all of the factors making up the total cost per square yard, labor, material, haulage, etc. The unit cost will be the sum of all these factors. By the monthly cost sheet, as made up in the office, the engineer can at once see the factor that is causing the excessive cost, and so can easily determine whether this extra cost is justified. For instance, supposing the labor per square yard is 20 per cent greater in section A than in section B. This cost is immediately noticed by the engineer and he can at once determine whether the difficulties in section A make this extra cost necessary. If they do not he can immediately find some way of bettering the conditions.

Supposing, on the other hand, that in section B the monthly report showed a lower figure of cost in the ton mile haul. The engineer could either better the conditions in A or else find out exactly what made the cost in that section greater.

¹³ *Suggestions to the Board of Estimate and Apportionment by the President of the Borough of Richmond, 1912, p. 3.*

This is a very inadequate statement of the plan but may show in a measure how such a plan would work. It is not different in principle from the cost price of large manufacturing concerns.

It is to be hoped that the plans suggested by Mr. Cromwell will be given a fair trial and that they will in a large measure make possible a more scientific budget.