

THE CITY RECORD.

OFFICIAL JOURNAL.

VOL. XIV.

NEW YORK, TUESDAY, SEPTEMBER 28, 1886.

NUMBER 4,062.



COMMISSIONERS OF ACCOUNTS.

Second Report on the Progress made in Repaving Fifth Avenue, under the Authority of Chapter 371, Laws of New York, 1885; and how far the Work already executed conforms to the Specifications of the Contract, dated October 28, 1885.

OFFICE OF THE COMMISSIONERS OF ACCOUNTS,
ROOM 115, STEWART BUILDING,
NEW YORK, August 4th, 1886.

To the Commissioners of Accounts:

Introductory.

GENTLEMEN—Since the submission of my preliminary report, dated 26th of May last, I have frequently visited and critically inspected the work of repaving Fifth avenue, while my assistant has been continuously engaged on the same duty during this period.

The same care which characterized our previous examinations as regards noting the kind and quality of the materials used, the character of the workmanship, and the adherence to, or departure from, the letter of the contract, has been continuously exercised since the rendition of that report.

Additional samples of sand and gravel procured

In addition to the specimens of the materials used in the work, laid before you with my preliminary report, other samples of the "sand" used in making concrete and for bedding the paving-blocks at different points on the work, as also of the "gravel" for jointing such blocks, have been procured from time to time.

And a number analyzed

A considerable number of such specimens have been submitted to Professor E. Waller, Ph. D., Professor of Analytical Chemistry at the School of Mines, Columbia College, for analysis. Abstracts of his several detailed reports are submitted herewith.

PROGRESS OF THE WORK.

Progress of work to July 24.

The progress of the work of repaving the Avenue up to *Saturday, July 24, 1886, at 6 P. M.*, was as follows:

Paving-blocks laid.

<i>Paving-blocks and bridge-stones laid and jointed—</i>	
From the south curb-line of Thirty-seventh street to a point 100 feet south of the south curb-line of Forty-eighth street, a distance of	2,797
And from the north curb-line of Ninetieth street to the north side of the crosswalk at Eighty-fifth street, a distance of ..	1,350
Total	4,147

Paving-blocks laid but jointing incomplete—

From a point 100 feet south of south curb-line of Forty-eighth street to a point 75 feet south of same line, a distance of ..

25

Concrete laid.

Concrete foundation laid—

From the south curb-line of Thirty-seventh street to 50 feet north of the north line of Fiftieth street, a distance of ...

3,411.5

And from the north crosswalk at Ninetieth street to a point 25 feet north of the north curb-line of Eighty-second street, a distance of

2,162.8

Total

5,574.3

Bridge-stones laid.

Bridge-stones laid—

Within the limits in which the paving-blocks have been laid and jointed, square feet

8,600

The whole representing, at contract prices, upwards of *one hundred thousand dollars earned*, provided every specification of the contract has been complied with.

CHANGES MADE IN THE PERSONNEL OF THE WORK AFTER JUNE 4.

Some improvements noted on and after June 4.

The several violations of important specifications of the contract described in my preliminary report, continued without any marked interruption until the 4th of June; on that day, for reasons which were not apparent at the moment, the average thickness of the concrete foundation being laid, suddenly rose simultaneously on both the upper and lower sections of the work, from four or four and one-half inches to plump six inches; and within the next twenty-two days additions were made to the personnel of the inspecting force, and various improvements in the quality of the material used and the character of the workmanship were introduced, which gave promise that an entirely new departure for the better was about to be inaugurated.

But work still radically defective.

After two months of close observation and watchful expectancy, any hope which may have been raised of seeing the superlative requirements of the statute fully complied with, has faded out under the clear light of daily experience.

Official history of this period given in Exhibit T.

A brief official history of this period of transition, from the open and deliberate disregard of the specifications and terms of the contract noted in my first report, to the more inconspicuous but no less serious violations of its provisions, which it will be my duty to describe in detail in this report, will be found in Exhibit T.

The following statement shows the number, names and the official designation of employes of the Department of Public Works now detailed on this work, the amount of their daily wages, and out of what appropriation such wages are paid. There has been no change in the personnel since June 26.

List of employes, Public Works, superintending the repaving.

Statement of Persons employed by the Department of Public Works directly engaged on the 26th of June, 1886, in the work of Overseeing the Execution of the Contract for Repaving Fifth Avenue.

EMPLOYES.	OFFICIAL DESIGNATION.	Pay, per Diem.	Amount Chargeable to this Work.	FROM WHAT APPROPRIATION PAID.
J. McI. Smith.....	City Surveyor....	(1) \$10 00	\$10 00	"Repaving Fifth Avenue."
Alston Culver....	Water Purveyor.	9 00	3 00	"Salaries—Department of Public Works."
R. H. Birmingham.	Inspector	4 00	4 00	"Repairs and Renewal of Pavements, etc."
T. Abbott	"	(1) 3 50	3 50	"Repaving Fifth Avenue."
C. Havican.....	"	(1) 3 50	3 50	"
A. S. Parker.....	"	2 00	2 00	"Repairs and Renewal of Pavements, etc."
I. A. Lawrence....	"	2 00	2 00	"Repairs and Renewal of Pavements, etc."
Total			\$28 00	
Authorized by chapter 371, Laws of 1885, and estimated for by Department of Public Works (1).....			\$17 00	

NOTE.—It is assumed that the Water Purveyor gives one-third of his time to this duty.

FIRST MONTHLY CERTIFICATE OF WORK DONE.

First certificate.

On the 10th of June, the "Engineer" gave the contractor his first monthly certificate² for a portion of the work completed up to that date, the concrete described and condemned in my preliminary report of May 26, 1886, being included in the 800 cubic yards of this material therein specified.

Certificates of two Inspectors.

This certificate was accompanied and supported by those of Inspectors Abbott and Havican³ to the effect that they had "personally examined and inspected the work * * * and that the same had been well done in full compliance with the contract," etc.

"70 PER CENT. PAYMENT," VOUCHER NO. 1.

Following these three certificates, there was prepared in the Department of Public Works "70 per cent. payment," Voucher No. 1, for the sum of \$16,517.20.⁴

After being duly certified by the Water Purveyor and the Commissioner of Public Works, the voucher was, on the 18th of June, forwarded to the Comptroller for audit and payment. This voucher was not paid.

Forwarded to Comptroller, June 18, for payment, but not paid.

Report 26th May did not treat of block-laying.

As stated in my previous report, block-laying did not commence on the Avenue until the 25th of May, and hence that report has no bearing whatever upon the merits or demerits of the 5,000 square yards of paving charged for in this voucher, except as regards the faulty character of the blocks entering into it, and that they had not been inspected as required by the contract.

For the same reason the report only refers to so much of the 800 cubic yards of concrete charged for as was laid up to May 26.

SECOND MONTHLY CERTIFICATE OF WORK DONE.

"Engineer's" second certificate, dated July 27.

On the 27th of July the "Engineer" gave the contractor his second certificate⁵ for a portion of the work completed to this date, less the quantity certified to on the 10th June.

Certificates of Inspectors Abbott and Havican.

This certificate was accompanied and supported by those of Inspectors Abbott and Havican, as in the case of the first certificate, to the effect that they had "personally examined and inspected the work * * * and that the same had been well done in full compliance with the contract," etc.⁶

70 PER CENT. PAYMENT, VOUCHER NO. 2.

Upon these three certificates there was prepared in the Department of Public Works "70 per cent. payment," Voucher No. 2, for the sum of \$33,924.80.⁷

Forwarded to Comptroller for payment August 3.

Certificates of work done not reliable.

After being duly certified by the Water Purveyor and by the Commissioner of Public Works, on the 3d instant this voucher and the accompanying certificates were forwarded to the Comptroller for audit and payment.

A careful examination of the facts to be presented in this report I am confident will prove that these certificates are quite as unreliable as those attached to Voucher No. 1.

Object of this report.

In view, therefore, of the preparation of this voucher, and of the large amount earned by the contractor up to the 24th of July, provided the work has been properly executed, it becomes my duty to describe in detail the progress of the work of repaving the Avenue since the date of my preliminary report, to critically review the methods of executing so much of the work as is claimed by the contractor to be completed, and to ascertain in the light of the observations made and the correlative investigations growing out of them, WHETHER HE HAS IN ALL THINGS STRICTLY COMPLIED WITH THE SPECIFICATIONS, TERMS AND CONDITIONS OF HIS CONTRACT.

I shall divide this portion of the report into two parts; treating—

FIRST—Of all that relates to block-laying and completing the pavement, being the natural sequence of the manner of laying the foundation as presented in my first report; and

SECOND—Of the changes which have been introduced in the manner of making and laying the concrete foundation since May 26, with a review of the present condition of the work.

PART FIRST—COMPLETING THE PAVEMENT.

When block-laying began on each section.

The work of laying the paving-blocks upon the foundation prepared for them commenced at the south line of Thirty-seventh street on Tuesday, May 25, at 1 P. M., and at the north line of Ninetieth street, on Monday, May 31, in the A. M.

In my first report I explained in some detail the manner in which the contractor had up to that time executed each step of his work, except the last one of bedding and jointing the granite blocks.

Regarding the sand bedding for these blocks, I showed in how far the specifications had been departed from, and that no arrangements whatever had been made to screen the material used for this purpose, to dry it in case it got wet, or to keep it dry until covered with the granite pavement.

I also copied at length a description of the quality and size of the paving-blocks which Mr. Baird voluntarily offered to supply, gave extracts from the specifications of his contract to show the quality and dimensions of the blocks he obligated himself to furnish and lay, and gave the sizes of a few blocks found in the piles on the sidewalks which did not conform to the requirements of the contract regarding dimensions, although that instrument prescribes that all blocks so piled shall be perfect in every particular.

¹ See Exhibit C. ² See Exhibit I 1. ³ See Exhibit I 2 and I 3. ⁴ See Exhibit I 4. ⁵ See Exhibit J 1. ⁶ See Exhibit J 2 and J 3. ⁷ See Exhibit J.

“Sand” and “Gravel” Defined.

As sand and gravel enter very largely into the work covered by this contract, and as if supplied of a quality conformable to its specifications, the cost of these materials required for the whole work will be nearly 40,000 dollars, it is important that before giving a description of the process of block-laying, in which both sand and gravel play so conspicuous a part, what is understood by these words should be clearly defined.

Accordingly, I have brought together in *Exhibit P* the definitions of the three well-known grades or sizes of divided mineral matter, viz.: sand, gravel and shingle, as given by the best technical authorities, such as Dana, Page, Brande and Van Cotta, and by the lexicographer Webster.

Fortunately we have in the text of the contract under consideration (paragraph 14, page 8) a clear description of the quality and size of the gravel to be used in jointing the blocks, in these words: “As the blocks are laid they shall be covered immediately with clean, hard, dry gravel, artificially dried, which shall be brushed into the joints until all the joints become filled therewith. This gravel shall be free from sand, and shall be such as has passed through a sieve of $\frac{3}{4}$ of an inch mesh and retained “by a $\frac{1}{4}$ -inch mesh.”

It is, therefore, evident that in the opinion of the Department of Public Works (under whose direction and authority this contract was prepared), no grains or fragments of mineral matter which will not pass a $\frac{1}{4}$ -inch mesh are to be considered as sand.

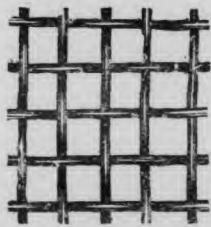
One limit for the size of sand grains is thus fixed; that is, they must pass a $\frac{1}{4}$ -inch mesh. But as all fragments which will so pass are not necessarily sand, some being classed as fine gravel, it becomes desirable at this point to be able to draw a clear line of distinction between fine gravel and coarse sand.

Van Cotta, in his Treatise on Lithology,¹ says: “In common sandstone the grains of sand are the size of mustard seed”; now as nature’s laws are unchangeable and as the limits of variation in the size of seeds of the same kind are extremely narrow, the mustard seed may very properly be taken as a standard for the maximum size of sand grains. I have had this seed tested for size, and find that all the grains will pass through a No. 8 mesh.²

Bearing in mind the description of gravel quoted from the contract, the definitions of sand and gravel given by the several authorities named in *Exhibit P*, and adopting mustard seed as the standard of size for coarse sand for the reasons adduced, I define:

1. *Sand*—As an accumulation or aggregation of loose or incoherent grains of silicious, calcareous, or argillaceous material derived from rocks or other mineral matter, in which the grains are not larger than a mustard seed; or referred to a fixed scale such as will pass through both a No. 4 and a No. 8 mesh.

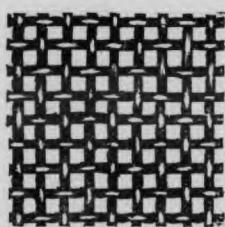
FIGURE 1.



4 Mesh.

No. 4, 4 meshes to the inch.

FIGURE 2.



8 Mesh.

No. 8, 8 meshes to the inch.

But as sand may and almost invariably is associated with more or less earthy or organic matter, the “clean, sharp sand” demanded by the contract may be defined as an aggregation of silicious grains, crystalline in structure and angular in shape, unmixed with either earthy or organic matter, and of a size which will pass through a No. 8 mesh.

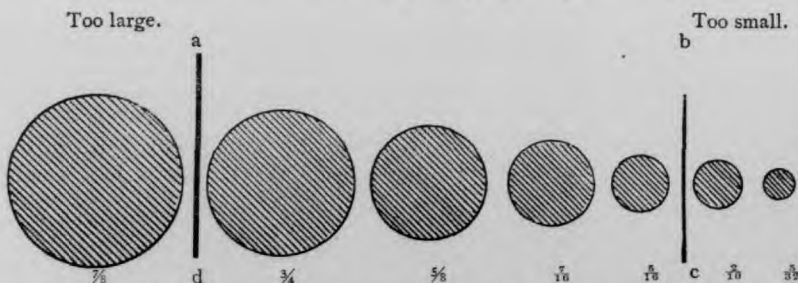
2. *Gravel*—As an aggregation of water-worn fragments of silicious, calcareous, or argillaceous material derived from rocks or other mineral matter, of a size from that of a small pea to that of a hen’s egg; or referred to a fixed scale, too large to pass through a No. 8 mesh.

3. *Shingle*—As loose, imperfectly rounded water-worn stones, or pebbles of any material derived from rocks, or other mineral matter, of a size from above that of a hen’s egg to that of the average “cobble” or “paving” stone.

To illustrate the relative size of the fragments of gravel to be used for jointing, as presented by the specifications, I give in *Figure 3* circles of various diameters from $\frac{5}{32}$ to $\frac{7}{8}$ of an inch. Only the four embraced within the limits a, b, c, d, comply with the specifications.

FIGURE 3.

Maximum and minimum limits of size for gravel prescribed by the contract.



I am now prepared to describe the last steps in the process of repaving as specified in detail in the contract.

Bedding for Paving-blocks.

Before describing the material actually used for bedding all blocks laid up to the date of this report, it is well to understand distinctly just what the contractor offered to supply, and what he afterwards obligated himself to furnish for this purpose.

The offer embodied in Matthew Baird’s “Proposal No. 2,”³ was that, on this concrete shall “be laid a bed of clean, sharp sand, perfectly free from “moisture and not less than 1½ inches thick.” Paragraph 13, page 7,⁴ of the contract provides that, “on this concrete foundation shall be “laid a bed of clean, sharp sand, perfectly free from moisture (made so by “artificial heat, if deemed necessary), not less than one and one-half inches “thick, to the depth necessary to bring the pavement to the proper grade “when thoroughly rammed.”

It will be observed that two distinct conditions are here imposed.

1. *The material must be “clean, sharp sand”; and*
2. *It must be “perfectly free from moisture.”*

Why these conditions are essential to the proper construction of the kind of pavement Mr. Baird has undertaken to lay, it is proper to explain at this point.

1. *Why clean, sharp sand, and not gravel, must be used.*

In my preliminary report I stated that the object of using dry sand was to afford a medium, the minute and dry particles of which would, as the blocks were rammed, quickly adjust themselves to every irregularity of their inferior surfaces; so that when by sufficient ramming the blocks were

finally settled in place, the sand became a solid, incompressible medium, through which any pressure on a block’s upper surface would be at once and uniformly transmitted to the monolithic foundation below; the under face of each block presenting the maximum number of bearing points for that purpose.

Conversely, the coarser the intervening material, the larger the stones it contained and the damper it was, the more difficult would it be for the material to adjust itself to the irregularities of the inferior surfaces of the blocks; the fewer would be the points of contact between them and the gravel and between the latter and the concrete; the greater would be the pressure on each point of contact and the greater the liability to unequal settlements.

2. *Why it must be “perfectly free from moisture.”*

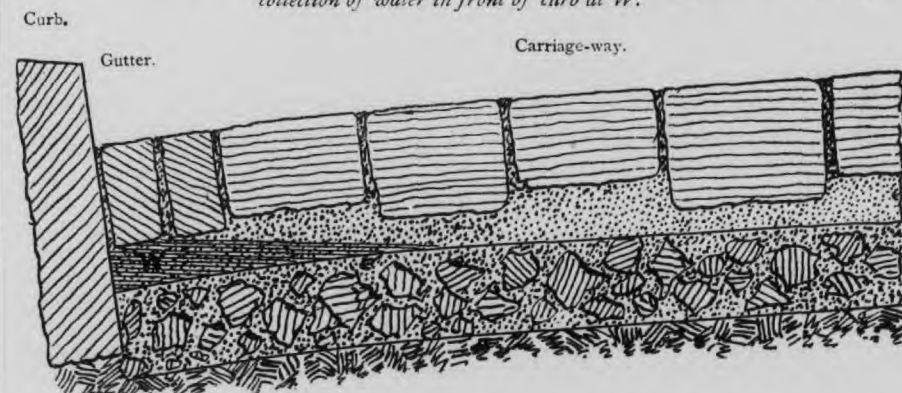
Since the monolithic concrete foundation, if properly laid, forms a covering for the roadbed impermeable to water, it becomes an absolute necessity in this kind of pavement, that not only shall there be no moisture under the blocks when laid, but that the joints between them shall be so treated as to be perfectly and permanently water-tight.

If this be not so, if any water penetrates to the surface of the concrete foundation, either before or after the blocks are set in place (no arrangements being made for its removal), under the immense pressure due to the expansive force of the freezing of this water in cold weather, the concrete beneath it must be ultimately fractured and cracked and the pavement above ruptured at the point where the water collects.

Just how this disastrous result will be accomplished is readily seen by an examination of *Figure 4*.

FIGURE 4.

Effect of frost illustrated. Transverse section taken through a “Course” of Blocks extending from curb to curb, in the Pavement as now being laid on the Fifth Avenue, showing the effect of damp Bedding and leaking Joints. Indicated by the collection of water in front of curb at W.



If the sand is wet when the blocks are set in place, if the open and uncemented joints are not covered to keep out the rain as the work of laying progresses, and lastly, if the work of cementing the joints is not properly executed; all of which indispensable conditions I am prepared to prove have been frequently violated up to this time, then as the bedding cannot free itself either by evaporation or drainage from the contained moisture, it is in a most favorable state to produce, by the action upon it of the winter’s frosts, the injurious effects just pointed out.

It is very evident, therefore, that if the provisions of the law of May 28, 1885,¹ which require “the best description of pavement, of the best material “and workmanship, to be laid in the most substantial manner and with the “best foundation,” are to be observed, the two conditions here set out must be strictly complied with, and that unless they are so complied with, the pavement now under construction will not and never can be the best.

No better evidence of the importance of having the sand dry can be offered, than the fact that the representative of the Department of Public Works, who drew this contract, expressly provided for the sand being “artificially dried, if deemed necessary.”

HOW THE SPECIFICATION RESPECTING THE BEDDING FOR PAVING-BLOCKS IS BEING FULFILLED.

1. *As regards the character of the material supplied.*

In my preliminary report it was stated that up to the 26th of May, there had been spread over the concrete a mixture of sand and coarse gravel, of which sample No. 38 was a fair specimen, except that it gave no correct idea of the size of the stones scattered over the foundation. Sample No. 30 was quoted as a fair specimen of these stones, the weight of which ran from four ounces to one and one-half pounds.

No attempt had been made up to that date to either screen this material or to remove the larger stones by raking.

Since that date, and up to the present writing, as fast as the concrete foundation has been laid, it has been covered to the depth of from one-half an inch to one and a half inches, with the same mixture described above.

Just prior to commencing the work of laying the blocks, more of this mixture has been wheeled on the roadbed at the point where laying is to begin and for a few yards in front of the last course of blocks, until its depth on the concrete is from 2½ to 3½ inches, and this depth is maintained as the pavers advance; except where, owing to a failure to excavate the roadbed to the prescribed depth, it has been necessary to reduce the thickness of the bottoming, or even to cut down the thickness of the concrete itself.²

For a short time, namely, from about the 5th to the 25th of June, spasmodic attempts were made to pick out the largest stones or to rake off such as showed on the surface of the roadbed after the sand and gravel had been spread over the concrete, but of late less care has been exercised in this particular, as will be seen by reading notes made since June 25, copied herewith.

In proof of these statements, I submit the following extracts from my note-books and those of my assistant. It will be borne in mind that the laying of the concrete foundation commenced at the south line of Thirty-seventh street on the 11th of May.

May 19. “The sand spread on the concrete to-day and that which has been “used heretofore for the same purpose is filled with small stones, many “of which are more than an inch in diameter.”

May 22. “Concrete bed covered with a mixture of coarse gravel and sand, “full of large stones.”

May 23. “Concrete has been laid from the south curb-line of Thirty-seventh “street to a point forty feet south of south curb-line of Fortieth street. “Gravel mixed with small stones has been laid on this concrete within “a few feet of its present terminus.”

May 27. “One of the laborers handling blocks informed me that none of “the small stones were removed from the gravel spread on the concrete, “previous to laying the blocks.”

May 31. “There is a considerable quantity of small stones in the gravel on “which the blocks are being laid to-day.”

June 8. “Noticeable points to-day. . . . The fact that the man who “was wheeling the mixture of sand and gravel in front of pavers, just “above Fortieth street, picked out the largest stones, a couple of cubic “feet of which lay near the main supply-pile of gravel in Fortieth “street.”

June 8. “Some of the largest stones have recently been picked out of the “gravel used for spreading on concrete and piled at southeast corner of “Eighty-eighth street and Fifth Avenue. Spasmodic efforts have been “made recently down-town to rake off the largest stones from the sur- “face of the gravel spread on concrete.”

¹ See EXHIBIT A, page 1.

² A noticeable case of this kind occurred on June 22, at the junction of Fifth Avenue and Forty-third street.

¹ “ROCKS CLASSIFIED AND DESCRIBED, a TREATISE ON Lithology,” 1866. See EXHIBIT P, page 2.

² See EXHIBIT R, second column.

³ See “THE CITY RECORD,” for November 13, 1885, page 2604.

⁴ See EXHIBIT B, page 7.

June 12. "Forty-first to Forty-second street. Found largest surface stones "raked off the concrete bed and left in little piles, a small pile of such stones in front of R. Graves & Co.'s."

June 15. "At crossing of Fortieth street. Laying blocks on the wet sand "and gravel, bed full of stones of from four to ten ounces in weight, as "heretofore."

June 18. "Found two men with shovels digging out large stones from "gravel spread on concrete, and at same time taking out large stones "from the concrete-bed and depositing them on the southwest corner "of Fifth avenue and Forty-second street."

June 19. "Eighty-seventh to Eighty-sixth street. Concrete all laid and "covered with from 1/2 to 1 inch of gravel and sand, and plenty of "small stones of from 4 to 12 ounces, visible all over this part of the "avenue." Sand mostly washed off.

"Forty-third to Forty-fourth street. Sand and gravel covering as "usual, lots of small stones all over surface, saw no one removing "them."

"One man wheeling gravel on to concrete bed, one man spread- "ing it, and one man removing the large stones from Forty-second to "Forty-third street."

July 1. "Forty-fifth to Forty-sixth street. Concrete covered, with mixture "of sand and gravel as heretofore, full of small stones."

July 15. "Forty-seventh to Forty-ninth street. From one-half to one inch "deep of the usual mixture of sand and gravel on the concrete bed. "The whole distance strewn thick with small stones, of from three to "sixteen ounces in weight. Saw one stone six inches long weighing "two pounds."

After the very explicit statement set out in this contract as to what the Department of Public Works understands by gravel, and the definition of sand, I have compiled from the descriptions of this and similar kinds of mineral matter, as given by four of the standard authors on Lithology and cognate subjects, it is simply preposterous for the contractor to claim that the material used as a bottoming for the paving-blocks, largely composed as it is of gravel, and containing stones, many of which would properly come under the designation of shingle, is sand within the meaning of the specifications of this contract.

Having thus clearly proved the use of this mixed material during the whole progress of the work up to this date, for the purpose specified, the next step is to ascertain, if possible, how much of the material is sand, and how much is something else, not called for by the contract.

According to the testimony taken before the Commissioner of Public Works on the 23d of June last, this mixed material comes from Cow Bay, and is used indiscriminately both for making concrete and as a bottoming for the paving-blocks; but not a single witness at such examination testified that this material had ever been screened after being brought on the work. In the absence of this practical test, the only reliable method of ascertaining the proportion which the earthy matter, gravel and sand bore to the whole mixture, was that of a laboratory analysis.

Accordingly, fair samples of this material have been obtained from time to time from different parts of the work as it has progressed. In selecting such samples, stones weighing over four ounces have been thrown out, so that the character of the specimens is manifestly in the contractor's favor.

Of the thirteen samples thus far procured of the mixed material from Cow Bay, the analyses of but four are completed; to the eye, however, there was no appreciable difference between the four referred to, before analysis, and those yet to be treated.

An average of the results of the analyses of the specimens procured June 2, July 3, July 13 and July 15, gives the following figures:

Earthy and organic matter and loss	2.45 per cent.
Gravel	32.35 "
Sand	65.20 "
Total	100.00 per cent.

The sand is of a superior quality and no better could be asked for. What I find fault with, is the quantity and not the quality, since it forms in round numbers but 65 per cent. of the material delivered on the work; the remaining 35 per cent. being of a character not recognized by the contract, even if it were not positively injurious to the concrete and the bottoming into which it has been permitted to find its way.

In plain English, out of every 100 loads of so-called sand from Cow Bay, delivered on the work, 35 loads had no business there, and should have been rejected, instead of which they have all, up to this time, been worked into the job, to the manifest pecuniary benefit of the contractor, and to the direct deterioration of the pavement.

2. As regards the Condition of Dryness of the Bottoming when the Blocks were laid.

The mixture of sand and gravel described as having been thinly spread over the concrete foundation, has been alternately wet and dried according to the state of the weather, until the advance of the pavers made it necessary to cover the foundation to the full depth of from 2 1/2 to 3 inches. When this portion of the work has been in progress, no effort has at any time been made to comply with the requirements of the specifications that the "sand" should be "perfectly free from moisture," much less that it should be made so by "artificial heat if necessary."

The so-called "sand" has been taken from the nearest stock pile in a side street, in whatever condition of dampness or dryness it may have been for the time being, and thence wheeled in place sufficiently in advance of the last course of blocks laid to enable the pavers to set up their "line" or "bond" blocks. If the "sand" happened to be dry, the terms of the contract were complied with, if on the contrary, the sand was wet, as I shall show much of it was, it nevertheless went into the work in spite of the contract.

Hence block-laying has invariably proceeded, without any reference to the condition of moisture of the bottoming, except at such times as the extremely wet condition of the whole roadbed precluded work of every description on the Avenue.

Except during the dry weather, between the 25th of June and the 9th July, inclusive, when no rain fell, none of this bottoming has been thoroughly dry when spread. In case of rain, of which there was an abundance during the remaining period of five weeks out of the seven in which block-laying has been progressing, no attempt whatever has been made to dry it, or to keep it dry, either in the stock pile, as spread on the concrete bed, in front of the advancing courses of blocks, or under the uncemented joints of the blocks, of which there has always been from 12 to 108 feet (measured along the axis of the Avenue), thus exposed at both parts of the work from the time block-laying began.

In proof of the manner in which paving-blocks have been repeatedly laid on this damp and even saturated material, I make the following extracts from my own field notes and those of my assistants.

The better to understand the situation and to appreciate the deliberate manner in which the specifications of the contract in the particular referred to have been disregarded, the state of the weather immediately preceding each violation is noted.

The record of the rain-fall is taken from the official meteorological register as kept by the Department of Parks, at the old Arsenal on Fifth Avenue, opposite Sixty-third street (see Exhibit F).

Monday, May 24. Rain fell from 9.45 A. M. to 5 P. M., to a depth of.....	.19 in.
Tuesday, May 25. Rain fell from 1.45 P. M. to 2 P. M., to a depth of.....	.03 in.

TUESDAY, MAY 25. "The first work of laying blocks began at 1 P. M. "to-day at Thirty-seventh street. * * * The gravel on "which the blocks were laid was quite moist from recent rains."

Thursday, June 3. Rain fell from 5 A. M. to 11 A. M., to a depth of..... .35 in.

FRIDAY, JUNE 4. "Notwithstanding the wet condition of the sand bed- "ding, blocks were laid between Thirty-ninth and Fortieth streets "and between Ninetieth and Eighty-ninth streets."

Wednesday, June 9. Rain fell from 5.50 P. M. to 12 P. M., to a depth of..... .25 in.

Thursday, June 10. Rain fell from 0.30 A. M. to 2.30 A. M., to a depth of..... .06 in.

THURSDAY, JUNE 10. "The heavy showers of last night rendered the "bed of mixed sand and gravel, on which the blocks are being "laid to-day, quite wet."

Monday, June 14. Rain fell from 0.15 A. M. to 2 P. M., to the depth of..... .85 in.

Tuesday, June 15. Rain fell from 0 A. M. to 5 A. M., to the depth of..... .02 in.

TUESDAY, JUNE 15. "Block-laying between the north and south "crossings of the avenue at Fortieth street, commenced early this "morning on a bed of sand and gravel saturated with water from "the effects of the heavy rain of preceding day."

"Block-laying going on between Eighty-seventh and Eighty- "eighth streets. Two men were scraping the wet gravel from "between joints of paving-blocks in place, between Eighty-eighth "and Eighty-ninth streets."

Tuesday, June 22. Rain fell from 4 P. M. to 9 P. M., to a depth of..... .10 in.

Wednesday, June 23. Rain fell from 0.45 P. M. to 12 P. M., to a depth of..... 1.20 in.

Thursday, June 24. Rain fell from 0 A. M. to 7 A. M., to a depth of..... .05 in.

FRIDAY, JUNE 25. "The block forces are at work to-day at Forty-third "street, and between Forty-third and Forty-fourth streets, laying "blocks on a bed of wet gravel and sand. Since the rain the sun "has been obscured and the bed has had no chance to dry. From "3 P. M., clear."

There was no rain-fall from June 25 to July 9, inclusive. Block-laying went on uninterruptedly at the lower work, but on the upper work it ceased at Eighty-fifth street on July 7, and has not been resumed at this date.

Wednesday, July 14. Rain fell from 5 P. M. to 7 P. M., to a depth of..... 0.28 in.

Thursday, July 15. Rain fell from 6.50 A. M. to 7.10 A. M., to a depth of..... .01 in.

THURSDAY, JULY 15. "In accordance with your instructions, I visited "the Fifth Avenue repaving and at 11 A. M., noticed the pavers "laying the blocks on the wet sand on a line about twenty-five "feet south of the south crossing of Forty-seventh street. When "the pavers set the blocks the water would form in little pools in "the sand."

All block-laying under the conditions thus described has been done in direct violation of paragraphs 13 and 14 of the specifications of the contract, which read as follows:

- § 13. "On this concrete foundation shall be laid a bed of clean, sharp sand, "perfectly free from moisture (made so by artificial heat, if deemed "necessary), not less than one and one-half inches thick, to the depth "necessary to bring the pavement to the proper grade when thoroughly "rammed."
- § 14. "LAYING THE PAVEMENT, ETC.—Upon this bed of sand the granite blocks and crosswalks will be laid."

Soakage through Uncemented Joints.

With respect to the soakage of rain through the uncemented joints of the newly-laid pavement, of which as has been stated there has always been from 12 to 100 lineal feet along the Avenue, on each portion of the work, thus exposed as the work of paving progressed, it is plain that through these channels, if unprotected, large quantities of water can readily pass under the pavement and permeate the sand bottoming, producing as has already been pointed out, most disastrous consequences as soon as the winter's frost sets in.

I will cite but one instance of the results of neglecting to protect these areas, the better to illustrate the point.

On Saturday, June 12, at the close of the day's work, the area of uncemented blocks was as follows:

	Feet.
From the north curb-line of Forty-first street to a point 50 feet north..	50
From 35 feet north of the north curb-line of Eighty-eighth street to the said north curb-line.....	35
From the south curb-line of Eighty-eighth street to 125 feet south of said south curb-line.....	125
Total.....	210

Multiplying this linear distance by the width of the carriageway, we have 8,400 square feet of partially-finished pavement left exposed to the effects of rain at the close of June 12.

On Monday and Tuesday, June 14 and 15, there fell on the Avenue .87 of an inch of rain, which for the given area amounted to 4,555 gallons, or 101 barrels of 45 gallons each which passed into the sand bottoming under the blocks. Every shower, whenever along the line of the work joints have been left uncemented, has likewise found its way to the sand.

Whether the bottoming has freed itself, or can free itself by drainage from this surface water, depends entirely on the grades of the Avenue at the points where this soakage has taken place; but even where the grades are favorable for such drainage, a sufficient amount of moisture, due to the surface attraction of the sand grains in the bottoming, will remain to be acted upon by frost and thus endanger the integrity of both the concrete foundation and the superstructure.

LAYING AND JOINTING THE PAVING-BLOCKS.

The sand bedding having been prepared of the prescribed depth, the next step is to lay, ram and joint the granite paving-blocks, thus completing the carriage-way.

I shall consider each of these processes separately.

Laying the Paving-blocks.

So much of Mr. Matthew Baird's "Proposal No. 2" for repaving Fifth avenue, hereinbefore referred to, as relates to this part of the work, reads as follows:

"Laying blocks.—To be laid at right angles to the line of the street "and intersecting streets, forming joints not more than 1 inch wide, top and "bottom. Longitudinal joints to lap 2 inches."

That portion of the 14th paragraph of the specifications of the contract of October 28, 1885, referring to laying the blocks, is in these words:

§ 14. "LAYING THE PAVEMENT, ETC. Upon this bed of sand the granite blocks and crosswalks will be laid.

"The stone blocks are to be laid at right angles with the line of the "street, except in special cases, when they shall be laid at such angles as "directed, with such crown and such grade as the Commissioner of Public "Works may direct; each course of blocks shall be of uniform width and "depth, and so laid that all longitudinal joints shall be broken by a lap of at "least two inches, and that all such joints shall not be more than one inch in "width top and bottom."

Preposterous to claim that the material used for bottoming is sand.

Cow Bay "sand" not screened.

Samples of mixed material called "sand" analyzed.

But 65 per cent. of sand.

Out of every 100 loads used 35 loads were composed of other material than sand.

Contract requires that the sand when used shall be dry.

No effort made to keep sand dry.

Wet sand used.

Proofs.

Record of rain-fall.

Extract from field notes.

Block-laying so done is in direct violation of contract.

Extracts from specifications.

Usual area of uncemented joints.

Area exposed June 12.

Rainfall June 14 and 15.

Mr. Baird's proposal.

Extract from specifications.

¹ See EXHIBIT E, testimony of T. Abbott, Inspector.

² See EXHIBIT F. 4.97 inches of rain fell during these five weeks, an average of nearly one inch per week.

Each course of blocks to be of uniform width and depth.

To attain this end practically the blocks must be assorted.

Importance of this clause from a philosophical point of view.

No change in volume of sand except that due to compressibility.

Compressibility should be exhausted by ramming.

Mixed sand and gravel bottoming.

Concrete foundation.

Sub-grade earth.

One of the most noticeable clauses in the foregoing paragraph is that requiring that "each course of blocks shall be of uniform width and depth." As each course is made up of over forty blocks, and as it is expressly stipulated that the whole course shall be of uniform width and depth, it is manifestly impossible to comply with the requirements of the specification unless every block in the same course is within the limits of width and depth prescribed by the contract.

To meet this provision practically, the blocks must first be assorted with reference to these two dimensions, so that when required for laying those of the same depth and the same width can be readily brought together in the same course.

The vital importance of a strict observance of this clause, on the part of the contractor, in order that the "best" results contemplated by the law of May 28, 1885, shall be attained, cannot be better illustrated and enforced, than by briefly considering the philosophical principles upon which this part of the specifications is based.

Block-laying theoretically considered.

If such of the specifications of the contract as relate to laying blocks are faithfully carried out, all of the space between the bottom of the blocks and the concrete foundation will be filled with "clean, dry, sharp sand," and the spaces between the sides and ends of the blocks will be filled with "clean, dry, gravel," imbedded in the paving cement as a matrix.

There can, therefore, be no change in the volume, or shape of the mass of sand beneath the blocks, after the pavement is laid as prescribed, except such as is due to the compressibility of the sand, or to a change in the elevation of the blocks.

Now, the sand has a certain amount of compressibility, which is intended to be exhausted as far as possible by the ramming called for by the contract.

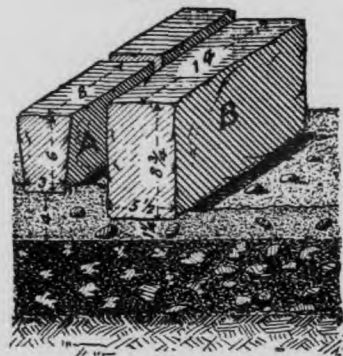
If this compressibility be not exhausted by proper ramming, the constant pressure upon the surface of the blocks due to the street traffic, will tend to depress them *unequally, if they vary much in their dimensions.*

To demonstrate the truth of this statement, it is necessary to consider the minimum and maximum sizes of blocks actually used in the work of repaving the Avenue.

Without resorting to extreme cases the following sizes (based, as they are, upon actual measurements) may be taken as a fair average of the least and largest sizes of blocks worked into the carriage-way in repaving the Avenue.

Minimum, 3 inches wide, 6 inches deep and 8 inches long. } See Figure 5.
Maximum, 5½ " 8¾ " 14 " }

FIGURE 5.



Longitudinal section in perspective of the carriage-way of Fifth Avenue as repaved. Taken through contiguous courses of wide and narrow blocks, to illustrate the difference in the effects of the same traffic pressure on adjacent blocks of different depths and lengths.

1. EFFECT OF COMPRESSIBILITY.

	Block A.	Block B
Area of bottom of blocks, square inches	24.00	77.00
Volume of sand under blocks, cubic inches	96.00	96.88
A pressure of one gross ton on each block gives a pressure per square inch on the under face of (Item C), pounds	93.33	28.9
If a pressure of one gross ton on Block B (= 28.9 pounds per square inch) reduces the volume of sand beneath it one-fifth, the block will settle, inches	....	0.25
The same pressure (28.9 pounds per square inch) on Block A will compress the sand under it and reduce its level, inch	0.80	....
But the pressure per square inch produced by a weight of one gross ton on Block A is more than three times that produced by the same weight per square inch on Block B (see Item C, above), and hence, under such a pressure, the level of Block A will be reduced more than, inches	0.80	....

2. EFFECT OF LATERAL PRESSURE.

If pressure be brought to bear upon the surface of a block, it will have a tendency to force the sand out laterally from beneath it, producing an upward pressure against the under face of an adjacent block, tending to raise it.

If two blocks, A and B (Figure 5), be side by side, a pressure of one ton, for example, on A will tend to raise B, and vice versa.

But a weight of one ton on A produces a pressure per square inch under B three times greater than the pressure per square inch which a weight of one ton on Block B produces under Block A.

Hence, with equal pressures on their upper faces, the larger blocks tend to rise and the smaller ones to sink, and the greater the difference in the dimensions of the blocks the greater will be the tendency of the larger ones to rise and the smaller ones to settle.

Conversely, the nearer the Blocks A and B approach each other in form and dimensions the less will be the tendency of the larger to rise and the smaller to sink, until, if the blocks are precisely alike, the effect of compressibility and of lateral pressure will be precisely the same and these forces will exactly neutralize each other.

The practical lesson to be drawn from the foregoing demonstration is, THAT THE DIFFERENCE IN THE AREAS OF THE CORRESPONDING FACES OF ADJOINING BLOCKS SHOULD BE AS SMALL AS POSSIBLE, AND THAT THE BEST RESULTS CAN ONLY BE ATTAINED WHEN THESE ARE THE SAME.

As to demand that all the blocks should be exactly the same size would add considerably to their cost, the desired end has been practically attained in the contract under consideration by narrowing the limits of size, as follows:

Maximum limit of size, 4½ inches wide, 7½ inches deep, 12 inches long.	
Minimum limit of size, 4 inches wide, 7 inches deep, 10 inches long.	
Giving an area of base, in the maximum block, of.....	54 square inches,
And an area of base, in the minimum block, of.....	40 "
Greatest difference in area.....	14 square inches,
being an increase of area of the largest over the smallest of 35 per cent. ; whereas, in the blocks as laid in repaving the Fifth Avenue, the	
Maximum limit of size is 5½ inches wide, 8¾ inches deep, 14 inches long.	
Minimum limit of size, 3 inches wide, 6 inches deep, 8 inches long.	
Area of base, maximum size of block.....	77 square inches.
Area of base, minimum size of block.....	24 "
Greatest difference of area.....	53 square inches,
being an increase of area of the largest over the smallest of 220 per cent.	

Deductions from these facts.

Effect of a departure from the terms of the contract.

In other words, the probabilities that traffic will ultimately produce irregularities and depressions in the surface of a pavement, laid in violation of the principles here demonstrated, over what it would if the principle had been closely adhered to, ARE AS 220 IS TO 35, OR OVER SIX TIMES AS GREAT.

In order to illustrate the practical effect of any departure from the imperative rule laid down in paragraph 14 of the specifications, that "each course of blocks shall be of uniform width and depth," I give below a section taken through a course in which this rule has been disregarded and adjacent blocks laid of different depths.

FIGURE 6.

Section taken through a Course of Paving-blocks extending from curb to curb (transverse section) in which adjacent Blocks are of different depths.



The following table has been prepared to show the effect of traffic upon each block in the pavement thus laid :

Table showing the Relative Distance each Paving-block represented in Figure 6 will be driven down by the hammering of Traffic in the same period of time, assuming that the Sand Bottoming is compressed by such Traffic to four-fifths of its original depth.

DESIGNATION OF BLOCKS.	DEPTH.			A COMPRESSION OF ONE-FIFTH DEPTH OF SAND.	
	Of Blocks. Inches.	Of Sand under Blocks. Inches.	Grade to Concrete Inches.	Gives actual depth of Sand under blocks after Compression. Inches.	Amount of Compression. Inches.
A.....	7.5	2.5	10.	2.0	0.5
B.....	6.5	3.5	10.	2.8	0.7
C.....	8.75	1.25	10.	1.0	0.25
D.....	6.0	4.0	10.	3.2	0.8
E.....	8.5	1.5	10.	1.2	0.3
F.....	6.25	3.75	10.	3.00	0.75

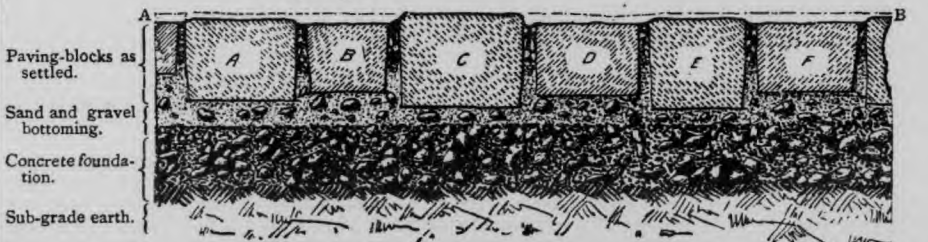
Blocks will be driven down unequal distances.

An examination of this table shows that in the case illustrated in Figure 6, the blocks will be driven down unequal distances, all the way from one-fourth of an inch for the deep blocks to eight-tenths of an inch for the shallow ones ; but as in view of the result of lateral pressure as has been shown, the large blocks will tend to rise, the practical result of these two opposing pressures on the large blocks will be to maintain them in their original positions.

The ultimate appearance of a pavement laid as shown in Figure 6, is given below. The line A, B, indicates the original line of the surface.

FIGURE 7.

Section taken through a Course of Paving-blocks, extending from curb to curb, in which adjacent Blocks are of varying depths, showing the ultimate appearance of the Surface of the Street, after having been subjected to a heavy traffic.



Having thus explained the principles which should govern the practice of block-laying, principles, which as I have shown, are fully recognized in the specifications of this contract, I am now prepared to enter upon an inquiry, to ascertain in how far they have been carried out in the work of repaving the Avenue, during the period of time covered by this report. The first step to be considered is the

INSPECTION OF THE PAVING-BLOCKS.

There exists such an evident misapprehension, not to designate it by a harsher term, among the officers and employes of the Department of Public Works connected with this Fifth Avenue paving job—not excepting the Commissioner himself—as to the meaning of the verb to inspect, and as to the nature of a bona fide inspection, that before quoting from the contract such clauses as refer to this duty, it is proper to set out distinctly what I understand by these words.

Taking as my authority the definitions of the word inspection, and its derivatives as given by the standard lexicographers Webster, Worcester and Stormonth,¹ the following are the meanings which I invariably attach to these words whenever used in this report.

To inspect—To examine for the purpose of determining quality ; to view narrowly and critically ; to pry into.

Inspection—The act of making a prying examination ; a close, narrow and careful survey.

Inspector—One to whom the examination of any work is committed for the purpose of seeing it faithfully performed in the manner indicated by the definition of the verb to inspect, as given herewith.

In this matter of inspection, therefore, I am a strict constructionist ; claiming that a faithful adherence to the obligations imposed by a contract, in respect to the manner of performing this act, is of such paramount importance that unless this duty is executed in the most thorough and conscientious manner, no contract can be truthfully said to be fulfilled ; or in the case under consideration, without such an inspection of all the material and the workmanship, it will be absolutely impossible to attain that degree of excellence in the pavement, so emphatically prescribed by the law of May 28, 1885.

As to the Manner in which the Inspection of the Blocks shall be Made.

The sixth paragraph of the specifications reads as follows :²

§ 6. "Description of materials.—The stone blocks for the pavement to be of granite, of a durable and sound quality, each measuring on the face or upper surface not less than 10 or more than 12 inches in length, not less than 4 nor more than 4½ inches in width, not less than 7 nor more than 7½ inches in depth, to be split and dressed so as to form, when

¹ See EXH. BIT P, pages 4 and 5.

² See EXHIBIT B, page 5.

"laid, end-joints not exceeding 1/2 inch wide, and side-joints not exceeding 1 inch wide, with fair and true surfaces on top and bottom, and are to be in all respects equal to the specimen blocks at the office of the Commissioner of Public Works."

"The stones will be carefully inspected after they are brought on the line of the work, and all blocks which, in quality and dimensions, do not conform strictly to these specifications will be rejected, and must be immediately removed from the line of work."

Each block a dimension stone.

This view of inspection not the popular one.

If the contracts are stringently drawn they must be fulfilled.

Practical value of conscientious inspection.

What the contract requires.

Rejected material to be removed forthwith.

Only conditions on which contractor can proceed.

These provisions disregarded.

Extracts from field notes as to delivery without inspection.

Further evidence that blocks were not inspected.

Now, every one of these paving-blocks is, in engineering parlance, a "dimension stone," i. e., it is to be of a size within certain specific limits; hence I assert, that it is impossible to decide the question which of such stones conforms to the requirements of the contract, WITHOUT ACTUALLY MEASURING EACH DIMENSION OF EACH ONE, and at the same time passing judgment upon its soundness, the perfectness of its shape, the fairness and trueness of its top and bottom faces, and the quality of the granite from which it is split.

Unless this is done for each individual paving-block, I hold that there has been no inspection within the meaning of the contract.

I am well aware that in view of the superficial and generally perfunctory manner of performing this duty of inspection, of which this Fifth Avenue repaving job is a typical illustration, that the standard herein set up will be derided by those trained in that school; but the undisputed fact that the Department of Public Works has for years deliberately inserted in all its contracts the most stringent provisions with respect to inspection, is sufficient warrant to demand that in every work upon which I may be called to pass judgment, the terms of such provisions shall be strictly fulfilled.

But as I shall presently show, it is not only utterly impracticable to lay the "best pavement" unless every block has been rigidly inspected and every imperfect one discarded; but on the score of cost it is easy to prove that nothing is so ruinously dear in the long run as bad material and poor workmanship. As an illustration of the truth of this, I am entirely satisfied that had the terms of every paving and repaving contract let in this city for the past six years been faithfully enforced we should have had smoother, firmer and more enduring carriage-ways, far easier to clean, and hence better from a sanitary point of view, with a reduction of the cost of repairs of at least one-half what that cost has been, and is to-day.

When and Where the Inspection is to be Made.

§ II. "Inspection of Materials."—On the day designated by the said Commissioner for commencement of the work at any point or points on the line thereof, the said contractor shall, before disturbing or making any alteration in the present roadway, haul upon the line of the work, at each of such points, a sufficient quantity of stone blocks and bridge-stones, for the paving of at least the space between any two intersecting streets.

"The stones so brought upon the ground, and before they are laid, will be carefully and thoroughly inspected, as provided for in specification 6, and all rejected stones shall be immediately removed by the contractor from the line of the work. The contractor will then be required to pile such stones as may have been approved, neatly on the front of the sidewalk, and not within three feet of any fire-hydrant, and in such manner as will preserve sufficient passage-way on the line of the sidewalks, and also permit of free access from the roadway to each house on the line of the street."

"After this inspection has been made, and after all the rejected stones shall have been removed entirely from the line of the work, and the accepted stones piled in the manner aforesaid, and not until each of these conditions shall have been faithfully fulfilled, will the contractor be permitted to proceed with the preparation of the road-bed for the new pavement."

How the Foregoing Specifications have been Observed.

In my preliminary report it was stated that on the 15th of May last paving-blocks were found piled on the east and west sidewalks of the Fifth Avenue, from Thirty-seventh to Forty-second street, and from Ninetieth to Eighty-fourth street, in the manner it was directed should be done—only after such blocks had been properly inspected. I also stated that my assistant and myself had made numerous measurements of blocks taken at random in these piles, with the results set forth in that report, namely, that 68 per cent. of those thus measured failed to come up to the standard fixed by the contract, and that the only reasonable deduction which could be made from this fact was, that the portion of the contract referring to the method of inspection and directing that "all rejected stones should be immediately removed by the contractor from the line of the work," had been disregarded.

Subsequent developments and examinations have fully confirmed the opinion then expressed, "that the blocks so located have either never been inspected, or if they have, that that duty has been most perfunctorily performed."

With respect to blocks delivered on the Avenue since that date, from Forty-second to Fiftieth street, and from Eighty-fourth to Seventy-seventh street, and regarding the manner in which the specifications under consideration have been observed since the 15th of May last, I submit the following extracts from notes made on the dates designated, by my assistant and myself, bearing directly on this point.

Monday, May 17. "A load of paving-blocks was delivered at 3 P. M. at the southeast corner of Thirty-ninth street and Fifth Avenue. No inspection made; no men engaged in piling at the time."

Friday, May 21. "A load of blocks was delivered at 9.40 A. M. at the northeast corner of Forty-second street and Fifth Avenue. One of the foremen was present at the time of unloading, but no inspection was made. Between Forty-first and Forty-second streets, four men were piling blocks; no inspection going on."

Saturday, May 22. "A load of blocks was delivered at 8.30 A. M., between Forty-second and Forty-third streets. Foreman present at time of delivery, but no inspection made. Between Forty-second and Forty-third streets, one foreman and three laborers piling blocks."

Monday, May 31. "A load of blocks was delivered at 2 P. M. in Fifth Avenue at north curb-line of Ninetieth street. No inspection was made at time of delivery. No men piling blocks to-day."

Saturday, June 12. Forty-ninth street to Forty-eighth street—"Examined piles in front of Nos. 603, 601, 599 and 597, east side of Fifth Avenue, found them full of imperfect blocks."

"Also, on west side, in front of Nos. 604 and 608 and Dutch Church, many too thick or too thin."

Forty-eighth to Forty-seventh street—"Examined piles on both east and west sides of Avenue. The same defects observable as between Forty-eighth and Forty-ninth streets, many only 3 inches wide and 6 inches deep."

Forty-seventh to Forty-sixth street—"No blocks on east side. Top of pile on west side made up of a hard, homblendic granite, lower part fine-grained pinkish stones; same defects of dimensions as above noted."

Saturday, June 19. "At southeast corner of Fifth Avenue and Forty-eighth street found a foreman and three laborers piling blocks from a loose pile lying on the roadbed. No inspection going on; saw defective blocks in the pile."

Wednesday, June 30. "At 9.30 A. M. a load of blocks was delivered on the east side of Avenue, between Fifty-first and Fifty-second streets. No inspection was made and no measurements taken. Men were piling blocks between Fifty-first and Fifty-second streets; no inspection going on."

Thursday, July 8. "A load of medium-grained, light grey blocks was delivered at about 2 P. M. in Forty-sixth street, west of Avenue. No inspection made or measurements taken."

As a further evidence that the blocks were not inspected as delivered, and that all rejected stones had not been "immediately removed by the contractor from the line of the work," I submit the following extracts from my notes and those of my assistant, as made from time to time:

Extracts from field notes giving location of piles of culls.

June 8. "Noticed small piles of rejected blocks left on the sites of the large piles, a number between Eighty-eighth and Eighty-ninth streets, proving that the blocks had not been inspected when delivered, as the contract requires."

Saturday, June 12. Forty-first to Forty-second street—"Noticed a considerable number of faulty blocks left on the sites of the large piles."

Tuesday, June 15. "Observed a pile of ten rejected blocks on the southeast corner of Thirty-ninth street and Fifth Avenue; a pile of fourteen on the southwest corner, twenty-five or more on the northwest corner, and others scattered along the block between Thirty-ninth and Fortieth streets."

Saturday, June 19. "Observed the following heaps of rejected stones, each containing from say ten to one hundred and fifty, on Fifth Avenue, from—

"Ninetieth to Eighty-ninth street, 7 on east side, 4 on west side.
"Eighty-ninth to Eighty-seventh street, 6 on east side, 7 on west side.
"Eighty-eighth to Eighty-seventh street, 8 on east side, 11 on west side."

Saturday, June 19, continued. On Tuesday, July 20, there remained—

Fortieth to Forty-first street— East side, opposite No. 475, 60 to 70. West side, 4 small lots.	East side, 3 piles. West side, 3 piles. East of Avenue, 2 piles.
Forty-first street.....	East side, 5 piles.
Forty-first to Forty-second street— East side, 7 piles. West side, 12 piles (1 being some 20 feet long, but only say 30 inches wide).	West side, 10 piles. East of Avenue, 2 piles; west of Avenue, 2 piles.
Forty-second street.....	

Thursday, July 1.
Forty-second to Forty-third street—
East side, 6 piles.
West side, 7 piles.
Forty-third street.....
East side, 7 piles.
West side, 4 piles.
East of Avenue, 2 piles; west of Avenue, 2 piles.

Wednesday, July 7.
Forty-third to Forty-fourth street—
East side, 6 piles.
West side, 11 piles.
Forty-fourth street.....
East side, 6 piles.
West side, 9 piles.
East of Avenue, 3 piles; west of Avenue, 3 piles.

Eighty-seventh to Eighty-sixth street— East side, 4 piles. West side, 7 piles.	East side, 8 piles. West side, 12 piles.
Forty-fourth to Forty-fifth street— East side, 12 piles. West side, 10 piles.	East side, 10 piles. West side, 9 piles.
Forty-fifth street.....	East of Avenue, 2 piles; west of Avenue, 2 piles.

Thursday, July 15.
Forty-fifth to Forty-sixth street—
East side, 13 piles.
West side, 13 piles.
Forty-sixth street.....
East side, 10 piles.
West side, 10 piles.
East of Avenue, 2 piles; west of Avenue, 9 piles.
Forty-sixth to Forty-seventh street.. East side (Windsor Hotel); west side, 10 piles.

It must not be imagined that in view of these numerous small heaps of culls so left along the Avenue and in the intersecting streets, they represent all those which an inspection made as prescribed by the contract would have discovered.

In addition to these, large numbers of imperfect blocks have been worked into the pavement, and not a few are daily going in; as I assert, with the full knowledge of the contractor or his representative, and of the Inspectors.

In proof of this I cite the fact that since the 15th of June on numerous occasions, my assistant and myself have seen the pavers bar out imperfect blocks at different points along the Avenue, for the purpose of replacing them by more perfect ones.

If these stones had not been faulty they certainly would not have been molested, and as the Commissioner of Public Works in his official report to the Mayor, for the quarter ending June 30, says of this Fifth Avenue repaving contract: "that special vigilance has been and will continue to be exercised to secure the best possible performance of this important improvement," we are bound to believe him. If therefore what the Commissioner states concerning the "vigilant manner" in which the Inspectors have performed their duty, is true, they must have known the character of every block laid under their supervision; hence it may be fairly assumed, that it was upon a revision of their first and faulty judgment that the blocks referred to were subsequently replaced by better ones.

Notwithstanding these efforts to correct errors, defective blocks have by no means been eliminated from the new pavement.

I am prepared at any time to go upon that part of the Avenue on which it is claimed paving is completed, and point out more than forty localities where there are paving-stones in place which do not conform to the specifications of the contract and the use of which was in direct violation of the terms of that instrument.

To sum up the facts presented, as to how the specifications touching the inspection of the blocks have been observed; as the result of ten weeks' close observation of the manner in which the work of repaving the Avenue has been and is now executed, I charge that up to this date in not a single particular has that portion of the contract quoted above, referring to the manner of inspecting the paving-blocks, been complied with.

The blocks after having been brought on the line of the work, have not been "carefully inspected"; such blocks as did not conform strictly to the specifications, have not "been immediately removed by the contractor from the line of the work," but have either been worked into the pavement, or have been left on the edges of the sidewalks of the Avenue, or in the side streets near by.

True, the stones have been "neatly piled" on the front of the sidewalks, but it was done BEFORE they had undergone any inspection whatever, INSTEAD OF AFTER that important duty had been performed. The contractor has been "permitted to proceed with the preparation of the road-bed for the new pavement" by the "Engineer" in charge, ALTHOUGH NOT ONE OF THE CONDITIONS PRESCRIBED BY THE CONTRACT AS PRELIMINARY THERETO, namely: the inspection of the blocks, the prompt removal of all the rejected stones from the line of the work, and the subsequent piling of the accepted blocks, HAS BEEN OBSERVED.

Before leaving this part of the general report, it will be instructive to consider how the officers charged with the duty of inspecting the blocks, regard its performance, and learn by what standard they measure the obligations they are under to "faithfully fulfill" the conditions respecting such inspection, so clearly set out in the contract.

For this purpose and as bearing directly on this phase of the subject, I invite your attention to the testimony and reports of the "Engineer," the Water Purveyor and Inspectors Abbott and Havican as given in Exhibits E, G 13, G 14, G 15 and G 16 herewith, and to my criticisms upon the evidence as given in Exhibit T.

Setting the Blocks in Place.

Under the general head of "Laying the paving blocks," I quoted from paragraph 14 of the contract so much as prescribed the manner of setting

Many imperfect blocks worked into pavement.

Proofs cited.

Can point out more than forty localities where there are imperfect blocks in the pavement.

The part of the contract quoted has not been observed in any particular.

Instructive to consider the views on inspection of the officers charged with that duty.

Exhibits referred to.

1 See EXHIBIT B, page 6.

1 See EXHIBIT G, page 2.

the blocks; it remains to be ascertained how this part of the work has been performed.

The paving-stones having been piled on the sidewalks, without having been inspected, the first step towards placing them on their beds is to move them to the roadway, in front of and within convenient reach of the pavers. To do this the stones are loaded into barrows by laborers, taking them "as they run" in the piles, no attempt being made to assort them, so as to bring those of the same width or the same depth together, as manifestly should be done, for convenience and rapidity of laying, and in conformity to the requirements of the contract that "each course of blocks shall be of uniform width and depth."

For the first ten days block-laying was in progress, little or no care was taken to prevent the use of stones of improper form and dimensions; practically, everything went into the pavement.

But the attention of the Commissioner of Public Works having been called by the Comptroller, on the 4th of June last, to the manner in which certain specifications of the contract were being violated,¹ some little regard began to be paid to these points.

On the 7th of June I found some of the laborers engaged in wheeling blocks to the pavers, occasionally throwing out stones, which in their judgment were too wide or too narrow, too short, or otherwise not up to standard. It is not to be understood that this work of examination was carried on systematically and vigorously by all the laborers thus engaged; on the contrary, it seemed to be secondary and merely incidental to the work of moving the blocks to the road-bed—and was executed in a desultory sort of way without the aid of rules or other means of measurement.

It will probably be claimed that a considerable number of imperfect stones were in this way discovered and thrown out; but such a method of inspection by irresponsible employes of the contractor, if inspection it can be called, by no means indicates that all the blocks which went into the pavement were "specification stone."²

On the contrary, as will be shown, the rejected form but about eleven per cent. of the whole number of imperfect stones piled on the sidewalks.

My observation of the fact that the laborers were throwing out some defective stones led me to note the number of piles of culls on each city block, as given in detail herewith.

It is possible to approximate very closely to the exact number of stones thus rejected, and from this data to determine with considerable accuracy what relation the whole number of such rejections bears to the whole number of blocks necessary to be handled, in order to pave a given area.

I have had the piles of culls from Fortieth street to Forty-sixth street and from Ninetieth to Eighty-fifth street, the location of which is given in this report, carefully counted and have made the result the basis of my ratios. For instance, it is stated that on the 20th of July, after the paving of the portion of the Avenue between Forty-third and Forty-fourth streets had been completed, 15 piles of culls were left along the east and west sidewalks, and 6 piles in Forty-fourth street; I find by actual count, that the 15 piles contained say 1,885 stone, the 6, 1,295, making a total of say 3,180. Now it requires to pave from the north curb-line of Forty-third street to the north curb-line of Forty-fourth street, a distance of 260.83 feet, say 23,735 blocks, adding to which the number rejected as explained, gives 26,915 as the number which had to be handled to get the 23,735 in the street.

In the conclusions presented in my preliminary report, I estimated that "not less than twenty-five per cent. of the granite blocks then piled on the Avenue ready for use would be rejected were they rigidly inspected as the contract demands."

Subsequent and very careful examination of the blocks delivered along the line of the Avenue, since the date of that report, convince me that that estimate was too low, and that thirty-five or possibly forty per cent. would be nearer the truth. I am the more convinced of this, by the evidence afforded by the table on the next page, which shows that under the spur of public agitation of the question whether the Department of Public Works was doing its duty in the matter of this Fifth Avenue repaving, the percentage of the rejections steadily increased, until on the block between Eighty-sixth and Eighty-seventh streets, between the 1st and the 7th of July, it rose to upwards of twenty-nine per cent. of the number of blocks to be handled, notwithstanding the fact that a very considerable number of defective stones has been worked into that portion of the pavement. Block-laying on that section of the work has been suspended since that date.

Giving the contractor the benefit of any doubt as to the accuracy of my estimate, I now place the percentage of such blocks as would be rejected, were they rigidly inspected as the contract demands, at thirty per cent. of the whole number subjected to examination.

From the data described I have prepared the following

TABLE, SHOWING THE PROPORTION OF REJECTED BLOCKS, TO THE WHOLE NUMBER OF BLOCKS HANDLED, IN LAYING THE PAVEMENT ON FIFTH AVENUE, BETWEEN THE STREETS NAMED BELOW:

*LOCATION ON FIFTH AVENUE AND INTERSECTING STREETS.	*DISTANCE BETWEEN INDICATED POINTS, FEET.	CULLS.		BLOCKS IN THE AREA.		PERCENTAGE.		
		No. of Piles.	Total Number as Counted.	As Paved.	Handled to Complete Pavement.	Of Culls to whole number handled, as del'd	Of Culls in blocks, as del'd	Of Culls put in Pavements.
40th to 41st street	257.5	6	435	23,432	24,102	2.78	30	27.22
41st street		2	235					
41st to 42d street.	292.5	15	1,910	26,617	28,757	7.44	30	22.56
42d street		4	230					
42d to 43d street..	265.83	11	630	24,190	25,050	3.97	30	26.03
43d street		2	365					
43d to 44th street.	260.83	15	1,885	23,735	26,915	11.81	30	18.19
44th street		6	1,295					
44th to 45th street	260.83	19	2,853	23,735	27,333	13.16	30	16.84
45th street		4	745					
45th to 46th street	260.83	20	2,900	23,735	27,573	13.92	30	16.08
46th street		11	938					
90th to 89th street	265.92	11	1,509	24,138	25,707	5.87	30	24.13
89th to 88th street	261.42	13	752	23,789	24,541	3.06	30	26.94
88th to 87th street	261.42	20	3,299	23,789	27,018	11.95	30	18.05
87th to 86th street	261.42	20	3,343	23,789	27,132	12.32	30	17.68
86th to 85th street	261.42	22	9,760	23,789	33,549	29.09	30	.91
Totals	2,909.92	201	33,014	264,568	297,679	.....	..	.....
Averages ..	264.54	18	3,001	24,054	27,061	11.09	30	18.91

* Being from the north curb-line of the first-named street to the north curb-line of the last-named.

The significance of the figures in the foregoing table will be referred to further on in describing the changes made in the character of the work after June 4.

The stones having been piled indiscriminately in front of the pavers, as has been shown, the latter select from the heaps before them such blocks as they require.

¹ See EXHIBIT H 6.

² See EXHIBIT E, pages 5, 8 and 9, testimony of Inspectors Abbott and Havican.

No attention paid to uniformity of depth of stones.

The blocks treated like cobble-stones.

Philosophical principles must be adhered to to get best results.

Appearance of surface of pavement as now laid illusory.

Effect of prescribed limits of width.

Effect of limits of width actually in use.

Limits of depth actually in use.

The more uniform the depth the better the results.

Blocks must be assorted for depth.

Blocks must be assorted when inspected.

Wedge-shaped blocks in pavement.

Not recognized by contract.

Objections.

Bad effects illustrated.

Faulty method illustrated

As regards their depth, no attention whatever is paid to uniformity; which, as will be presently explained, is—under the existing conditions—practically impossible.

True to the traditions of the trade and to their experience, the pavers, uninstructed by the "Engineer" in charge, in any better way, bed these rectangular and "fair" faced blocks, precisely as they would the most irregularly-shaped cobble-stones; excavating the sand to place the deep ones, and packing it under the shallow ones with their paving hammers, in order to raise them to the plane of the general surface. In other words, as in other kinds of street pavement, exercising their judgment as to how they can best bring the blocks in the same course to a uniform level surface, prior to ramming.

In that portion of this report in which I considered the theory of block-laying in street pavements, I pointed out the philosophical principles upon which the construction of the "best" pavement depends; demonstrated that as regards the shape and size of the blocks used, the nearer they approached each other in form and dimensions, the closer would be the approximation to the best results, and that such results would be obtained only when the form and dimensions of all the blocks were the same.

It was further explained, that in proportion as this rule was departed from and as this difference in form and dimensions increased, in just that same proportion would the results be more and more unsatisfactory. I showed that these principles had been carefully recognized in the contract under consideration, and that it only remained to ascertain how far in the case before us these principles had been adhered to in its execution.

Although so far as the appearance of the surface of the carriage-way is concerned, as compared with other granite-block pavements in the city, this is apparently the superior, we must not be deceived into the belief that this is due to a strict compliance with the terms of the contract; on the contrary, I am prepared to prove that the essential specification, "that each course of blocks shall be of uniform width and depth," HAS NOT BEEN AND IS NOT NOW BEING COMPLIED WITH.

To demonstrate this I will consider—

1. The width of the blocks in the same course.

Had the limits of four and four and a half inches, prescribed by paragraph 6 of the contract been adhered to, where blocks of these widths were placed next each other in the same course, their larger axes being in line, the sides of the larger block would have projected beyond the sides of the smaller but $\frac{1}{4}$ of an inch, and as 1 inch is allowed for the width of the joints between courses, blocks of any width between the given limits could have been laid in the same course with impunity, and the loss of time incident to selecting blocks for courses of different widths, as has to be done now, would be entirely avoided.

The rules concerning the inspection of blocks and the limits of width having been disregarded, the blocks supplied to the pavers ranging all the way from 3 to $5\frac{1}{2}$ inches in width within superior faces, this departure from the letter of the contract not only made it necessary to go to the trouble and extra cost of separating the stones into wide and narrow courses, but is, as has been proved, positively detrimental to the pavement.

Hence I assert emphatically that under the conditions imposed by the non-fulfillment of the contract in this regard, it has not been practicable for the pavers to comply with the rule under consideration.

2. Uniformity of depth of blocks in same course.

Precisely the same difficulty is here met with as is presented in the case of the widths of the blocks.

Instead of the limits of seven and seven and a half inches given in paragraph 6 of the agreement, the stones in the pavement range from six to eight and three-fourths inches.

As has been clearly shown in explaining the principles of block-laying, the closer the blocks approximate to each other in their dimensions, the more uniformly will the pressures due to traffic be distributed, and the better will be the results, as shown by the surface of the pavement being maintained in a smooth and even condition.

In order that this specification shall be complied with, it is indispensable that the blocks should be assorted according to their respective depths.

If this is not done before they reach the pavers, and the different depths kept separate until needed for use, it will never, indeed it can never be done except at much expense.

As it is, the pavers follow their old ways and the requirements of the contract respecting uniformity of depth, even if heard of—is simply ignored.

Now careful inspection, in conformity with the terms of the contract, is the preliminary step to assorting the blocks, since this work can be much more economically and expeditiously done, when testing their dimensions than at any other time.

As this preliminary step has not been taken in the mode indicated in the contract, I assert, that under the conditions imposed by the non-fulfillment of the contract in this regard, it has not been practicable for the pavers to comply with the rule respecting uniformity of depth in the same course.

Before dismissing this part of the subject, there is another point in which the contract has not been regarded, to which it is important that attention should be called.

I refer to the practice of laying truncated pyramidal-shaped blocks with the base or face of largest area uppermost. My assistant notes under date of Friday, May 28:

"The blocks are invariably laid with the widest side up; one of the workmen informed me that they were made to lay that way."

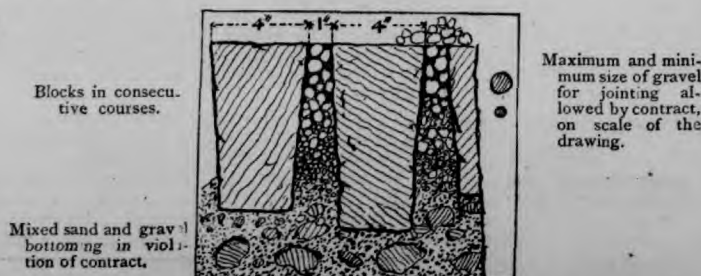
Blocks of this shape are not recognized by the specifications, which state explicitly (paragraph 6), "The stone blocks for the pavement * * * * * to be split and dressed, so as to form when laid end-joints not exceeding $\frac{1}{2}$ inch wide and side-joints not exceeding 1 inch wide." If this rule is complied with wedge-shaped blocks must be rejected; nevertheless many blocks of this shape have been introduced into the pavement.

This method of laying gives a closer joint at the surface, but the effect of a heavy pressure, as, for instance, that due to the passing of a heavy load, as has been shown under the head of "Block-laying theoretically considered," is to force down the block which has the smallest base, displacing a corresponding cubic area of the sand bottoming; which following in its motion the line of least resistance is crowded up the wide throat at the bottom of the blocks caused by their wedge shape, thus filling up the lower part of the joints and displacing just so much gravel and paving cement, to the ultimate injury of the bond of the pavement.

The evil effect of this practice is best illustrated by its action in blocks belonging to consecutive courses. Figure 8 represents a section taken parallel to the curb through contiguous four-inch blocks, in consecutive courses, as now laid on the Fifth Avenue, showing the difference in their depths and the effect of forcing the sand into the throat of the joint, due to the wedge shape of the blocks.

FIGURE 8.

Longitudinal section taken through Granite Pavement as now laid on the Fifth Avenue, showing the faulty wedge shape of contiguous Blocks and its effect on a proper Bond, preventing the Matrix of Paving Cement from reaching the lower part of the Blocks.



The proper method illustrated.

The more clearly to illustrate the striking difference between the faulty method just described and the proper method of laying such blocks, in Figure 9 is given a cross-section taken through contiguous courses, when the upper face of the blocks is also 4 inches wide; it will be observed that the throat of the joint is very narrow, that the blocks are the same depth, and that in accordance with the requirements of the contract they are bedded on clean sand only.

FIGURE 9.

Longitudinal section taken through a Granite Pavement in which the widest faces of the Blocks are placed next the Bottoming. The Blocks being bedded in "clean, sharp Sand" only.

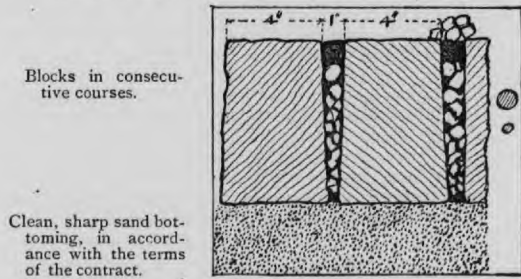
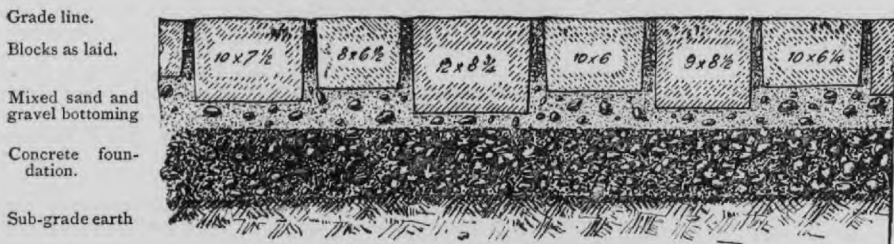


Illustration of present method of laying blocks on Fifth avenue.

In order to illustrate the method now followed in laying the pavement, in which both the specification that "each course of blocks shall be of uniform width and depth" and that which requires that the blocks shall rest on a bed of "clean, sharp sand," have been disregarded, in Figure 10 is given a section taken through a course laid from curb to curb in which these two radical defects are clearly set out.

FIGURE 10.

Transverse section taken through a Course of Paving-blocks on the Fifth Avenue, showing the manner of laying such Blocks in violation of the terms of the Contract of October 23, 1885.

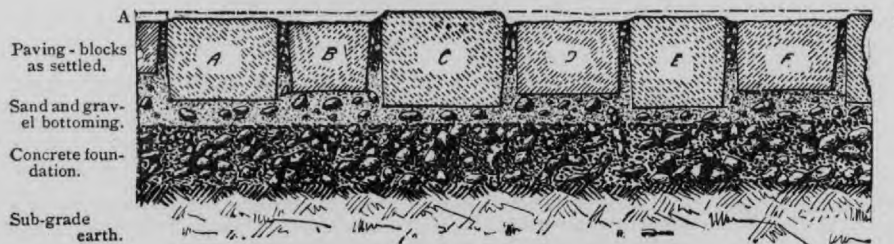


Pavement as laid cannot withstand heavy traffic without rapid deterioration.

What the practical result of this disregard both of the principles which should govern block-laying and of the requirements of the contract, will be eventually, after the pavement has been subjected to a heavy traffic for a year or two, is shown in Figure 11. Attention is especially called to the large gravel stones in the bottoming, and to their injurious effect as noted under the head of "Bedding for Paving-blocks."

FIGURE 11.

Transverse section taken through a Course of Paving-blocks as now being laid on the Fifth Avenue, showing what the effect of a heavy Traffic will ultimately be upon the surface of the Carriage-way. The line A B indicates the upper edges of the blocks as originally laid on the grade.



The evils growing out of these objectionable methods and the difficulties of correcting them will be again referred to under the head of ramming the blocks.

Reviewing what has been said respecting the setting of the blocks, I call your attention:

1. To the deliberate manner in which, after the very significant warnings given by this office, the requirements of Paragraphs 6, 11 and 14 of the contract have been ignored by the Contractor, the "Engineer" and the Inspectors.
2. To the fact that notwithstanding the pavement as completed looks well, it is not because the terms of the contract have been "faithfully fulfilled," but rather in spite of the fact that they have been disregarded. If, on the contrary, the specifications of that agreement had been scrupulously respected, the mere appearance of the street would not only have been more strikingly perfect, but what is of far greater moment, its solidity, its smoothness of surface and its imperviousness to water would have been largely increased, and the term of its life correspondingly extended.

Quality of the Paving-blocks.

Regarding the soundness and hardness of the blocks supplied by the contractor: I have observed stones of different degrees of hardness, brought from different localities, in the same pile; so far as my assistant or myself have been able to discover, little, if any, attention has been paid to this point of keeping different varieties and different grades of hardness together. In corroboration of this statement I make a single extract from my assistant's notebook, bearing on this point.

Extracts from field notes bearing on quality of blocks.

"Wednesday, June 30.
 "The following are the kinds of blocks now piled on the sidewalk in "Fifth avenue, and unpiled in the cross streets between Forty-sixth and "Fifty-first streets.
 "In Forty-sixth street, east and west of avenue, light grey and light pink.
 "Between Forty-sixth and Forty-seventh streets, east and west side of avenue, fine grained light grey.
 "In Forty-seventh street, east and west of avenue, light grey.
 "Between Forty-seventh and Forty-eighth streets, grey with black spots.
 "In Forty-eighth street, east and west of avenue, light grey.
 "Between Forty-eighth and Forty-ninth streets, light grey and grey with black spots (in same pile).
 "In Forty-ninth street, east and west of avenue, light grey and light pink.
 "Between Forty-ninth and Fiftieth streets, light grey.
 "In Fiftieth street, west of avenue, light grey.
 "Between Fiftieth and Fifty-first streets, grey with black spots.
 "As they are thrown from the wagons, the grey blocks with black spots "appear to be the hardest, as the edges do not chip off. The medium

¹ See EXHIBIT B.

Six varieties of granite used.

Last steps in work of repaving.

What Mr. Baird proposed.

What the contract requires.

"grained light grey blocks come second in point of hardness and chip very little."

"The fine-grained and light pink blocks are the softest."
 As Engineer McLean in his report, dated June 23 last, describes six varieties as having been delivered on the work, and as the contract merely states that the stone blocks for the pavement "shall be of granite of a durable and sound quality," it is plain that unless unusual vigilance and good judgment are exercised, this diversity must become—owing to inequality of resistance to abrasion of the different grades—a fertile cause of unevenness of surface and consequent deterioration of the pavement.

The last steps in the progress of completing the pavement are ramming the blocks and cementing the joints.

Before describing these two processes in detail, it is desirable to ascertain exactly what the contractor offered, and what the contract requires him to do.

Proposal No. 2 of Matthew Baird, as given in "Digest of the specifications received," herein-before referred to, provides for ramming and filling the joints, as follows:

"Blocks covered with artificially-dried gravel, free from sand, 3/4 to 1 1/4 inch, brushed into the joints; blocks then rammed; more gravel brushed in to fill joints and blocks; rammed again; process repeated until joints "are full."

That portion of the 14th paragraph of the specifications to the contract of October 28, 1885, referring to ramming and graveling, is as follows:

"As the blocks are laid they shall be covered immediately with clean, "hard, dry gravel, artificially dried, which shall be brushed into the joints "until all the joints become filled therewith.

"This gravel shall be free from sand; it shall be such as has passed "through a sieve of three-quarters of an inch mesh and retained by a "quarter-inch mesh; the blocks shall then be thoroughly rammed; more "gravel shall then be brushed in to fill the joints; the blocks again care- "fully rammed; the process to be repeated until the joints are full and the "blocks brought to an unyielding bearing, with uniform surface, true to the "roadway on the established grade."

Quality of the White Gravel used for Jointing.

In order to ascertain whether the white gravel used on the work for this purpose, was fully up to the required standard, samples of it have been obtained from week to week along the line of the Avenue at such points as block-laying was in progress.

Nine such samples have been obtained to date. After a very careful comparison of these samples with the material of this description used on both sections of the work, I am satisfied they fairly represent the quality of the gravel which has up to this time been used for jointing.

This material, so far as its being "hard and dry" is concerned, is fully up to the requirements of the contract; but, in order to determine with accuracy how "clean" it was, and also whether the size of the pebbles, or particles of which it was composed, conformed to the standard fixed by the contract, five of these samples were submitted to Professor Waller, Chemist to the School of Mines, for analysis.

A summary of the results obtained by him in each case will be found in Exhibit S. The volume of each sample was 100 cubic inches. An average of the percentages of gravel, sand and earthy matter obtained in each case affords the following results:

Clean gravel.....	54.35 per cent.
Sand.....	45.46 "
Earthy and organic matter and loss.....	.19 "
Total.....	100.00

Samples fairly represent material used.

Samples analyzed.

Out of every 100 loads used 46 should have been rejected.

Saving effected in whole job, \$2,000.

Why sand is detrimental.

How the injury is effected.

Practical result.

Object of ramming.

If all the conditions required were fulfilled, uniform force and number of blows would give best result.

Illustration of such a pavement.

These figures mean that out of every one hundred loads of so-called jointing gravel brought on the work, not less than forty-six were sand and earthy matter, which should have been rejected, but which, nevertheless, have gone into the pavement.

So long as this practice is permitted by the "Engineer" in charge of the work to continue, the contractor is effecting a saving in the cost of every cubic yard of this material delivered on the work of not less than fifty cents, which, for the quantity required on the whole job, amounts to upwards of \$2,000.

It is, however, with the mechanical injury which this admixture of sand with the gravel effects, that we have particularly to deal.

The presence of this material is a positive injury to the bond between the stones, and prevents the cement from forming the perfect matrix it was intended to make.

As the ramming of the blocks progress after the hot gravel has been brushed into the joints, the sand slits down between the larger pebbles, gathers in the lower part of the joint, fills up the interstices between the pebbles lodged there, and most effectually prevents the hot cement from permeating that portion of the joint.

An examination of Figure 8 will show this fine material lodged in the lower part of the joint, when it meets the fine sand forced up from the bottoming by the action of the rammer on the smaller wedge-shaped stones.

Nothing could be better adapted to nullify the mechanical conditions necessary to secure a well cemented water-tight joint than this inroad of sand into the lower half of the joints from both above and below.

I am of the opinion that as a result of the constant use of this mixture of sand and gravel since block-laying commenced, in conjunction with other radical defects in jointing which I shall presently describe, there is not to-day 100 feet of perfect joint in the 500,000 feet or more in the pavement as laid to date.

Ramming the Blocks.

In discussing the theory of block-laying in the earlier pages of this report, reference was made to the fact that the sand used as a bed for the blocks has a certain amount of compressibility, which it was the object of ramming to exhaust as far as practicable; and that if this compressibility was not so exhausted by proper ramming, the constant pressure upon the surface due to street traffic would tend to depress the blocks unequally if they varied much in their dimensions. The truth of this statement was clearly demonstrated.

It now remains to be ascertained how thoroughly this work of ramming, which is such an indispensable feature in the construction of the "best" pavement, has been executed in the case under consideration.

The blocks having been laid as described, and the dry "gravel" having been brushed into the joints for the first time, the courses are now ready for ramming.

If the material on which these courses rest was "clean, sharp sand," homogeneous in character, free from any admixture of gravel and "dry"; if, in addition, the blocks in each course were of a "uniform width and depth," as the contract specifically demands, it is plain that with the exception of the slight difference in their lengths, all the blocks would rest in a position, under precisely the same conditions, particularly as regards the depth of the sand separating their inferior faces from the monolithic foundation. Hence, the same number of blows, uniformly delivered on each block, would produce like results on each, so far as settling it in place and compressing the sand beneath it are concerned. In other words, the more exactly the requirements of the contract are carried out in the particulars named, the closer will be the approximation to the "best" results which the law of May 28, 1885, so imperatively demands.

In Figure 12 is given an illustration of such a pavement in which the essential conditions indicated have been carefully observed. A comparison of the details in this section with those given in Figures 10 and 11, clearly

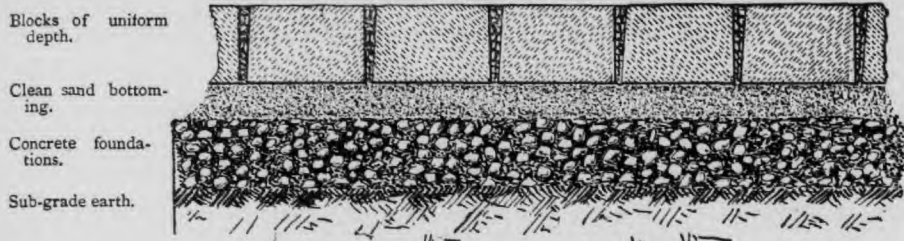
¹ See EXHIBIT H 5, page 14.

² See CITY RECORD for November 13, 1885, page 2005, column 9.

indicate the great superiority of this form over those, in which, as has been shown, the principles of block-laying have been disregarded.

FIGURE 12.

Transverse section taken through a Street Pavement in which the Blocks in the same course are of "uniform width and depth," and are underlaid with "clean, sharp Sand."



Conditions as they exist on Fifth Avenue.

But as has been shown in this report on the work now in progress on Fifth Avenue, the "sand" is not homogeneous, it is not as a rule "dry," nor are the blocks in the same course the same depth, hence as the shallow blocks have a greater depth of sand under them than the deeper ones, they will be more easily driven down by the rammer.

Rammers exercise their judgment.

Under these conditions it becomes necessary that the rammers as they pass over the courses delivering their blows, should exercise their judgment as to the force of each blow precisely as they do in ramming every other kind of pavement in the city, i. e., giving the short, narrow and shallow ones a gentle tap; dealing somewhat heavier blows on others, and delivering numerous and vigorous blows on the largest and deepest; their exertions being directed to making the grade of all the blocks conform to that of the lowest, except in the case of an unusually low one, when the bar is used to raise it to the proper grade.

Second ramming.

The courses having been thus rammed, a second supply of dry gravel is spread over the rammed blocks and brushed into the joints until they are full.

A second ramming is then given with the same object that prompted the first; namely, to adjust the superior faces of the blocks to a "uniform surface," as the contract expresses it, "true to the roadway on the established grade," the bar being in constant use to correct alignments of blocks in the same course, or other minor defects, as previously noted.

Extract from Engineer McLean's report, June 23.

Engineer McLean, in his report made to the Comptroller on the 23d June, 1886, in speaking of the manner in which the blocks had been laid and rammed up to that time, uses the following language:

"When I first went on the ground I found that the courses were not laid true across the street, nor was the uniformity in each course in width and depth attended to. There has been considerable improvement in this respect, but nothing like perfection has been reached. Stones of different widths and depths are placed in the same course, but much care is given to straightening the blocks, after they are laid by the pavers."

"I cannot state positively that there is an insufficiency of ramming, but it appears to me that it is done more with a view to an even surface than a firm foundation."

"In order that this foundation should be perfect it is quite essential that every stone should be rammed with the same amount of force, and the small margin allowed in the depth is intended to insure this result, as it has been found impossible of attainment in the limits heretofore allowed."

Correctness of principles enunciated confirmed.

Nothing could be more confirmative of the correctness of the principles laid down in this report, than this statement of facts, especially Engineer McLean's last remark in reference to the impossibility of attaining even good results if the limits of depth of the blocks are not made quite narrow.

Notwithstanding the condemnation of his methods as given in this report, I find the contractor, one month later, still laying his courses, regardless of the obligations imposed by the contract.

If therefore a general "evenness" and "uniformity of surface" of the carriage-way on the "established grade" is the primary and only object to be attained by ramming, then up to the date of this report the ramming has been properly done.

But if the essential object of ramming is to bring each block to an "unyielding bearing," then I assert that up to this time such ramming has failed to accomplish its object.

An unyielding bearing the essential point of ramming.

Results of a departure from the specifications.

Nothing more forcibly illustrates the necessity of a strict adherence to that part of the specifications which requires that "each course of blocks shall be of uniform width and depth," as well as proves how uniformly this part of the contract has been violated since block-laying commenced, than the constant use of the bar to adjust blocks in the same or in contiguous courses, and the unequal and irregular ramming which has had to be resorted to to make the surface of the blocks "true to the roadway on the established grade."

After all the judgment which has been exercised and the labor expended on the part of the rammers in their endeavor to partially remedy, even if they cannot correct, the radical defects of construction I have pointed out, the blocks have not been and cannot be brought to an "unyielding bearing," as the contract specifically demands. The shallow stones which have been lightly rammed, if rammed at all, must inevitably, under the hammering and pressure of traffic, in due time find their bearing, the ultimate result of which will be, an irregular, uneven and unsightly surface, UNPLEASANT TO RIDE OVER, DIFFICULT TO KEEP CLEAN, AND ON WHICH THE EFFECTIVE DRAUGHT POWER OF HORSES WILL BE SENSIBLY DIMINISHED.

Cementing the Joints.

All the blocks having been brought to an "unyielding bearing" by ramming, the only work remaining to complete the pavement, is to cement the joints, by which the whole surface of the carriage-way is made impervious to water or to organic matter.

In ordinary pavements resting upon foundations of sand or other porous materials, the theory is, that so much of the water as finds its way between the stones, is either conveyed away by a suitable system of drainage, or descends through the soil below the average depth to which frost penetrates.

But as in this pavement the monolithic concrete foundation presents an impermeable surface to any water which may reach it, the effect of leakage between the paving-blocks will be, as has been shown, to saturate the sand bottoming, especially near the curbs. The action of frost on this wet sand will tend not only to upheave the pavement, but to rupture and destroy the integrity of the concrete foundation at these points.

It is exceedingly important therefore, that no water should be permitted to penetrate below the surface of the street; hence the care used to have the sand on which the blocks are bedded "artificially dried, if necessary," and the joints all thoroughly cemented with some material, which to its water-resisting quality, adds that of maintaining and preserving its elasticity and toughness even in the very hottest and coldest of weathers.

In reference to this part of the work the contract provides as follows:

§ 15. "Paving Cement to be used in Joints of Blocks.—There will then be poured into the joints paving cement, as hereafter described, heated to a temperature of 300 degrees, Fahrenheit, until the joints are full and will take no more, and are filled flush with the top of the blocks. Dry, hot gravel of proper size, heated in pans specially provided by the contractor for that purpose, will be poured along the joints, filled with paving cement, as above described, and consolidated by tamping with a light rammer or otherwise."

Provisions of contract.

¹ See Exhibit H 5, page 14.

² If more care had been given to obeying the specifications respecting the inspection of the blocks, all this work of "straightening" would have been entirely unnecessary. G. T. B.

Object of delivery week before use.

Defects of the coal-tar residuum explained.

Pitch should fill every void.

Block should be dry and warm.

Voids choked by sand.

Rapid pouring of pitch not favorable to thorough work.

"The paving cement to be used in filling the joints between the paving-blocks and between the crosswalk stones, as herein provided, shall be obtained from the direct distillation of coal-tar, and shall be the residuum therefrom, and shall be such as is ordinarily numbered 5 or 6 at the manufactory. It shall be delivered on the work at least one week before being used."

It will be noticed that the cement (or "paving pitch" as it is known in the trade) is to be obtained from the direct distillation of coal tar, and that this material is to be delivered on the work at least one week before being used.

The object of this precaution is to afford time for a proper inspection of the pitch before it is wanted. But I venture the assertion that there is not a man connected with the work in any capacity, or off of it, for that matter, who can distinguish by any tests which can be applied in the street, whether the paving pitch delivered on the work was the product of direct or indirect distillation; although between these two products a very broad difference in quality exists, the latter being inferior.¹

In my preliminary report in speaking of the generally admirable way in which the specifications of this contract had been drawn, I took exception to the use of this coal-tar residuum as a cement for the paving-blocks. As the use of the best cement which can be procured is a matter of vital importance to the integrity and life of the pavement, I have thought it proper to state my reasons for this expression of opinion, and I therefore invite your attention to some remarks on this subject in Exhibit U.

In order that the paving-pitch may fully perform the office for which it is used, it should, when heated and poured into the joint, permeate every void as far down as the sand bottoming, firmly attach itself to the walls of the joint and thus form a solid matrix, perfectly impermeable to water and effectually completing the bond of the blocks.

This operation should only be performed when the blocks are perfectly dry or well warmed by a hot sun, for it must be borne in mind that the paving cement rapidly stiffens from loss of heat when it comes in contact with the cold gravel, or the cold walls of the joints, that being their usual condition, particularly after a rain.

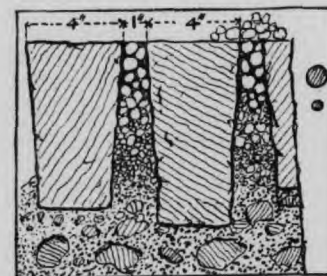
But the presence of so large a percentage of sand in the gravel, as has been shown, chokes up the voids and prevents the cementing action of the matrix from extending to a depth greater than from an inch to an inch and a half below the top of the joint; except under an unusually favorable condition of the gravel filling, when the pitch may get half way down the joint. The rather rapid manner in which the men who are pouring the hot cement pass along the joints is not favorable to thorough work.

See Figure 13, in which the joints are shown filled with a mixture of sand and gravel, the cementing material occupying only the voids in the upper part of the joint.

The impossibility of driving any of the pebbles in the Pile A into the joint is apparent.

FIGURE 13.

Longitudinal Section through contiguous courses in the Pavement as now laid on the Fifth Avenue, showing the joints filled with a mixture of Sand and Gravel; only the voids in the upper part of the joint being filled with paving cement.



Gravel poured along the joints after the latter have been filled.

Mixed sand and gravel bottoming.

Prior to June 9 gravel not poured along joints.

Broadcasting hot gravel.

Water Purveyor visits work June 8.

Rammers first used June 9

As indicating how far this part of the specification has been complied with, I cite the fact that from the 25th of May to the 9th of June, on the lower section of the work, from Thirty-seventh to Fortieth streets, no attempt whatever was made to "pour the gravel along the joints," and no rammer for the purpose of consolidating the gravel by "tamping" had, to my knowledge, been used.

Broadcasting the hot gravel from a shovel over the surface of the pavement, after the pitch had been poured into the joints, was regularly gone through with; but few pebbles were caught in the cement.

On the 8th of June the Water Purveyor came on the work at Fortieth street and among other instructions given the Inspector, told him that "the hot gravel must be poured along the joints, and not thrown over the pavement and must then be tamped with light blows."

These instructions were obeyed; the next day a small rammer with a 1/4-inch iron face, 10 inches long by 2 1/4 inches wide, and weighing about 7 pounds, was brought on the work and has since been used for "tamping."

That is to say, the form of pouring the hot gravel and dropping this rammer on the pile so left has been regularly observed since June 9, but so far as any useful purpose is accomplished by the act it is a farce, and no one understands it better than the laborer who uses the rammer.

To what extent the Pitch Adheres to the Sides of the Blocks.

It is important to ascertain the practical effect of this mode of filling the joints and to learn, if possible, to what depth from the upper face of the blocks the cement adheres to their sides.

I have already explained in detail the pernicious results due to the admixture of sand in the gravel used for jointing, in excluding the cementing material from the middle and lower part of the joints; it remains to be ascertained whether the conclusions drawn are corroborated by the facts.

On the 19th of June, just after the pouring of the cement had been very carefully executed, I saw two blocks removed from the finished pavement in the area so treated, between Eighty-eighth and Eighty-seventh streets; the sides of these stones showed a cemented surface which averaged 1 1/2 inches all round.

On July 7, on the east side of the avenue, between Thirty-seventh and Thirty-eighth streets, opposite No. 417, about four feet square of the new pavement was taken up; out of the 35 or 40 stones displaced, all but two had only a narrow band of cement, averaging from 1 to 1 1/2 inches wide below their upper faces, while on two blocks, the cement surface extended more than one-half their depth.

On the 23d of July, the same thing was observed at the east crossing of Thirty-eighth street, at its junction with Fifth Avenue. In order to dress a bridge-stone, some eight or ten paving-blocks were lifted. Their sides showed the same narrow band of black which characterized the other examples given.

Other instances can be cited if necessary.

All these blocks presented the appearance given in Figure 14. Owing to the uniformly inferior grade of roofing gravel used for jointing up to this time, and the imperfect manner in which the cement has been applied, I am convinced that the blocks whose appearance has been described present fair examples of the cementing done up to this time, and that for all the blocks thus far laid, this cement band will not average 1 1/2 inches wide.

FIGURE 14.



Perspective view of a Paving-block as laid on Fifth Avenue, showing the appearance and width of the band of Paving cement adhering to its sides.

¹ See EXHIBIT U.

Bad outlook for durability of pavement.

Temptation to substitute gravel for pitch.

Calculation of value of paving pitch saved.

Proper method of executing the work.

In view of the very inferior quality of the paving cement used in the work, its probable rapid deterioration and the comparatively short distance it penetrates the joint, the outlook for durability and freedom from the necessity for repairs, in the pavement as now furnished, is not encouraging.

This very imperfect sealing of the joints, due to the substitution of sand for cement, and the significant fact that while a gallon of cement costs eight cents, a gallon of roofing gravel, such as is now used on the work, costs but one and two-tenths cents, leads me to consider and to measure the temptation which the contractor has constantly before him, to use the cheap in place of the more expensive material.

It will therefore be interesting to ascertain what this substitution of sand for pitch means, looked at solely from a pecuniary point of view.

The contract provides that the joints between courses shall not be more than one inch wide, and between the ends of the blocks one-half inch wide. Taking the average depth of the joints at seven inches, which is less than the actual depth, and assuming that the lower inch of this space will be filled up by the intrusion of sand due to the compression of the bottoming by ramming, there remains a space six inches deep to be filled with gravel. Now, the actual voids in gravel amount to .37 of the given space, calling them but .33 these are therefore the spaces to be filled with paving cement.¹

After what has been shown of the actual depth to which the cement penetrates the joints, it is a very liberal estimate to say that the cement perfectly fills the voids in the upper two inches of the six inches, leaving the voids in the remaining four inches filled up with the fine gravel which would pass a quarter-inch "mesh," and the still finer sand.

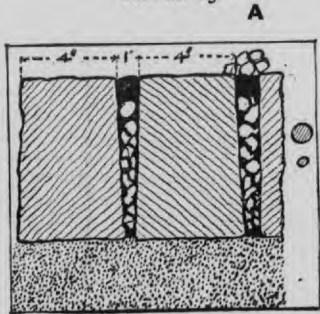
Making the necessary calculations on this basis, I find that the actual number of gallons of paving-pitch required for the whole work will be 76,051, costing..... \$6,084 08 WHILE THE SAVING WILL BE 152,104, COSTING..... \$12,168 16

The only method of thoroughly executing the part of the work just referred to, is the following:

After the blocks have been brought to an "unyielding bearing," only the cleanest gravel having been previously swept into the joints, they are to be again filled with large, clean gravel. The joints should then be calked by means of a calking-iron and rammer, the former being set so that when the gravel has been firmly compacted in the joint, a clear space of from one to one and a-half inches deep, will be left in the top of the joint, for receiving the hot cement. The joint having been filled with this material, hot gravel is at once poured upon it and the work of ramming promptly proceeded with. Under these circumstances it will not be difficult to imbed the gravel in the cement and thus, so far as manipulation goes, to make a thoroughly good job.

In Figure 15 are shown two joints filled in the way described. The solid block at top of joints indicates the paving cement. The pile A is the gravel placed for ramming into the hot cement.

FIGURE 15.



Gravel poured along joints after the latter had been filled with cement.

In Figure 16, is given a perspective view of the side and end of one of the blocks in Figure 15, showing the perfect manner in which the cement has spread itself over the walls of the joints.

FIGURE 16.



Nothing more significantly illustrates the apparent ignorance of the object in view in cementing than to notice the expense for plant, fuel and labor incurred by the contractor for the purpose of heating the gravel and getting it into the joints; and next to observe that before these joints have been sealed with the paving-pitch, considerable areas have been left exposed to drenching rains, without any protection whatever. This has occurred not less than twenty-six times since block-laying commenced, and, as I have shown, may yet prove a fruitful source of future expense.

PART SECOND.

CHANGES INTRODUCED IN THE MANNER OF MAKING AND LAYING THE CONCRETE FOUNDATION SINCE MAY 26—PRESENT CONDITION OF THE WORK REVIEWED.

Regulating the Avenue.

First step.

The first step in carrying out the provisions of the act of May 28, 1885, relating to repaving the Fifth Avenue, was to re-mark its legal grade, as upon this grade depended, 1. The work of regulating, and 2. That of repaving.

"Grade."

Technically, the grade of a street is the angle which its axis makes with a horizontal line.

"Legal grade."

In this city the legal grade of a street or avenue is its entire profile referred to an established datum plane [viz.: The underside of the water table of the Bellevue Hospital, from which the bench marks throughout the city have been taken], as fixed under and by virtue of either a special or a general act or ordinance for laying out said street or avenue, or an act or ordinance changing the provisions of a previously enacted one, or as provided for in sections 1962 and 1963 of the Consolidation Act of 1882.

"Grading"

and

"Regulating" defined.

To grade a street therefore is to make its surface throughout its whole length conform strictly to the legal grade as established under the authority mentioned, and as permanently recorded upon the official maps.

While to regulate a street² is to so shape its surface that the contour of a transverse section will at its middle point, conform to the legal grade and at the curbs, to their position as fixed by city ordinance.

Relation of curbs to legal grade.

Concerning the relation which the curbs bear to the legal grade in the matter of elevation, so far as I can ascertain, there is no law fixing it except that of usage, which for the last twenty-five years at least has been, that on the avenues the curbs shall be set on the legal grade, as given on the maps.

On the avenues curbs are set at legal grade.

As a rule, all the avenues of the city, certainly all those which have been laid out by either the Department of Parks or the Department of Public Works for the last twenty years have been constructed with their curbs at the same elevation as the legal grade, with the exception of the Grand Boulevard, where the grass-plots are 0.3 above, but the surface of the carriage-way is at grade.

The following examples may be cited:

	Slope Centre to Gutter.
Avenue A, One Hundred and Sixteenth to One Hundred and Twenty-fourth street, 60' between curbs.....	1 in 60
First avenue, One Hundred and Tenth to One Hundred and Sixteenth street, 60' between curbs.....	1 in 60
Sixth and Seventh Avenues Boulevards, 80' between curbs.....	1 in 80
One Hundred and Tenth street, from Eighth avenue to Riverside Drive, 40' between curbs.....	1 in 40

The old city maps give centre line of street only, but the maps of all that part of the city laid out by the Department of Parks shows the grades of the avenues to be laid from house-line to house-line on opposite sides.

¹ Trautwine Ed. of 1876, page 505.

² See EXHIBIT N, pages 6 and 7.

Pennsylvania Avenue, how regulated.

Where contour of carriage-way cuts curbs.

Gutters 10 inches deep.

Deep gutters a necessity as late as 1857.

A change in the sanitary conditions of the problem.

Results in the custom of fixed depth of gutters at 6 inches.

First engineering work was to reset curbs.

Hence remarks under head of "Grade" in first report.

Mr. Smith admits correctness of method indicated but prefers his own.

Statement of errors committed due to Mr. Smith's defective method.

The public care nothing for methods but want honest work.

Legal grade has been raised 3 inches.

Only authority for this is in the Consolidation Act.

Failed to find any official evidence of such authority. Such change of grade illegal.

What the contour of carriage-way should be, disregarding drainage.

Level surface best.

Pavement should be sloped only enough to carry off water.

Maximum and minimum slopes in practice.

By this standard the slope on Fifth avenue would be 1 in 40.

As now regulated, 1 in 26.6.

Which is unnecessarily steep and bad for traffic.

An examination of the map and profile of the Fifth Avenue, prepared from the notes of a survey made in March last, shows that this avenue is no exception to the rule above stated.

The work of regulating, grading and paving the streets of the City of Washington has for many years been under the professional supervision of an officer of rank in the U. S. Engineer Corps.

Particular attention has been paid by these officers to this question of regulating, and an excellent example of the results of such supervision is shown in Pennsylvania Avenue, in which is presented a combination of the best technical features of a metropolitan street of great width, suited for a moderate traffic. In this instance the slope of the carriage-ways, on either side of the double-track street railway, occupying the centre of the avenue, has been fixed at 1 to 92.¹

The elevation of the edges of the curbs on the avenues being thus fixed, the next point is to ascertain how far down on their faces the contour of the carriage-way intersects them.

It would appear from the city ordinances that the depth of the gutters measured on the face of the curbs has been fixed at ten inches, but this depth was established at a time when all the streets of the city, which were paved, were paved with cobble-stones, presenting a somewhat rough and uneven surface. The outer edges of the gutter-stones were not laid flush with the surface of the pavement, but two or three inches below it, so that the contour of the pavement cut the curb at about seven or eight inches below its upper edge.²

Deep gutters or kennels were, even as late as 1857, a necessity, because much of the garbage and refuse matter from houses was thrown into the street, and all the roofs and yards drained into the gutters over the sidewalks, and thence into the receiving-basins.

All this is now changed; ashes and garbage are no longer permitted to obstruct the gutters; the roof water passes directly into the sewers, and hence the gutters serve only to mark the line of separation of the carriage-way from the sidewalk, and as a depression to carry to the receiving-basins the surface drainage of the sidewalks and of the roadway.

Recognizing this change, custom has fixed the depth of the gutter at not over six inches on the avenues, and in some localities even less has been found sufficient.

Such, then, being the law and the usage, it is evident that the first step in the work of repaving the Avenue was to re-align and reset the curbs to conform to its legal grade; that done, the curbs could be used in turn to fix the grade of the axis of the street. Hence it was that, under the head of "grades," I stated in my preliminary report, that the position of the curbs as reset and re-aligned fixed the grade of the Avenue along their front edges; but as in a cross section of the street (referring to the contour of the Avenue as heretofore regulated), a right line joining the upper edges of opposite curbs should be tangent to the curve of the finished pavement at its middle point, it was essential to secure that "good workmanship" required by law, that this middle point should be accurately fixed—a succession of such points giving the exact or legal grade.

I further remarked that these points should be determined at the inception of the work, and indicated for this purpose the use of stakes, set along the axis of the roadbed at convenient distances apart (after the old pavement had been removed, of course), on which would be marked the depth of the sub-grade, as also the point on each, six inches above the sub-grade, where the upper surface of the concrete foundation would cut the stake—as a simple and accurate method in connection with the use of a proper templet, of enabling the workmen to give the proper curvature, 1st, to the sub-grade earth, and 2d, to the superior face of the concrete foundation resting thereon, in order that both should conform in transverse section to the contour of the finished pavement.

In a report to the Commissioner of Public Works dated August 3rd Mr. Smith admits the correctness of the method indicated for marking the grade, but enters into an elaborate explanation to show that the use of stakes is obsolete and far inferior in convenience and simplicity to the plan followed of stretching a line from curb to curb, from which the necessary measures to the roadbed (or the ordinates) are taken.

In view of the fact that for a distance of not less than 1,500 feet along the Avenue the concrete foundation was not laid of the thickness required by the contract, and that even after this fault had been in a measure corrected, it became necessary at certain points on the Avenue (as I am prepared to prove) to dispense with a portion of the sand bottoming under the paving blocks, and to actually reduce the thickness of the concrete foundation by removing a portion of its surface, in order to get the blocks down so that their upper surfaces would conform to the curvature of street, it does not speak well for the accuracy of the engineering methods employed. The use of stakes for such a purpose may be old-fashioned and not recognized in City work during the six or seven years Mr. Smith has been a City Surveyor,⁴ but such use, if properly carried out, would at least have prevented unpardonable errors like these.

The details of the professional methods employed to attain certain results, the public care nothing for, but what they do care for and want, is good, honest, thorough work, and that method is the best whose adoption will best contribute to such a result.

But it now appears, both from Mr. Smith's report as well as by his testimony taken before the Commissioner of Public Works, on June 23,⁵ that the grade of the centre line of the carriage-way has been established by him at three inches above the curb-line, or in other words, three inches above the legal grade, notwithstanding the clear and specific requirements of twelfth paragraph of the contract.⁶

As the grade of Fifth avenue was established below Fifty-ninth street more than forty years ago, and as the act of May 28, 1885, makes no provision for any such change, the only authority under which it could be made is that conferred by sections 1962 and 1963 of the Consolidation Act.

If the change has been made in conformity to the provisions of either of these sections, I have failed to find any official record of it; if it has not been so made, it is illegal.

Effect of Raising the Grade Three Inches.

If we consider the contour of the carriage-way, disregarding for the moment the question of surface drainage, it is evident that that is the "best" pavement on which horses can draw their loads most rapidly, with the least discomfort to passengers, with the least effort for themselves and the least danger from accidents by slipping or falling. A perfectly level surface from curb to curb would without doubt give the maximum of effect for the minimum of effort. This principle has been fully recognized in the construction of all the newer or more important avenues. But as the pavement must be sloped so as to free itself from water, it should be crowned just enough to do this effectively and no more, since the steeper the slope, the less effectively is the power of the horse applied and the greater is the danger of his falling.

The greatest slope on any of the avenues heretofore has been 1 in 40, the least 1 in 80. Gillmore recommends for streets paved with stone blocks from 1 in 40 to 1 in 50.

If the Fifth Avenue is regulated so that its crown shall be tangent to the legal grade, and the gutter six inches deep, the slope will be 1 in 40 (see right half of Figure 17). But as now regulated with the crown of the pavement three inches above legal grade, the slope is 1 in 26 6-10 (see left half of Figure 17).

I contend therefore that the contour of the Avenue as now fixed is unnecessarily steep, that it is positively detrimental to traffic as compared with a flatter surface and that at all times, but particularly in icy weather, the danger from accident by falling will be much enhanced.

¹ "Pennsylvania Avenue, Washington, D. C., has a width of 160 feet between building lines and 108 feet between curbs; there is a double-track street railway in the middle of the street, leaving a clear carriage-way on either side of 46 feet. The sidewalks are 26 feet in width, with a slope of one-half an inch to the foot, are paved with brick on the south side and on the north side with "Granolithic," artificial stone. The curbing is dressed granite, 8 inches in thickness and 24 inches in depth. Adjoining the outside rails of the car-tracks there is a line of blue-stone curbing 4 inches in thickness and 6 inches deep. The carriage-way is paved with sheet asphalt. The portion between the car-tracks and between the rails is paved with cobble stones. The top of the street-car rails and the pavement adjoining are level with the curbs; the gutters are 6 inches lower. The surface of the roadway is an arc of a circle tangent to a line joining the top of the curbs. This is equivalent to a slope of 1 in 92." "Engineering News," Vol. 15, page 131.

² See Ordinances of 1838; also amended charter of April 14, 1857, chapter xv., p. 243, § 10; also Ordinances of January 1, 1881, section 105.

³ See EXHIBIT G 13, page 2.

⁴ See EXHIBIT N, page 1.

⁵ See EXHIBIT E, page 16.

⁶ See EXHIBIT S, page 7.

Esthetically considered the new pavement is a success.

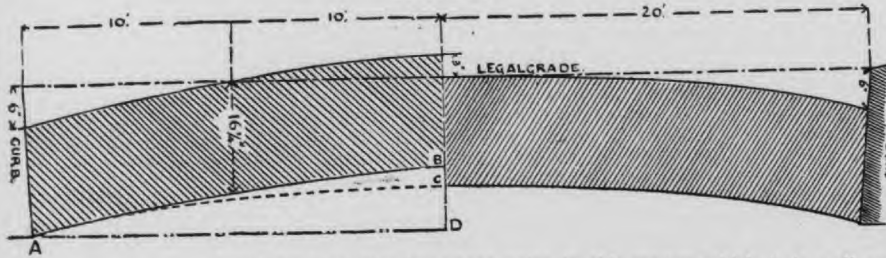
As a fact the main objects for which pavements are built appear to have been overlooked.

Difference between the two contours illustrated in Figure 17.

If a handsomely rounded surface, the graceful sweep of whose curves gratifies the eye and commands the admiration of those unfamiliar with the technicalities of street engineering, is the all important end to be attained in regulating the Avenue, then the new pavement is a complete success, but if facility of draft, wear and tear of wheeled vehicles, comfort and safety of passengers and last, but no means least, regard for the stability and immunity from accident of horses at work, are considerations of any weight, then in this new construction of the Avenue, the main objects for which street pavements are built and maintained have been strangely overlooked.

FIGURE 17 illustrates the difference in the two slopes, the heavily shaded curve on the right being designed to indicate the arch of the blocks and concrete foundation, with a slope of 1 in 40. The heavy shading on the left indicating the work as now laid, with the crown of the street three inches above grade, and a slope of 1 to 26.6. In the drawing, the vertical scale is three times that of the horizontal scale, hence the slopes appear three times as steep as they really are, but compared to each other are accurate.

FIGURE 17.



There is another important point in this matter which it is well not to leave unnoticed.

By thus raising the grade, the contractor's pocket is largely the gainer, even if horse-flesh has to suffer, since by this method of construction a very considerable amount of excavation and the consequent cost is saved.

If the excavation is made to suit the case where the crown of the street conforms to the legal grade, then the contractor will be obliged to excavate a quantity of earth whose boundaries in cross-section are represented by double the half segment A B C, but as now regulated, with the crown of street placed three inches above the legal grade, he is not called on to do this work. The area of the difference between the areas of twice the half segments A D B and A C B is 6.67 square feet, and the cubic contents of a solid of this cross-section and 20,110 feet long (the length of the Avenue to be paved) would be 4,938 cubic yards.

As to remove this thin slice of earth requires careful trimming and in the upper part of the avenue might necessitate some blasting, I estimate the cost of such excavation at not less than one dollar per cubic yard, or, by thus raising the profile of the avenue, the contractor is saved, in round numbers, an outlay of some \$5,000.

Preparation of the Roadbed.

The twelfth paragraph of the specifications of the contract provides that "the sub soil or other matter (be it earth, rock or other material) shall then be excavated and removed by the contractor to such a depth as that when the surface is thoroughly compacted by ramming or rolling it shall be left sixteen inches below established grade of the top line of the finished pavement."

On the part of those in charge of the work, it is not denied that this requirement of the contract has not been complied with; on the contrary, the charge I made in my first report, that up to May 26 no evidence appeared that it had been obeyed, is admitted to be true.

Inspector Abbott says in his report of August 3, "another of the charges relative to the preparation of the roadbed rests entirely upon the statement that it has not been rolled or rammed. This is true, and as I understand the contract it is not needed, except where spongy or vegetable matter is met with on the line of the work. The specifications in this contract in this respect are the same as are usually found in all paving contracts, and I have never understood it was required."

Evidently Mr. Abbott has no very clear idea of the force of language. Inspector Havican says, "as the roadbed for the Telford-McAdam pavement had been rolled to my personal knowledge with a heavy steam roller, we found it in a very hard, firm and compact condition, and suitable for laying the present pavement."

In reply, I have to say: That judging from a personal examination of the roadbed, after being prepared for the concrete foundation from Thirty-seventh to Fifty-second street, with the exception of the vicinity of Forty-first street, where it is underlain with stiff clay, I have not seen any part of the surface which could not have been compacted from one-half an inch to two inches by well directed blows from a twenty-pound iron-shod rammer; and had I have been the engineer on the work, I should not have considered my duty discharged without having had every square foot of this portion of the Avenue thoroughly rammed.

Regarding that portion of the avenue from Fifty-eighth to Ninetieth street laid originally with the Telford-McAdam pavement, it is true that it was rolled with a heavy roller when under construction some ten years ago; but when it is understood that in the preparation of the roadbed under this contract, the six inches or less of metal forming the rolled surface has been removed, and the entire body of stone forming the Telford bottoming loosened up with bars, a large portion of it having been taken out to be converted into "broken stone" for concrete, it will at once be perceived that

¹ See EXHIBIT P, page 1.
² See EXHIBIT G 15, page 5.

³ See EXHIBIT S, page 7.
⁴ See EXHIBIT G 16, page 2.

Directions for ramming mandatory and not conditional.

The fact that the foundation is good does not comply with the law.

To ram 3 1/2 miles of avenue

Will cost not less than \$5,000.

Opinion: quoted worth \$5,000 to contractor.

Contract calls for the best quality of cement.

Test prescribed.

How carried out.

Inspector Abbott's testimony.

Inspector Havican's testimony.

Water Purveyor's testimony.

Correspondence between the Commissioners of Accounts and Commissioner of Public Works on subject of cement inspection.

Brief of Engineer Webster's inspection reports.

Statement to test the value of these reports as evidence that all the cement was of the best quality.

the effect produced by the rolling referred to must have been destroyed, and that while the loose rock and dust left may be very firm under foot, it must contain many interstices which would be filled up and unstable fragments which would be made solid by proper ramming.

In view therefore of the clear and specific requirements of the law, repeated in the first paragraph of the proposals, which proposals in turn form a part of the contract—that the pavement was "TO BE LAID WITH THE BEST FOUNDATION," and that the directions for ramming or rolling are mandatory and not conditional, I cannot see, if the terms of the contract are to be lived up to, if the contractor is to "hew close to the line," how ramming or rolling the roadbed can be avoided.

From this point of view it is simply a question of fulfilling an obligation, and not a matter to be decided by the opinion of an inspector.

But I contend that ramming is necessary, that the foundation would have been greatly improved thereby, and that although it is claimed that the foundation is "good," the law says and the contract repeats it—the foundation must be the "best."

That which is merely good can always be made better, but best is a higher degree of excellence than either good or better, and until by actually making the trial to practically ascertain the fact, it is proved that in this way the foundation cannot be improved, the requirements of the law will never be fulfilled.

To ram the roadbed for a distance of 3 1/2 miles will cost something, and just as long as the contractor can get an opinion from those charged with the supervision of the work that ramming is unnecessary, just so long will he avoid this expense. I estimate that to do this work and test the question of necessity—and it can be tested in no other way, will cost not less than five thousand dollars.

The opinions I have quoted are therefore worth at least this sum to Mr. Baird.

QUALITY OF THE MATERIALS OF WHICH THE CONCRETE FOR THE MONOLITHIC FOUNDATION IS REQUIRED TO BE COMPOSED.

1. Cement.

In my preliminary report I quoted from the 13th paragraph of the specifications of the contract, that portion relating to the character of the cement to be used on the work as follows: "The concrete shall be composed of one part of fresh ground American hydraulic cement of the best quality."

As a precaution against the use of any cement not of the best quality, these specifications also require that "the cement shall be capable of resisting a tensile strain of 50 lbs. per square inch, after 30 minutes' exposure in the air and 24 hours' immersion in the water."

It was stated in that report that neither my assistant nor myself had ever seen any barrels which showed any indications of having been sampled, and that there had not been any testing carried on at the work.

At the examination held before the Commissioner of Public Works on the 23d June, Inspector Abbott, who is on the lower section of the work, said, "the cement has been tested; it is tested every week, I believe, the engineer taking a sample from me every week."

Inspector Havican, who is on the upper part of the work, had nothing to say on the subject, except that the concrete was made according "to specifications."

Water Purveyor Culver said, "The cement I have tested on the ground myself." As this officer did not receive his orders to go on the work until June 3, and was on the work very little, if at all, after June 25, the period covered by this testimony is just sixteen out of the period of sixty-two days under consideration.

It having been publicly asserted that all the cement used by the contractor had been duly inspected, on the 29th of June a letter was addressed to the Commissioner of Public Works, asking for specific information on the subject.

In a reply to this communication, received from the Commissioner on the 1st July, he stated that he had directed that the information "so far as the facts apply, be furnished."

Nine days having elapsed, and no letter having been received, another request was made July 8. This was answered July 9, enclosing a copy of Engineer Webster's report of July 6, which later on was supplemented by another bringing up the date of the inspections to July 24.

An examination of these official reports establishes:

1. That the samples to be tested were taken from the lots of cement as brought on the line of the work, each briquette to be tested being made up from samples obtained from two to four barrels, by the engineer in charge, and by him taken to Engineer Webster's office, at No. 31 Chambers street.

2. No official tests have been made on the work.

3. There is no evidence presented to show that the contents of the barrels from which the samples were taken were not used in the work at once and before the results of the tests were made known.

4. All the samples tested show an excellent quality of cement.

In order to judge how far the results given in these reports can be taken as evidence that all the cement thus far used on the work is of the same quality, I have prepared the statement below, showing the length and superficial area of the concrete laid on the Fifth Avenue in the eleven weeks between the 12th of May and the 24th of July; the number of barrels which should have been used in making it, if the specifications had been strictly followed; the estimated number used by the contractor during the same period; the number of such barrels actually inspected and the dates of such inspections.

The statement is based upon my own observations and those of my assistant, the reports of Engineer Webster¹¹ and that of Engineer McLean, dated June 4.¹²

¹ See EXHIBIT E, page 3. ² See EXHIBIT E, page 12. ³ See EXHIBIT G 1.
⁴ See EXHIBIT G 4. ⁵ See EXHIBIT K. ⁶ See EXHIBIT K 1.
⁷ See EXHIBIT K 2. ⁸ See EXHIBIT K 3. ⁹ See EXHIBIT K 4.
¹⁰ See EXHIBIT K 5. ¹¹ See EXHIBITS K 4 and 5. ¹² See EXHIBIT H 2.

Statement of the Length and Area of Concrete laid on the Fifth Avenue, Showing the Number of Barrels of Cement which should have been used by the Terms of the Contract, the Estimated Number used by the Contractor, the Number of Barrels Actually Inspected and the dates of such Inspection, between May 12 and July 24, 1886.

PERIOD COVERED.		LINEAR DISTANCE ON AVENUE LAID WITH CONCRETE.			SQUARES OF 100 SQUARE FEET LAID.		BARRELS USED IF THE CONTRACT IS FULFILLED.			ESTIMATED BLS. USED (McLEAN'S REPORT).			DETAILS OF INSPECTIONS, AS PER ENGINEER WEBSTER'S REPORTS.				NOT INSPECTED.			
Week Ending.	Days Worked. No.	Lower Section. Feet.	Upper Section. Feet.	Total. Feet.	Lower Section. Squares.	Upper Section. Squares.	Lower Section. Barrels.	Upper Section. Barrels.	Total. Barrels.	Lower Section. Barrels.	Upper Section. Barrels.	Total. Barrels.	Date of Inspection.	Number of Briquettes Made.	Barrels Sampled. Num-ber.	Estimated Number of Barrels used this Day.	Ratio of In-spected to Used. 1 to	Days Work'd. Number.	Number Required to be Used by Con-tract. Barrels.	Esti-mated Number Use'd. Barrels.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
May 15.....	3½	257.	....	257.	107.	....	(129) 454	....	(129) 454	(51) 178	....	(51) 178	.....	0	0	....	....	4	454	178
" 22.....	5¼	450.	....	450.	186.	....	(124) 653	....	(124) 653	(59) 309	....	(59) 309	May 17.....	4	16	59	3.6	5	637	293
" 29.....	5½	282.5	355.9	638.4	117.	146.	(74) 410	(107) 512	(107) 512	(33) 184	(44) 242	(77) 426	" 24.....	4	16	77	4.8	5	906	410
June 5.....	5	217.5	281.4	498.9	90.6	114.4	(63) 318	(80) 401	(143) 719	(30) 150	(38) 184	68 340	June 3.....	4	16	68	4.25	4	703	324
" 12.....	6	248.8	241.4	490.2	100.	93.4	(58) 350	(57) 345	(115) 695	(58) 350	(57) 345	(115) 695	" 7.....	5	20	115	7.2	5	675	675
" 19.....	4¾	310.8	206.4	517.2	132.	84.4	(97) 403	(159) 296	(159) 759	(97) 403	(159) 759	(159) 759	" 14.....	3	12	159	13.	..	....	....
" 26.....	5¼	521.6	169.8	691.4	216.	70.	(144) 758	(191) 246	(191) 1,004	(47) 246	(144) 758	(191) 1,004	" 16.....	2	8	159	20.	3	739	739
July 3.....	6	320.8	255.	575.8	137.	106.	(121) 727	(127) 502	(243) 1,289	(121) 727	(127) 502	(243) 1,289	" 21.....	5	20	191	9.5	5	984	984
" 10.....	4½	210.3	159.3	370.2	84.	56.	(66) 296	(109) 196	(109) 492	(66) 296	(109) 492	(109) 492	" 28.....	6	24	248	10.4	..	....	....
" 17.....	5¼	260.8	214.3	475.1	109.1	70.	(72) 382	(119) 246	(119) 628	(72) 382	(119) 628	(119) 628	July 1.....	4	16	248	15.5	4	1,249	1,249
" 24.....	4¾	330.8	279.3	610.1	138.3	106.	(102) 485	(178) 372	(180) 857	(102) 485	(178) 372	(180) 857	" 6.....	7	28	109	4.	..	....	....
							(66) 296	(109) 196	(109) 492	(66) 296	(109) 492	(109) 492	" 9.....	8	32	109	3.	3	432	432
							(72) 382	(119) 246	(119) 628	(72) 382	(119) 628	(119) 628	" 12.....	4	16	119	7.5	..	....	....
							(102) 485	(178) 372	(180) 857	(102) 485	(178) 372	(180) 857	" 13.....	6	24	119	5.	4	588	588
							(102) 485	(178) 372	(180) 857	(102) 485	(178) 372	(180) 857	" 20.....	5	20	180	9.	..	....	....
							(102) 485	(178) 372	(180) 857	(102) 485	(178) 372	(180) 857	" 21.....	5	20	180	9.	3	817	817
Totals.....	55½	3,411.5	2,162.8	5,574.3	....	....	5,296	3,176	8,472	4,282	2,693	6,977	15	72	288	2,140	7.4	45	8,184	6,689
Total length of avenue to be paved, 20,110 feet.							Will require 29,065 barrels cement.													

¹ See Exhibit F.

² See Exhibit H 2, page 2.

³ See Exhibits K 4 and K 5.

⁴ Requires 3,508 barrels to a square.

The facts here presented may be summarized as follows :

Frequency of the inspections.

As to the Frequency of the Inspections.

First week, May 10 to 15—No inspection whatever.

For five weeks (ending May 22, 29, June 5, 12 and 26)—Inspections on one day in the week, apparently covering cement from the lower section only.

For five weeks (ending June 19, July 3, 10, 17 and 24)—Inspections on two days in the week, one for each section of the work.

Making 15 days out of 62 on which work was being done, on which inspections took place.

Scope of the inspections.

Scope of the Inspections.

As Engineer Webster states that each *brique* was made up from the samples "taken from 2 to 4 barrels," I have assumed that it represented four barrels, so as to be as liberal as possible. Hence,

On days when inspections took place, 1 barrel in 7½ inspected.

1. The inspections made during these fifteen days embrace samples from 288 barrels; now, on these days I estimate that the aggregate number of barrels used was 2,140 (see column 17 of statement), or one barrel inspected out of every 7½ used.

Of the cement presumed to have been used,

2. Taking Engineer McLean's report as the basis of a calculation by which to ascertain the number of barrels of cement consumed up to Saturday, June 5, and granting, as is claimed in the reports of the officers engaged in overseeing the work, that the specifications of the contract in the matter of cement had been followed since that date, it appears that of 6,977 BARRELS OF CEMENT ACTUALLY USED (see column 13 of statement) 6,689 BARRELS (see column 21 of statement) OR 95.9 PER CENT. WERE NOT INSPECTED AT ALL.

95.9 per cent. not inspected.

Of the cement which should have been used,

3. But assuming, as we have a right to do, that from the 12th of May up to the 5th of June, the full number of barrels of cement called for by the contract should have been put into the work; it appears that the whole number of barrels which should have been thus worked into the concrete up to July 24, would be 8,472 (see column 10 of statement), OF WHICH 8,184 BARRELS (see column 20 of statement) OR 96.6 PER CENT. WERE NOT INSPECTED AT ALL.

96.6 per cent. not inspected.

Inspection of cement on New Aqueduct. Rules.

If this is to be the rule followed until the pavement is completed, then out of the 29,000 barrels of cement required for the concrete foundation, but 986 or 3 4-10 per cent. will ever be inspected.

Quantity inspected.

In a recent report made to the Aqueduct Commission, by its Chief Engineer, on the subject of the inspection of the cement used in the construction of the New Aqueduct, it is stated, that the rule is to inspect one barrel in every ten, and that as a result of such inspection from the commencement of the work up to the date of the report (June 14, 1886) there had been examined on the Third, Fourth and Fifth Divisions of the work 28,598 barrels of cement, out of which 1,632 barrels or 5 7-10 per cent. had been rejected.

Inspection of cement for the foundation of Statue of Liberty. Quantity. Rules.

In the work of constructing the foundation and pedestal for the Statue of Liberty on Bedloe's Island, requiring the expenditure of 34,400 barrels of cement, the Engineer-in-Chief reports, that in addition to a careful examination of each package for traces of dampness, testing samples were taken from every tenth barrel. These samples were not only tested for tensile strength but for fineness as well, no cement being used of which ten per cent. was rejected by a sieve of 2,500 meshes to the inch, and that the usual percentage of rejection was under five per cent.

Comparative statement of results on the three works named.

The facts presented may therefore be stated as follows :
On the New Aqueduct 10 per cent. of the cement is tested, with 5 7-10 per cent. of the inspections rejected.
For the Statue of Liberty 10 per cent. of the cement is tested, with 5 per cent. of the inspections rejected.
On the Fifth Avenue repavement, 3 4-10 per cent. of the cement is tested; no rejections reported.

The cement used on Fifth Avenue not superior to that used on the other works.

It is not reasonable to suppose that the cement used on Fifth Avenue is so superior to that consumed on the great works named, that it has not been necessary to reject any. Had the same rules been observed which obtain on the Aqueduct and at Bedloe's Island, the rejections would undoubtedly have been not less than 5 per cent. of the whole quantity used, or on 6,977 barrels, 348 barrels.

Engineer Church's opinion of brands.

Engineer Church in speaking of different brands of cement, a point on which some stress was laid by Mr. Baird, at the examination held before the Commissioner of Public Works, on June 23, says: "I know of no such 'thing as a standard cement; all cements vary in quality, and I would not 'accept any merely for its name, all must be tested.'"

The cement used on Fifth Avenue has not been properly inspected.

In view of these statements, I assert so far as a proper inspection of the cement used on the Fifth Avenue work up to this time is concerned, a very important duty has been most imperfectly performed, and that it is impossible to ascertain whether all the cement is "of the best quality," unless this work of inspection is hereafter more thoroughly done.

Saving on cement up to June 5, 1886.

With respect to the reduction in the quantity of cement used up to the 5th of June, compared with what should have been used as set out in Engineer McLean's report, I estimate the saving to the contractor on this material, on the work done up to that day, to have been \$1,644.30.

For the whole work, on an estimated five per cent. of rejections, the saving on 29,065 barrels would be 1,952 barrels, which, at \$1.25, is \$2,441.

2. Sand.

References to sand in preliminary report.

In my preliminary report, in speaking of the sand used for concrete, I described the mixture of sand and gravel which passed under the name of sand. The report was accompanied by four specimens of this material taken from piles along the work. Since then a considerable number of additional samples have been obtained.

Greater part of sand used from Cow Bay.

With the exception of two lots, one used on the upper section of the work between Eighty-sixth and Eighty-seventh streets, and the other on the lower section, in front of the Windsor Hotel, on the block between Forty-sixth and Forty-seventh streets (being that used by the International Pavement Co., in putting down their asphalt blocks on a concrete foundation in 1880 and 1881, and re-used by the contractor), the whole of this material used up to the date of this report has been that described in Inspector Abbott's testimony before the Commissioner of Public Works June 23, as coming from Cow Bay.

Sand not screened.

I also stated that none of the material had ever been screened before use, and this remark is equally true of all that has been put into the concrete since that date.

Quality of the sand in the material used as such excellent. Only 65 per cent. of the 100 per cent. charged for is sand.

As has already been remarked the quality of the sand is excellent, what I object to is the quantity the City gets in lieu of what it is charged for. That is, it gets in the concrete as laid but 65 per cent. of what is charged in the certificates at 100 per cent.

Character of data in Exhibit R.

EXHIBIT R presents the results of analyses of six samples of the sand used in making concrete, taken from different parts of the work at different times; and for purposes of comparison the analyses of other specimens, notably, one of the crushed trap-rock used in preparing the fine concrete for the pedestal of the Statue of Liberty, on Bedloe's Island.

In order to arrive directly at the relative value of the different kinds of sand used, the data given in Exhibit R has been condensed into the following statement :

1 See EXHIBIT K 4, page 2.
2 See EXHIBIT M, page 2.
See EXHIBIT H 2.

3 See EXHIBITS G 13, 15, 16 and 17.
4 See EXHIBIT E, page 17.
5 See EXHIBIT M.

Exhibit R condensed.

Comparative Statement showing the Percentage of Weight of Earthy Matter, Gravel, coarse and fine Sand, in the material used for making Concrete on Fifth Avenue; and the Relative Merit of each Variety as compared with the crushed Trap-rock used in the Pedestal of the Statue of Liberty.

MATERIAL.	No. IN EX. R.	NOT RECOGNIZED BY THE CONTRACT.			ACCORDING TO CONTRACT.			TOTAL PER CENT.	COMPARATIVE MERIT.		
		Earthy Matter.	Gravel.	Total.	Under No. 8 Mesh and above No. 30.	Under No. 30 Mesh.	Total.		Weight of 100 Cu. Ins. Oz.	ORDER OF VALUE.	
										Per Cent.	Better or Worse.
Mixed silicious sand } Gillmore..... }	1	....	....	....	89.9	10.01	100.00	100	.....	....	.....
Fine sand..... }	5	4.99	19.72	24.71	14.93	60.36	75.29	100	97.	....	.....
Sand, Windsor Hotel.. }	7	3.82	22.90	26.72	32.95	40.33	73.28	100	106.53	9.8	Better than No. 5.
Cow Bay..... }	8	1.67	35.40	37.07	45.68	17.25	62.93	100	105.16	....	.....
"..... }	9	2.16	38.59	40.75	35.39	23.86	59.25	100	109.98	....	.....
"..... }	9	3.02	24.52	27.54	37.25	35.21	72.46	100	106.91	....	.....
"..... }	10	2.94	30.90	33.84	38.96	27.20	66.16	100	109.98	....	.....
Average, Cow Bay.	..	2.45	32.35	34.80	39.32	25.88	65.20	100	108.02	11.3	Better than No. 5.
Crushed trap..... }	4	4.31	30.80	35.11	33.82	31.07	64.89	100	119.96	23.66	" "
"..... }	..	....	....	....	....	....	....	..	13.36	.....	Better than Cow Bay.

† Under the microscope, proved to be composed of minute angular fragments of rock, cannot properly be classed as earth.
‡ Small sharp angular fragments of rock below No. 2 and above No. 8, cannot properly be classed as gravel.

Density of samples considered.

The most noticeable point in the foregoing table is the relative density of the samples, as indicated by the weight of a given volume, being least for the fine sand (No. 5), (the proportions of voids increasing as the size of the particles diminish), and greatest in the crushed trap-rock, the density of the latter being nearly 24 per cent. greater than that of No. 5.

Value of any material for making concrete depends on nature of surface of particles or grains.

Another point which the table develops is, that the value of the material for making concrete depends directly upon the character of the surface of each atom, particle or fragment, increasing with its roughness and angularity, and decreasing as the surface becomes smoother.

The so-called earthy matter in crushed trap composed of minute fragments.

The so-called "earthy" matter in the trap-rock is, in reality, rock crushed so fine that the atoms floated in the process of washing the sample; but, under the microscope, each one of these atoms was ascertained to be a rough, angular fragment, with all the surface characteristics of its bulkier neighbors, admirably fitted for packing the minute voids.

In the crushed trap the size of the grains progressively and uniformly decrease.

A further examination of the analysis of this crushed trap in Exhibit R shows how progressively the size of the grains, making up the mass, decreases from No. 8 mesh to No. 260, thus as it were, giving an assortment of sizes most suitable for filling the voids.

Large fragments show same characteristics of surface as smaller ones.

The same characteristics of surface and interlacability are exhibited in the larger fragments, classified for convenience only, under the head of "gravel," being composed of angular, serrated pieces of rock, which, in grading for size, fall between No. 1 and No. 8.

Deductions.

Hence, the deductions to be made from the figures presented are :

1. The rougher the surface of the material the stronger and more solid the concrete made from it.

1. That the more angular, serrated and rough each grain or fragment is the more closely it will pack in the mass, the less will be the percentage of voids, the greater will be the friction developed between adjacent surfaces, and, therefore, the stronger, denser and more solid will be the concrete into which such grains or particles enter.

2. The greater the variety in size of grains the better the result.

2. That within the limits of size prescribed for gravel and sand, say from No. 1 mesh to the finest used, it is better to have a variety of sizes of grain, the quantity of each of which shall uniformly decrease as the mesh grows finer; in this way the voids will be most perfectly filled.

3. That material is the best which unites all these qualities.

3. That that is the best material for making concrete which, in itself, most perfectly unites these qualities.

Crushed trap-rock best.

Thus, in crushed trap, putting the so-called "earthy" matter with the finer grains, where it belongs, we have say one-third by weight (30.80 per cent.) of the gravel sizes; one-third by weight of sizes No. 8 to No. 30 (33.82 per cent.); and one-third (35.38 per cent.) below No. 30.

Cow Bay sand next.

The Cow Bay sand next best fulfills these conditions, while the fine sand, No. 5, is the least valuable.

Objections to common gravel.

Applying this test to ordinary gravel the objection to it is, that it is composed of rounded water fragments, having a smooth surface, rarely presenting any angles or sharp edges; so that pebbles in contact roll or slide over each other with the least friction; such a surface affords also but little hold for the mortar, hence this material is devoid of the very qualities which are essential to the best concrete.

Use of gravel in concrete inconsistent with the "best" results.

I claim, therefore, that its presence is positively injurious.
It is true that gravel of all sizes is used in large quantities for making concrete, and this fact is set up as a sufficient reason for its use as mixed with sand on the Fifth Avenue; but bearing in mind the requirements of the law, which I have had occasion to so frequently refer to, that on this work the foundation is to be the "best," I contend that this portion of the law can never be obeyed, so long as gravel, whether mixed or unmixed with sand, continues to be used.

Gravel should be replaced by small broken stone.

If the broken stone was properly screened and cleaned, the place now taken by this gravel would be filled by a certain proportion of irregular, angular, rough fragments which would pass a No. 1 and be held by a No. 4 screen; these various sizes, combined with the "clean, sharp sand" prescribed by the contract, would, when mixed as concrete, give an artificial stone many times stronger than the best that can be made from smooth pebbles.

Quantity of sand used on the work.

Coming now to the quantity of this highly objectionable material present in the "sand," as daily used, and to the very serious question as to how far a departure from the strict letter of the contract regarding the use of "clean, sharp sand" has heretofore and does now entail a positive loss on the City, I give the following figures :

Of sand for making concrete, there will be required for the entire work, in round numbers.....	8,100
And for bottoming the paving-blocks.....	7,700
Total.....	15,800

Quantity of objectionable matter worked into concrete and charged for.

By the foregoing statement it appears that the average quantity of sand in the material from Cow Bay is 64.88 per cent.; calling it 65 per cent., there has been and will be put into the work—

Of "clean, sharp sand," as per contract, 65 per cent., or.....	10,400
Of earthy matter and gravel, in violation of the contract.....	5,400
Total.....	15,800

Saving effected by the contractor by the use of this material.

I estimate the saving effected by the contractor by the use of this objectionable material to be fifty cents per cubic yard, WHICH FOR 15,800 CUBIC YARDS, AMOUNTS TO THE SUM OF \$7,900.

Reference to character of the broken stone in first report.

3. Broken Stone.
In my preliminary report, in speaking of the quality of much of the gneiss bottoming then being removed from the roadbed above Eighty-fifth street, and taken to the breaker at Seventy-seventh street and Fifth Avenue for crushing, it was estimated, "that on account of its micaceous and dis-integrated character, not less than twenty per cent. should be rejected for 'making concrete,' * * * * * 'in the breaker the greater portion 'is reduced to powder'; and it was added, that 'at the breaker the 'crushed rock, including the dust, is run into a large hopper, from which it 'is discharged directly into the wagons, which transfer it to the work 'between Thirty-seventh and Forty-first streets.'"

Efforts made to improve its quality after June 4.

As a consequence of the statements regarding the bad character of the concrete, made in Engineer McLean's report of June 4, and the subsequent agitation of the subject, some efforts were made to clean the broken stone.

Hand screening June 12 to 19, at breaker.

Screen put in breaker, June 20.

And stone since well cleaned.

Referred to by Inspector Abbott, June 23.

Hand-screen referred to used May 12 to 14.

No other screening on lower section until June 7 or 8.

From 10th of May to 5th of June all stone was delivered on lower section in form shown in samples 9 and 10.

Sample No. 150, dust from lot corner Seventy-seventh street and Fifth avenue. Identical in character with 9 and 10. 21st June to 24th July 200 cubic yards dust made by breaker.

Verifying the assertion in my first report that 20% stone should be rejected.

Had the methods followed prior to June 4 been observed, all this dust could have gone into the concrete.

Engineer McLean's opinion of the character of the broken stone prior to June 1.

Broken stone began to improve from June 7.

Not fully up to standard June 23.

Inspector Abbott on use of forks.

Not a fork on the work in May.

Forks did not fully replace shovels until June 26.

Since 7th July quality of stone has improved.

But not attention enough paid to size.

Must be screened.

Engineer McLean's report on method of mixing confirms mine of May 26.

And produces a reform in this part of the work.

Measuring by barrow-loads inexact.

Measuring by boxes described.

Figures 18, 19 and 20.

and on the 12th of June, a man was found on the east side of Fifth Avenue, near the corner of Seventy-seventh street, screening the crushed rock as it came from the breaker. On the 16th of June, two men were found employed at this work and so continued until the 19th of June. By Monday, the 21st of June, the contractor had had time to have made and set in the bottom of the hopper attached to the breaker, a suitable screen, to replace the movable ones used on the street. This screen consists of a plate of boiler iron $1\frac{1}{2}$ feet long by 4 feet wide, set flush with the bottom of the hopper, a portion of it $9\frac{1}{2}$ feet long by 4 feet wide, being pierced with round holes 1 inch in diameter, set in rows $\frac{3}{4}$ of an inch apart each way. The bottom of the hopper slopes at an angle of 25° or 30° .

Since the last date all the stone-dust has been separated from the coarser material as it passes over the screen, falling into a receptacle below the level of the breaker, whence it is removed by a cart to a dump in the sunken lot near by.

It was to this screen, put in operation *but two days before*, that Inspector Abbott referred in his testimony taken before the Commissioner of Public Works on June 23, where he says, in speaking of the broken stone used on his section: "The stone comes from a crushing machine, on which there is a screen which makes them come out clean. At first, when they were cleaned by a hand-screen, they were little dirty."

The hand-screen referred to was that used between Thirty-seventh and Thirty-eighth streets on May 12, 13 and 14, after which it disappeared, and the dust was shoveled into the concrete with the coarser material with which it was mingled, up to the time Engineer McLean made his first report. No other broken stone used on the lower section was screened by hand, until that screened at the breaker, as noted above, except, possibly, a small lot on the 7th or 8th of June, just above Forty-second street, in anticipation of an official visit from the Commissioner of Public Works on June 8, on which occasion a platform of sand and cement, mixed dry and arranged with a basin-shaped cavity, together with five barrow-loads of unusually clean broken stone ranged about the platform, were most ostentatiously displayed in a manner not seen before or since.

The absolute fact is, that from the 10th of May to the 5th of June all the broken stone used on the lower section of the work was delivered in the condition described in my preliminary report. Accompanying that report were samples Nos. 9 and 10, being specimens of broken stone with associated dust, fairly illustrating the condition of the stone as delivered during the period named.

Herewith I hand you sample No. 150, being a specimen of the dust from the breaker piled in the vacant lot southeast of Fifth Avenue and Seventy-second street since the 21st of June. It will be perceived that the character of this material is identical with that of samples 9 and 10.

I find by measurements taken at the dust dump, that during the five weeks between the 21st of June and the 24th of July, there was accumulated 200 cubic yards of breaker dust.

As the capacity of the crusher for the kind of rock treated is about 50 cubic yards per day, for the period named the product would be about 1,400 cubic yards, of which 1,200 were clean stone and 200 were dust, practically confirming the truth of my assertion that "20 per cent. of the stone sent to the crusher should have been rejected."

During the same period of five weeks, the quantity of concrete laid on the lower section of the work required the use of 1,200 cubic yards of clean, broken stone. Had the same methods prevailed during this period which obtained prior to the 5th of June, the 200 cubic yards of dust referred to, being nearly 17 per cent. of the whole quantity of stone required, would have all gone into the foundation, confirming the accuracy of my estimate in the first report, that "if the crushed rock had been run over graduated screens at the breaker, at least 15 per cent. of the material actually delivered and worked up into concrete between Thirty-seventh and Fortieth streets would have been sifted out."

Speaking of this period, Engineer McLean, in his report of June 23, says: "I am of the opinion that, until my inspection was commenced, the broken stone was not screened or handled with the care necessary to extract the dust and dirt. It is now screened at the crusher at Seventy-seventh street, and it is handled with more care, forks instead of shovels being used."

From about the 7th of June the character of the broken stone began to improve, but even as late as the 23d of June Engineer McLean used this language: "The stone used in making concrete is that found on the line of the work. It is not fully up to the requirements of the contract either as to size or perhaps hardness and strength."

In his report dated August 3, Inspector Abbott, referring to the method of handling the broken stone on his section says: "As to the broken stone, it came from a crusher from the upper end of the avenue, and was brought to my portion of the work, where it was screened and handled with forks in order that any particles of dust and dirt should be removed."

The fair inference from this statement is that forks were used to handle the broken stone from the commencement of the work; the fact is, there was not a fork seen on the work during the month of May, and it was not until some time after Engineer McLean's report had been sent to the Commissioner of Public Works that any were used. I saw them used for the first time on the 19th June, on the upper section, and there were but two in use that day. After Mr. Birmingham came on the work (June 26), the broken stone was really handled with forks.

On the 7th of July, on the upper section, I observed that care was taken not only to handle all the broken stone with forks, but to remove the stone-dust from the roadbed to the sidewalks. Since that date, the quality of the stone on both sections has improved, although not enough attention is yet paid to the requirements of the contract touching size. This condition can never be properly fulfilled until the stone, as broken, is passed over a screen with holes of the standard gauge.

MAKING AND LAYING THE CONCRETE.

1. Mixing.

The report of Engineer McLean of the 4th of June, in regard to the improper manner in which the concrete had been mixed up to that date, fully confirms the statements made on this subject in my report of May 26.

The effect of the first-named report was to at once lead to a reform in the proportions of the parts, and after the appointment of Special Inspectors Lawrence and Parker the quantities of each ingredient given in Mr. Lawrence's report of July 29, seem to have been carefully adhered to on both sections of the work.

Engineer McLean, in his report of June 23, says, "since the 9th (June), the concrete has been made in proper proportions."

For the closest and best work however, such as the contract demands, the method followed of measuring by barrow-loads is too inexact to give uniform results. The only accurate and at the same time practical plan to follow is that of using boxes with sloping sides, of a content exactly suited to the volume of each ingredient, similar to those used in making the concrete for the foundation of the pedestal of the Statue of Liberty, as is fully described in the report of the Engineer-in-Chief.¹

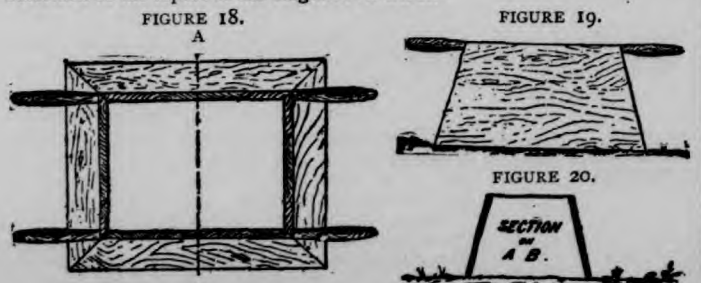


Figure 18 represents the plan of such a box, Figure 19, a side view, and Figure 20, a cross-section on A-B.

¹ See EXHIBIT E, page 3.

² See EXHIBIT H 5, page 11.

³ See EXHIBIT G 17.

⁴ See EXHIBIT H 5, page 13.

⁵ See EXHIBIT G 15, page 9.

⁶ See EXHIBIT H 5, page 13.

⁷ See EXHIBIT M.

Boxes, how used.

Advantages of this method.

Careful observance of proportions no guarantee of good quality.

Other indispensable conditions.

Most serious objection to present method is size of the batches.

Too large.

Different sizes of batches, Gillmore.

For foundation, Statue of Liberty.

On Fifth Avenue.

Work per man as compared with Gillmore's and Stone's methods.

Marked tendency to use too much water.

Danger of "setting" before laying. Cases cited.

Testimony of Inspector Abbott on this point.

Use of concrete mixed over three hours.

Case cited.

Not until batches are reduced in size and less water used can law be fulfilled. Recommendations.

Mr. Baird's proposal.

What contract requires.

How specifications respecting depth have been observed.

Up to May 26.

Still adhere to my original statement.

Thickness of concrete. May 26 to June 26.

Extracts from field notes.

The box having been placed on the platform, small end up, it is filled with the cement, sand, or broken stone, as the case may be, and the top edge struck. The box is then removed. By this method there can be no possible deviation from exact quantities and with properly organized and directed labor, the work of mixing can be executed fully as rapidly as it is at present.

But the mere fact that the prescribed proportions of the several ingredients have been observed, is by no means a guarantee that the concrete will be the best, or that it will even be good. Indeed, I shall show that it may be very poor, and even worthless, since the size of the batches and the thoroughness and rapidity with which they are manipulated are quite as essential to the best results.

Hence, I am led to say, that the most serious objection to the method which has been followed since work on the Fifth Avenue began, and particularly since the proportions of the ingredients have been so carefully observed, is that the batches are too large.

If concrete is made according to the directions of General Gillmore, as quoted in my preliminary report, each batch will contain (the proportion of the cement, sand and broken stone being as prescribed in the contract), about 20 cubic feet, or an average of five feet for each of the four men engaged.

If made according to the practice observed in the work on the foundation for the pedestal to the Statue of Liberty, in as large a batch "as is consistent with good work, having in view a saving of expense to the contractor,"¹ each batch would contain 64 cubic feet, or eight feet for each of the eight men engaged.

Four barrels of cement, twelve barrow-loads of sand, and twenty-three barrow loads of broken stone mixed as per Lawrence's report,² will give 82 cubic feet in a batch, or as usually mixed by an average of eight men, ten and one-fourth cubic feet each.

Being double the quantity per man, by General Gillmore's method, and twenty-five per cent. more than General Stone allowed his men to make under the most favorable conditions, and with a desire to favor the contractor as much as possible.

The practical result of this attempt to do too much is, that there a marked tendency to use too much water, and make up with water what is lacking in vigorous, well-directed and prolonged manipulation. If the work is not pushed with the utmost vigor—and handling so large and heavy a mass is a most difficult and laborious task—with a quick cement, the concrete will take a decided set before it can be got on its bed.

Instances of this have come under my own observation, and I am prepared to cite at least six more which have been witnessed by my assistants.

This trouble will frequently occur where the cement and sand have been made into mortar just before the dinner hour, and the stone is added on the return to work. A pick has been frequently used to separate the mass at the core.

The testimony of Inspector Abbott confirms all I have said. In his report, dated August 3,³ he states: "Subsequently, by direction of the Deputy Commissioner, the concrete was mixed as required by the specifications. The sand and cement mixed first and the stone stirred in afterwards. The result is that the cement and sand when thus mixed with the water set so rapidly that as thorough a mixture is impossible as when done the other way. This can be seen by examining the mixing-boards, where the cement and sand can be seen firmly attached to the boards, showing that all the cement mixture had not been incorporated with the broken stone."

A still more serious fault has been committed, how often it is impossible to ascertain, in using concrete which has been mixed over three hours, in direct violation of paragraph 13 of the specifications to the contract. The fact that one such violation can be clearly proved, greatly discredits the character of the whole foundation.

Such a case occurred on the 28th of July, when a whole batch, which had been mixed late in the afternoon of the 27th, had to be left on the platform in consequence of a heavy shower coming up.⁴ When, on the following morning, the workmen attempted to remove the concrete to the roadbed, the mass had to be loosed with a pick before any shoveling could be done. By a liberal application of water the material was got into a condition to be handled, and, under the direction of the Special Concrete Inspector, the entire batch, amounting to thirty-five barrow-loads, was spread on the road bed before the Chief Inspector arrived. The stuff was so slushy that it could not be rammed.

I am prepared to point out the exact locality where this defective material was placed.

It is evident, I think, from these statements, that the inspectors as well as the contractor have something yet to learn on the subject of making concrete. I contend, therefore, that not until the batches are reduced in size and less water is used in mixing, will the conditions of the law and the contract, respecting the best foundation, be fulfilled.

In my opinion, a reduction in the size of the batches of one half, the use of boxes instead of barrows for measuring the ingredients, and a far more parsimonious use of water, would contribute at this time more than anything else to an improvement in the quality of the concrete, and to avoiding the faults just pointed out.

2. Spreading.

So important is this operation and the subsequent one of ramming, that for convenience of reference I repeat here so much of my first report as relates to what the contractor offered and what he obligated himself to perform.

Proposal No. 2 of Matthew Baird provides:

"Concrete of such depth as Commissioner requires * * * to be rammed and compacted until a clear mortar surface, which surface shall be ten inches below line of pavement." * * *

Paragraph 13 of the specifications requires that: "Upon the foundation thus prepared shall be placed a bed of concrete to the depth of six inches. * * * The concrete shall be placed in proper position and then rammed until it is thoroughly compacted and has a clear mortar surface, which surface when left shall be ten inches below the grade of the top of the finished pavement."

Regarding the depth of the concrete foundation as laid between Thirty-seventh and Fortieth streets, in my preliminary report I stated that "between the streets named it will not average five inches in thickness, and we entertain grave doubts whether it will not average less than four inches," adding that "between Ninetieth and Eighty-ninth streets the concrete was spread from about two to four inches in thickness."

Notwithstanding the very specific statements of the "Engineer," of the Water Purveyor and of the two inspectors⁵ that the concrete foundation has been made of the thickness prescribed by the contract, I still adhere to my original statement, and am ready to have its accuracy tested, and to abide by the result of taking up the pavement within the limits given above, at such points as I shall designate.

Regarding the thickness of the concrete laid since the rendition of my preliminary report, I make the following extracts from my assistant's and my own field notes.

Friday, June 4. "The concrete is being laid (between Forty-first and Forty-second streets) from five to six inches thick, to-day; this increase in depth begins at about No. 489 Fifth avenue."

Sunday, June 6. "The most noticeable thing was the thickness of the concrete as last laid between Eighty-eighth and Eighty-seventh streets, which was full six inches. At Forty-second street the edge of the concrete bed was well covered with gravel; it did not appear as thick as on upper section."

Wednesday, June 9. "Between Eighty-seventh and Eighty-eighth streets the concrete is being laid from 4 to 5 inches thick, except along east gutter, where it is from 3 to 4 inches."

Thursday, June 10. "The concrete is being laid about 4 inches thick to-day between Forty-second and Forty-third streets. About 4 inches thick to-day at Eighty-seventh street."

Saturday, June 12. "Forty-second to Forty-third street. The line of concrete at 10.55 A.M. was opposite door of No. 510 Fifth avenue, laid very soft and slushy, and not over five inches thick. No ramming."

Tuesday, June 15. "Concrete is being laid five inches thick to-day between Forty-second and Forty-third streets."

Saturday, June 19. "Concrete at Eighty-sixth street, four to five and a half inches thick; at Forty-fourth street, four to six inches."

¹ See EXHIBIT M.

² See EXHIBIT G 7.

³ See EXHIBIT G 15, page 9.

⁴ See EXHIBIT F, page 2.

⁵ See EXHIBITS G 13, page 4; G 16, page 4; E, pages 2, 9 and 10.

Monday, June 21. "The concrete just north of Forty-fourth street is four and a half inches thick."
 Tuesday, June 22. "Line of concrete at 2.30 P.M., opposite doorway of No. 537 Fifth Avenue, five inches thick."
 After June 26 laid full depth.
 After the 26th of June, when Inspector Birmingham came on the work, the concrete was laid full six inches and at the date of this report it is being laid full thickness on both sections of the work.

Engineer McLean's testimony
 Reviewed.
 In his report of June 23, Engineer McLean, in speaking of the concrete, says: "I have found the concrete full in thickness, slight deficiencies being made up by slight excesses."
 Evidently, my assistant and myself mainly observed the deficiencies. I cannot, however, agree with Engineer McLean that slight excesses make up for slight deficiencies; what he means by slight the Engineer does not explain, but where such deficiencies exist and are sufficiently large to attract attention, they not only may seriously affect the smoothness of surface of the concrete, but may impair its power of resistance to strains or crushing, which power it is the aim of the contract to make as uniform as possible.
 In engineering, an excess of strength in one part of a work by no means compensates for the want of it in another part; the structure is no stronger than its weakest member.

Ramming.

Importance of thorough ramming.
 The importance of thoroughly ramming concrete, beton, or any of the mixtures from which artificial stone is made, is dwelt upon with much force by all writers on engineering; since the more intimately the particles of matter are associated, the more closely will the adjacent surfaces be brought in contact, the more perfect will be the action of the matrix and the more dense and solid is the resulting artificial stone.

Secret of making best concrete.
 The ingredients having been properly prepared, the secret of making the "best" concrete, is the use of the least possible quantity of water (only sufficient to give the mortar the consistency of damp brown sugar), broken stone perfectly freed from dust or dirt by washing, thorough incorporation and thorough consolidation by ramming.

Ramming not properly done.
 I have already referred, under the head of mixing, to the fact that all through this job too much water has been used in making the concrete. I now assert that the ramming when done at all, has been so inefficiently executed, that practically it has added little or nothing to the density or resisting qualities of the concrete.

Up to June 30 no rammers used.
 Up to the 30th of June, no rammers had been used on the work in connection with laying the concrete.

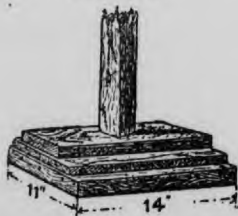
Engineer McLean in his report of June 23, says: "The concrete is not rammed as called for, but dressed to a wet surface with a shovel."
 Inspector Abbott, in speaking of the concrete in his report of August 3, says: "When spread it was tamped by the men with the backs of their shovels, and with sufficient force to compact it thoroughly and leave a clear mortar surface as required by the contract."

"Tamping" as done ineffectual.
 Now I have repeatedly seen this operation of "tamping" performed, as described by Inspector Abbott and disagree with him entirely as to its "compacting the concrete thoroughly"; it does nothing of the kind; compared to the effect of a good twenty-pound rammer, the work done by a shovel amounts to absolutely nothing, it was simply used as trowel might have been, and had too little weight and too large a surface to do any real work in solidifying the mass.

Fallacy of a "clear mortar surface."
 All the inspectors lay great stress on the fact that a "clear mortar surface" is obtained; but if an excess of water is used in mixing, nothing is easier to produce, since such a surface will appear by simply spreading and "slicking" the concrete with the back of the shovel.

Effect of Engineer McLean's report.
 Engineer McLean's very emphatic statement, that the concrete was not rammed as called for, evidently had its effect; for two days after a copy of this report was sent to the Commissioner of Public Works, three rammers (if such tools as appeared could be called by this name) were seen on the work for the first time (June 30), and have since been used on both sections to ram the concrete. They consist simply of a piece of two-inch spruce plank, 11" x 14", with a couple of battens of inch stuff nailed on, to keep the plank from splitting, fitted with a suitable handle. They weigh seven and a half pounds each. Figure 21 represents one of these rammers.

FIGURE 21.



The manner of using them a burlesque on good work.
 In regard to the operation of using them, which I have frequently witnessed, it is sufficient to say that, as compared with the ramming done at Bedlow's Island, on the concrete in the foundation for the Statue of Liberty, it is simply a burlesque, and, in my opinion, is of no practical value in compacting the concrete, as required by the contract. In fact, the use of these rammers is a mere form, which might enable the men working them to testify before a Court that they had used a "rammer" on the concrete, but nothing more.

Rammers used at Bedlow's Island.
 In marked contrast are the rammers used on Bedlow's Island on similar work, one of which is illustrated by Figure 22.

Description.
 It is made from a block of second growth white oak, has 2" x 1/4" wrought-iron tire or ferrule shrunk on a 7" x 7" face, and weighs eighteen pounds.

Relative effectiveness of the two rammers.
 As regards the relative efficiency of the two rammers for compacting concrete, if it is assumed that they are both let fall from the same height, the effective work or vis-viva of the first will be to that of the second as is 1 to 2 2/3; but for effective work per square inch of surface the first is to the second as 1 is to 7 1/8; or in other words, the 18-pound rammer with the 7" x 7" face is more than seven times the superior of the 7 1/2-pound rammer with a 11" x 14" face.

No tool like the eighteen-pound rammer has ever been seen on the work.

FIGURE 22.



Shrinkage of concrete from original volume of ingredients.
 Concrete, when mixed, occupies at first from 3/4 to 3/5 of the total volume of the ingredients before mixing, and when laid and thoroughly rammed, it undergoes a still further reduction in volume of about 1-6, so that its final volume varies from 5-9 to 3/8 of the volume of the ingredients, equal to a reduction of 44.5 per cent. and 37.5 per cent. respectively (Rankine, page 373).

General Stone says of the concrete in the foundation of the Statue of Liberty, "64 cubic feet of loose materials in each batch, when well rammed in place, formed 44 cubic feet in concrete," equal to a reduction of 31.25 per cent.

The allowance made in Engineer McLean's report of June 4, in his calculation of the cost of the concrete over an area of 210' by 40', gives a reduction of 36.7 per cent.

Saving in depth effected by manner of ramming.
 Keeping this shrinkage in view, considering the excess of water used in mixing the concrete, that no ramming at all was done until after the 30th of June, and that since that day it has been of the most superficial and ineffective character, I charge that if the concrete had been laid in conformity to the specifications, and had then been properly rammed, the six inches of concrete as loosely spread would have been reduced, by compression, to five inches; and that in consequence of the absence of proper ramming the contractor has been able thus far to save, and, by the same rule, will continue to save to the end of the job, one inch deep of concrete over the whole area to be repaved.

Money value of this saving.
 Taking the figures in Engineer McLean's report of June 4 as the basis of a calculation, which is much more liberal towards the contractor than if

Rankine's figures are used, I find that as a result of this entire absence of ramming prior to June 30, and of the ineffective method since followed, the actual saving to the contractor on the whole work will amount to..... \$12,336 00
 But it has been shown that up to the 26th of June the average depth of the concrete, as laid, without reference to the effect of ramming, was under rather than over five inches; here, then, is an inch of concrete saved over the area laid up to that date. This quantity amounts to 437 cubic yards, which, at the contract price of \$4.10 per cubic yard, amounts to..... 1,792 00

Aggregate saving on concrete.
 MAKING THE AGGREGATE SAVING IN CONCRETE FOR THE ENTIRE WORK..... \$14,128 00

Saving effected by the Use of Imperfect Blocks in Pavement.

Before closing this review of the present condition of the work it is important to note the amount the contractor saves, by introducing into the pavement, as has been clearly proved, blocks which do not conform to the specifications, and which a proper inspection would have thrown out.

In connection with the Table giving the proportion of rejected blocks to blocks handled, the significance of the figures therein given was alluded to. These figures showed that, estimating such rejections by inspection at thirty per cent. of the gross number required to repave the whole Avenue, 11.09 per cent. had been thrown out, leaving 18.91 per cent. to go into the pavement.

If these blocks had all been discarded, as most undoubtedly they should have been, the contractor would have been obliged to replace them by good ones, costing full price, the only offset being what might be obtained for the rejected ones, for use on streets with light traffic.

Estimated money value of saving on blocks.
 I estimate the number of blocks of average size required for the work, in round numbers, at..... 1,900,000
 Calling the number of blocks which have gone into the pavement, and which should have been thrown out, as also such as will go in if the same rules hold, 18 per cent. of the whole, instead of 18.91 per cent., there would be of such blocks..... 342,000
 Which at the cost price of \$100 per thousand, delivered on the Avenue, would amount to..... \$34,200 00
 Deducting the value of 342,000 at say, three cents each..... 10,260 00

LEAVES A SAVING ON THE ENTIRE WORK OF..... \$23,940 00

Bringing together at one view all the savings mentioned we have the following result:

SUMMARY STATEMENT OF THE VARIOUS ITEMS WHEREIN IT IS ESTIMATED THAT THE CONTRACTOR SAVES OUTLAY BY NOT BEING OBLIGED TO STRICTLY COMPLY WITH THE SPECIFICATIONS OF THE CONTRACT OF OCTOBER 28, 1885, TOGETHER WITH THE AMOUNT OF SUCH SAVINGS.

In not being obliged to excavate 16 inches below the legal grade by reason of the crown of the roadway having been raised three inches above the legal grade..... \$5,000 00
 Not being obliged to roll or ram 20,110 feet of road bed..... 5,000 00
 Saving in cement to June 4 in not observing prescribed formula for making concrete as shown by Engineer McLean's report of that date..... 1,644 00
 By imperfect inspection of cement..... 2,441 00
 On 15,800 cubic yards of "sand"..... 7,900 00
 In laying concrete from failure to properly ram the foundation and to lay concrete full thickness up to June 26..... 14,128 00
 The difference in cost between a quality of jointing gravel in conformity with the contract and that in daily use..... 2,000 00
 Saving in quantity of paving-pitch by using poor quality of jointing gravel..... 12,136 00
 Saving due to imperfect blocks laid in the pavement..... 23,940 00

AGGREGATE AMOUNT..... \$74,189 00

CONCLUSIONS.

In view of what has been presented, I feel that I am justified in drawing the following conclusions:

1. In the work of regulating the Avenue, the crown of the roadway has, without any proper authority apparently, been raised three inches above the legal grade, to the manifest injury of the carriageway as regards draft, comfort of passengers and the safety of horses.
2. Although made mandatory by the terms of the contract and necessary to secure the "best" foundation, the surface of the excavation made for the road-bed has neither been rammed nor rolled.
3. One-third of the material supplied as sand comes either under the definition of gravel as given in the contract, or is earthy matter equally objectionable; while nearly one-half of the jointing gravel supplied does not fulfill the specifications, because of the presence of sand.
4. The batches of concrete as now mixed are too large, too much water is used in wetting up the mass, and the concrete as laid is not properly or thoroughly rammed.
5. The provisions of Paragraphs 6 and 11 of the specifications, respecting the inspection of the paving-blocks have not been regarded.
6. Hence the laying and jointing of the blocks and crosswalks, as provided for in Paragraphs 14, 15 and 16 cannot be executed in strict conformity to their requirements.
7. That in consequence of this failure to comply fully with the specifications, terms and conditions of the contract, a large sum of money, the expenditure of which is essential to the proper fulfillment of the contract has been saved to the contractor.
8. These omissions and defects in construction indicate that up to this time the special object and purpose of the statute, "to secure the best description of pavement, of the best material and workmanship, to be laid in the most substantial manner and with the best foundation," has as yet not been complied with either in the spirit or the letter.

WHERE THE RESPONSIBILITY LIES FOR THE VIOLATIONS OF THE LAW AND THE CONTRACT DESCRIBED IN THIS REPORT.

It does not require the trained eye of the engineer to detect the violations of the contract.
 The violations of the contract which have been described are so gross, and the departures from the letter, not to speak of the spirit, of the statute, are so palpable, that it scarcely requires the trained eye of the engineer to discover them, or to appreciate the injury in a mechanical sense, which they do to the whole structure of the repaved street.

Where the responsibility lies.
 Even if some of these violations are obscure, when once pointed out, any non-professional man can appreciate their significance. The point understood, the question very naturally arises, with whom lies the responsibility for these acts of omission and commission?

My answer to this question is: first, THE ENGINEER; next, THE CONTRACTOR; and last, THE COMMISSIONER OF PUBLIC WORKS.

Responsibility of the Engineer.

Referring to the several instances, presented in connection with the detailed description just completed, of the mode of laying the foundation and the pavement, in which I have criticised the methods adopted to accomplish certain ends, it is pertinent to remark that it was to meet and overcome just such technical difficulties as are involved in the methods alluded to, that provision was made in the act of May 28, 1885, for the employment of an engineer.

His duties.
 In addition (in connection with his two inspectors) "to properly inspecting the materials to be furnished and the work to be done under the agreement, and to see that the same correspond with the specifications," it

These duties grossly neglected.

Allowed himself to be superceded.

And see the contract violated.

Without protest.

So long as he retains the position so long he should be held accountable.

Why he has not resigned.

TABLE SHOWING THE NUMBER OF PUBLIC WORKS PLACED IN CHARGE OF CITY SURVEYORS BETWEEN THE 19TH OF FEBRUARY AND THE 1ST OF JULY, 1886, GIVING THE NAMES OF SUCH SURVEYORS, THE NUMBER AND AGGREGATED ESTIMATED COST OF EACH CLASS OF WORKS, AND THE PERCENTAGE OF THE WHOLE ESTIMATED AMOUNT OF COST FOR WHICH EACH SUCH SURVEYOR IS RESPONSIBLE.

SURVEYORS HAVING WORK IN CHARGE.	CONTRACTS LET.		ESTIMATED, BUT NOT LET.		AGGREGATE ESTIMATED COST.	NUMBER OF CONTRACTS.			PERCENTAGE OF BUSINESS.
	No.	Amount.	No.	Amount.		Let and Est'd.	Not yet Est'd.	Total	
J. McL. Smith.....	50	\$1,627,337 12	32	\$520,931 06	\$2,148,268 18	82	5	87	94.03
R. S. Waters.....	8	105,096 98	6	20,163 40	125,260 38	14	2	16	5.48
R. J. Dodge.....	1	6,807 70	1	4,200 00	11,007 70	2	..	2	.49
Total.....	59	\$1,739,241 80	39	\$545,294 46	\$2,284,536 26	98	7	105	100.00

Ratio of Surveyor's fees to cost of works.

One of the results of a very exhaustive analysis made by me of all the contracts let in the Street Improvement Bureau of the Department of Public Works for the years 1882 to 1885, inclusive, was to ascertain that the ratio of the fees of the Surveyors to the aggregate cost of the works, was represented by 3.26 per cent. of that cost. Applying this rule to the amounts in the foregoing table, I have been enabled to prepare the following:

TABLE SHOWING THE GROSS AMOUNT OF FEES EARNED BY EACH SURVEYOR UPON THE COMPLETION OF THE PUBLIC WORKS SPECIFIED IN EXHIBIT L.

SURVEYORS.	ESTIMATED COST OF WORKS IN CHARGE.	FEES EQUAL TO A % OF.	AMOUNT OF FEES.
J. McIntyre Smith.....	\$2,148,268 18	03.26	\$70,033 54
R. S. Waters.....	125,260 38	03.26	4,045 91
R. J. Dodge.....	11,007 70	03.26	358 85
Total.....	\$2,284,536 26	.....	\$74,438 30

What an income of 70,000 dollars can do.

An income of 70,000 dollars for work, to accomplish which not over eighteen months will be required, and at least one-half of which will be completed within the calendar year, for a young man who testified before you on the 21st of July last, that he had been a City Surveyor for but six or seven years, renders it easy, possibly, to put up with professional slights which under other circumstances might be intolerable, and is a salve which appears to have healed any wounds the very uncomplimentary orders of the Commissioner of Public Works may have inflicted.

Manner in which the Engineer has neglected his duty only exceeded by his incapacity.

Be this as it may, it is evident from the facts set out in this report, that the manner in which, and the extent to which this officer has neglected his duty, is only exceeded by his incapacity as an engineer. The manner in which he was appointed, and the unprecedented number of works placed in his charge within a period of four months, to simply visit which once a day would be almost an impossibility, is one of the most flagrant examples of nepotism to be found even in the annals of the Department of Public Works. His retention in a position of such responsibility is a disgrace to the public service.

Responsibility of the Contractor.

Views of ex-Commissioner Campbell on the responsibility and duty of contractors.

The views of Mr. Allan Campbell, who held the office of Commissioner of Public Works from 1875 to 1880, inclusive, upon the duties of contractors, as expressed in his report for the quarter ending June 30, 1878 (page 18), are so apposite that I quote them at length:

"There seems to be a misapprehension as to the obligation and duty of contractors in carrying on works which they have undertaken. Provision is made for the employment of inspectors, whose duty it is to be upon any work to which they may be assigned, and they are required to be vigilant in the discharge of their duty; but this by no means relieves the contractor of his obligation to supervise his own work and to fulfill to the letter the terms of the contract. If an inspector is absent or negligent, or should even consent to the allowance of inferior work, this affords no excuse to the contractor, and he can be compelled to repair and rebuild at his own cost any work thus imperfectly done.

It is not unjust to Mr. Baird to enforce the contract.

"The specifications are explicit and the contractor can read in them his plain duty." It may be urged that as it has not been the custom of the Department of Public Works of late years to thus rigidly enforce contracts, it is unjust to Mr. Baird to make him the victim of a new policy.

It is a sufficient reply to this argument to say, in the words of Mr. Campbell, "the specifications are explicit and the contractor can read in them his plain duty." Moreover, Mr. Baird voluntarily assumed the obligations which the contract imposes, they were not forced upon him, and it would be an insult to his intelligence to presume that he did not fully and clearly understand the exact nature of the responsibilities he undertook in becoming a party to this agreement.

If the laches of the officers charged with protecting the interests of the City have thus far caused the yoke of the contract to bear lightly upon the

neck of the contractor, they have not in the slightest degree impaired the obligations which that contract imposes; hence, if in the order of events, a change of policy or a change of administration should oblige him to remove from the avenue every vestige of the pavement thus far laid and commence the whole work anew, it would only be meting out to him that exact measure of justice which he stands ready to demand from the City, if on its part, it should fail to comply with the least of the obligations by which it is bound in this agreement.

A severe, but salutary lesson.

Such a lesson would be a severe one, but it would be deserved, and its effect would be salutary.

Responsibility of the Commissioner of Public Works.

The Commissioner of Public Works responsible for the acts of his subordinates.

Whatever may be the measure of responsibility of the engineer and of the contractor respectively in this business is a matter of no importance to the public; it does not know them. IT LOOKS ONLY TO THE HEAD OF THE DEPARTMENT, AS THE OFFICER PERSONALLY RESPONSIBLE FOR THE PROPER EXECUTION OF THE WORK AND FOR THE ACTS OF HIS SUBORDINATES.

Letter of the Commissioner to Counsel to the Corporation.

In my preliminary report, under the head of "Appointments of Engineer and Inspectors," I called attention to a letter written by the Commissioner of Public Works to the Counsel for the Corporation on the 6th of May last, asking his advice as to his powers and duties under chapter 371, Laws of New York for 1885.

Plain duty of the Commissioner on receiving reports of May 26 and June 23.

In the letter of the Counsel in reply to the above, this language occurs: "It is plainly your duty to appoint the engineer and the two inspectors contemplated by the act, and whose compensation is provided for by the appropriation. The engineer, however, does not take the place of the Commissioner of Public Works, upon whom the contract very plainly rests the responsibility of satisfying himself as to its proper execution."

What was done.

In view of this opinion, it was clearly the duty of the Commissioner, as soon as the charges made in my report of May 26, and in Engineer McLean's of June 23, were officially laid before him, to have made them the basis of an exhaustive investigation which should probe this business to the bottom.

Under the authority vested in him by Paragraph 20 of the contract, the further prosecution of the work should have been at once suspended until the verity or falsity of the charges thus preferred had been clearly determined.

Evident desire to shield the offenders.

The ex parte examination held on the 23d of June, as described in EXHIBIT T, the entire testimony taken at which is given in EXHIBIT E, and the circular letter of the Commissioner, dated June 28, calling on the officers engaged on the work and on the contractor "to furnish any comments on the charges the facts in the matter may demand," represents the entire action taken.

If it was drawn with an understanding then the certificates

There was no opportunity given these officers to meet their accusers face to face, the pavement in and under which lay the evidences of the neglect and fraud charged remained untouched, and there was an only too evident disposition to evade an honest investigation and to protect the offenders.

May be taken as proof that it has been faithfully fulfilled.

Hence it is that the work has been permitted to be prosecuted in the manner and with the results described in this report.

Finally, the whole matter may be summed up in a few words. If the provisions of this contract, prepared as it has been with scrupulous care and executed under all the formalities prescribed by law, were intended by its makers to be executed, then in the light of the facts set out in this report, its terms and conditions have not been fulfilled and the contractor has no legal claim for any compensation up to this date.

If, however, these provisions were only intended to be understood in a certain restricted or "Pickwickian" sense, and the apparent severity of its terms was only intended to deceive the public, but were not intended to be observed by the contractor, except perhaps "so far as it is possible to enforce any contract," then the "certificates" of the "engineer" and of the inspectors as to the quality of the material and the character of the workmanship might be taken as proof that such a contract had been "faithfully fulfilled."

In view, therefore, of the facts presented in this report, I reiterate here the recommendation made in my preliminary report, that until the work of repaving Fifth Avenue shall have been executed in strict conformity with the specifications, terms and conditions of the contract of October 28, 1885, NOT A SINGLE DOLLAR BE PAID TO THE CONTRACTOR.

All of which is respectfully submitted.

GEORGE T. BALCH.

EXHIBIT A.

CHAP. 371.

An Act relating to the Fifth avenue in the City of New York. Passed May 28, 1885; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The mayor, aldermen and commonalty of the city of New York, by the commissioner of public works, is hereby authorized to proceed forthwith with the work of repaving Fifth avenue in the said city, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street. The said pavement to be of granite blocks, and in order to secure the best description of such pavement, of the best material and workmanship, to be laid in the most substantial manner and with the best foundation, the said commissioner of public works shall, by public advertisement in the CITY RECORD, inserted for at least ten days, invite plans and proposals with specifications annexed for such work. All plans, proposals and specifications submitted to said commissioner of public works shall be by him presented and submitted unopened to a board, consisting of the mayor of the city, the comptroller of the city, and the commissioner of public works, and the said board shall select the plan, proposal and specification which will in their judgment best secure the purposes aforesaid, or they may reject any and all plans, proposals and specifications which they may consider will not secure such purposes, and on such rejections and whenever any successful bidder shall fail to comply with his bid, the commissioner of public works shall again advertise for plans and proposals with specifications annexed for such work, and all plans, proposals and specifications received in answer to any such subsequent advertisement shall be submitted to the said board for acceptance or rejection as hereinbefore provided. Each proposal shall be accompanied by a certified check for twenty-five thousand dollars, upon a New York city bank drawn to the order of the comptroller as a guarantee that the person whose plan, proposal and specifications is accepted by the commissioners shall, within three days after his proposal is accepted, enter into a contract with two sufficient sureties, to be approved by the comptroller, who shall be bound in the sum of one hundred thousand dollars, that said contract shall be in each of its conditions, provision and stipulations duly performed by the said contractor. Within three days after the decision as to who shall receive the contract the comptroller shall return all the deposits made to the persons making the same, except the deposit made by the bidder to whom the contract shall be awarded, and if the bidder to whom the contract is awarded shall refuse or neglect, within ten days after due notice that the contract has been awarded, to execute the same and furnish the security required, the amount of deposit made by him shall be forfeited to and be retained by the said city as liquidated damages for such neglect or refusal and shall be paid into the sinking fund of said city for the redemption of the city debt, but if the said bidder to whom the contract is awarded shall execute the contract and furnish the said security within the time aforesaid, the amount of his deposit shall be returned to him. The contract when so awarded shall, after the same shall have been approved as to form by the counsel to the corporation, be executed in triplicate by the contractors or contractors on the one part, and the commissioner of public works acting for the city of New York on the other part. One of the said originals shall be delivered to the contractor and the other two shall be filed, one in the finance department and the other in the department of public works in said city. No contract shall take effect until a majority of the members of the said board shall certify thereon in writing that its acceptance will, in their judgment, best secure the public interests and the efficient performance of the work therein mentioned.

§ 2. The appropriation made by the board of estimate and apportionment of said city in the tax levy for the year eighteen hundred and eighty-five, for the partial pavement of said avenue is hereby appropriated for the performance of the work by this statute authorized, and the amount necessary to complete the whole work, including the expense of not more than two inspectors and one engineer, shall, on the certificate of the said commissioner of public works, be included in and appropriated by the tax levy for said city for the year eighteen hundred and eighty-six. Payment for the work shall be made to the contractor, under the contract hereby authorized, in monthly installments, and any payments reserved shall be paid upon the said work being finally and fully completed.

1 See EXHIBITS G 10, G 11.

§ 3. When the pavement, or any portion of the same, by this statute authorized is completed, any interference with such pavement, by making any opening therein, or removing any portion thereof, can only be made by any company or companies, officers, agents or contractors duly authorized by law, and in addition to such authority, upon a special permit from the said commissioner of public works; in such permit it shall be the duty of the said commissioner to require the company or companies, officers, agents, or contractors to whom such permit is granted, to open the said pavement in sections not exceeding three blocks to be opened at any one time, and to restore the said pavement in every respect equal in material and workmanship, and laid in as substantial manner, and with a foundation in every respect the same as the pavement laid as by this statute authorized; and if the said company or companies, officers, agents or contractors, fail to conform in every respect to the requirements of such permit, it shall be the duty of such commissioner to withdraw such permit, and upon such withdrawal no work can be proceeded with by said company or companies, officers, agents, or contractors, until the requirements of such permit are fully complied with; and if the said company or companies, officers, agents, or contractors, to whom any such permit is granted, or the said commissioner of public works, fail in the duties hereby required of them, respectively, the directors and trustees of any company or companies, and the said officers, agents, or contractors who shall so fail, and the said commissioner of public works, shall each and all of them be guilty of misdemeanor.

§ 4. Except for the necessary crossing of railroads laid or to be laid upon Fifth avenue, at the intersection of other streets, no railroad shall be laid upon, above or along any part of Fifth avenue in the city of New York.

§ 5. This act shall take effect immediately.

EXHIBIT B.

DEPARTMENT OF PUBLIC WORKS.

1885.

DEPARTMENT OF PUBLIC WORKS,
COMMISSIONER'S OFFICE, ROOM 6, NO. 31 CHAMBERS STREET,
NEW YORK, July 6, 1885.

TO CONTRACTORS.

Plans and proposals with specifications annexed will be received at this office until Monday, July 20, 1885, at 2 o'clock P. M., for Repaving Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street, Pursuant to the provisions of chapter 371, Laws of 1885.

The said pavement to be of granite blocks, of the best material and workmanship, to be laid in the most substantial manner and with the best foundation.

All plans, proposals and specifications must be submitted to the Commissioner of Public Works, and shall be presented by him unopened to a Board consisting of the Mayor of the City, the Comptroller of the City and the Commissioner of Public Works for acceptance or rejection.

No plan and proposal with specifications annexed will be received unless accompanied by a certified check for Twenty-five Thousand (\$25,000) Dollars upon a New York City bank, drawn to the order of the Comptroller, as a guarantee that the person whose plan, proposal and specification are accepted by the Commissioner shall, within three days after his proposal is accepted, enter into a contract with two sufficient sureties, to be approved by the Comptroller, who shall be bound each in the sum of One Hundred Thousand Dollars, that the said contracts shall be in each of its conditions, provisions and stipulations duly performed by said contractor.

Within three days after the decision as to who shall receive the contract, the Comptroller shall return all the deposits made to the persons making the same, except the deposit made by the bidder to whom the contract is awarded; and if the bidder to whom the contract is awarded shall refuse or neglect, within ten days after due notice that the contract has been awarded, to execute the same and furnish the security required, the amount of deposit made by him shall be forfeited to and be retained by the said city, as liquidated damages for such neglect or refusal, and shall be paid in the sinking fund of said city, for the redemption of the city debt; but if the bidder to whom the contract is awarded shall execute the contract and furnish the said security within the time aforesaid, the amount of his deposit shall be returned to him. No contract shall take effect until a majority of the members of said Board shall certify thereon, in writing, that its acceptance will, on their judgment, best secure the public interests, and the efficient performance of the work therein mentioned.

ROLLIN M. SQUIRE, Commissioner of Public Works.

In pursuance of the following preamble and resolution:

Whereas, The Board, composed of the Mayor, Comptroller, and Commissioner of Public Works, appointed under chapter 371, Laws of 1885, is required to select the plan, proposal and specification submitted for the repaving of Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street, which will secure a pavement of granite blocks of the best material and workmanship, to be laid in the most substantial manner and with best foundation.

Therefore be it

Resolved, That the contract for the Repaving of Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street, be and is hereby awarded to Matthew Baird, whose plan, proposal and specification, marked No. 2, for paving with granite blocks, from curb to curb, with joints filled with paving cement, and with concrete foundation, in our judgment will best secure the purposes aforesaid.

Adopted by the Board, September 17, 1885.

JOHN S. ROUTH, Secretary.

[No.]

FORM OF AGREEMENT,

TO BE EXECUTED IN TRIPLICATE.

For Regulating and Paving, with Granite-block Pavement, the CARRIAGE-WAY of Fifth Avenue, from Ninth Street to the northerly line of Ninetieth Street, except the five blocks from the north side of Thirty-second Street to the south side of Thirty-seventh Street.

THIS AGREEMENT, made and entered into this twenty-eighth day of October, in the year one thousand eight hundred and eighty-five, by and between THE MAYOR, ALDERMEN AND COMMONALTY OF THE CITY OF NEW YORK, parties of the first part, by the Commissioner of Public Works, and MATTHEW BAIRD, of said city, Contractor, party of the second part:

WITNESSETH, That the said party of the second part has agreed, and by these presents does hereby for himself, his heirs, executors, administrators and assigns, covenant, promise and agree to and with the said parties of the first part, for the consideration hereinafter mentioned and contained, and under the penalty expressed in a bond bearing even date with these presents and hereunto annexed, that he, the said party of the second part, his heirs, executors, administrators or assigns, shall and will furnish and provide at his or their own proper cost and expense, all the necessary materials and labor, and in a good, firm and substantial manner, and strictly in accordance with the following specifications, Regulate and Pave, with granite-block pavement, the Carriageway of Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south line of Thirty-seventh street; and also lay and relay crosswalks; all the said work to be done in the manner and under the conditions hereinafter specified; and has further agreed that the said Commissioner of Public Works shall be and is hereby authorized to appoint an Engineer and such person or persons, not exceeding two in number, as he may deem necessary to properly inspect the materials to be furnished and the work to be done under this agreement, and to see that the same correspond with the specifications hereinafter set forth, which are, and are to be taken, as forming part of this contract.

The party of the second part agrees that he will complete the entire work to the satisfaction of the Commissioner of Public Works and in substantial accordance with the following specifications, and that he will not ask, demand, sue for or recover for the entire work, any extra compensation beyond the amount payable for the several classes of work in this contract enumerated, which shall be actually performed, at the prices therefor herein agreed upon and fixed.

Work to be done.

Work and materials must agree with specifications.

Inspectors on subdivisions of work.

Right to construct sewers, etc., prior to laying of pavement.

Contractor to remove incumbrances.

Quality and dimensions of stone blocks.

To be carefully culled.

Over rail ties and other places.

Bridge-stones.

Manhole heads.

Curb and gutter stones.

Circular corners.

SPECIFICATIONS.

1. The work to be done consists of laying a granite-block pavement, with concrete foundation and cemented joints, on the roadway of Fifth avenue, from Ninth street to the northerly line of Ninetieth street, excepting five blocks, from the north side of Thirty-second street to the south side of Thirty-seventh street, crosswalks to be laid and new curb-stones set, and pavement on intersecting streets and adjoining the avenue relaid, where required.

2. All the materials furnished and all the work done, which, in the opinion of the Commissioner of Public Works, shall not be in accordance with these specifications, shall be immediately removed, and other materials furnished, and work done that will, in the opinion of said Commissioner, be in accordance therewith. Before any stone is placed upon the street or avenue, the Commissioner of Public Works shall approve of the quality and finish of samples of the same which shall be furnished at his office.

3. The work under this agreement is to be prosecuted at and from as many different points in such part or parts of the street or avenue on the line of the work, as the said Commissioner may from time to time determine; and at each of said points Inspectors may be placed on the day designated for the commencement of the work thereat. Whenever any work is in progress an Inspector may be appointed by said Commissioner to supervise the same, whether such work be the culling of the stone blocks or of the bridge-stones, or the excavation for and preparation of the foundation, or the laying of the pavement, or the laying of the bridge-stones, or otherwise.

4. The right to construct or repair any sewer or sewers, or receiving-basins and culverts, or to reset or renew any frames and heads for sewer manholes, or for Croton water or gas stop-cocks, or to lay gas or water pipes, or to construct necessary appurtenances in connection therewith in said street or avenue, or to grant permits for house connections with sewers or with water or gas pipes, at any time prior to the laying of the new pavement over the line of the same, is expressly reserved by said Commissioner; and said Commissioner of Public Works reserves the right of suspending the work on said pavement on any part of the line of said street or streets at any time during the construction of the same, for the purposes above stated, without other compensation to the Contractor for such suspension than extending the time for completing the work as much as it may, in the opinion of the said Commissioner, have been delayed by such suspension; and said Contractor shall not interfere with or place any impediment in the way of any person or persons who may be engaged in the construction of such sewer or sewers, or in making connections therewith, or doing other work above specified, or in the construction of any receiving-basins and culverts, or in setting or resetting any curb-stones on the line of the street or avenue.

5. In case there shall be, at the time stipulated for the commencement of the work, any earth, rubbish or other incumbrance on the line of the work, the same is to be removed at the expense of the Contractor.

6. DESCRIPTION OF MATERIALS.—The stone blocks for the pavement to be of granite of a durable and sound quality, each measuring on the face or upper surface not less than 10 or more than 12 inches in length, not less than 4 nor more than 4½ inches in width, not less than 7 nor more than 7½ inches in depth, to be split and dressed so as to form when laid, end joints not exceeding ½ inch wide, and side joints not exceeding 1 inch wide, with fair and true surfaces on top and bottom, and are to be in all respects equal to the specimen blocks at the office of the Commissioner of Public Works.

The stones will be carefully inspected after they are brought on the line of the work, and all blocks which, in quality and dimensions, do not conform strictly to these specifications will be rejected, and must be immediately removed from the line of the work. The Contractor will be required to furnish such laborers as may be necessary to aid the Inspector in the examination and culling of the blocks; and in case the Contractor shall neglect or refuse so to do, such laborers as in the opinion of the Commissioner of Public Works may be necessary, will be employed by said Commissioner, and the expense thus incurred by him will be deducted and paid out of any money then due or which may thereafter grow due to the said Contractor under this agreement.

Between, in and one foot outside of railroad tracks, over vaults, around sewer manhole frames, and in such other places as the Commissioner of Public Works may deem proper, the Contractor shall use for the pavement stone blocks of such lesser depth as the said Commissioner shall direct, but the same general dimensions on top surface shall be maintained.

7. BRIDGE-STONES.—Where new bridge-stones are required they are to be furnished in conformity with the following description, to wit:

The new bridge-stones to be blue-stones, equal to the best quality of North river blue-stone, free from seams and imperfections. Each stone to be not less than 4 nor more than 8 feet long, except in cases where especially permitted, and 2 feet wide and not less than 5 nor more than 8 inches thick in any part, and dressed to a face on top not varying in evenness by more than ¼ inch, and on the bottom beaded, with sides and ends square and full, and to be cut so as to lay to a joint not exceeding ¼ inch from top to bottom on the ends, and ½ inch from top to bottom on sides.

The bridge-stones will be carefully inspected after they are brought on the line of the work, and all those which, in quality and dimensions, do not conform strictly to these specifications, will be rejected and must be immediately removed from the line of the work. When required all old bridge-stones shall be relaid.

8. MANHOLE HEADS, ETC.—All the frames and heads for sewer manholes and for Croton water stop-cocks on the line of the work, are to be reset or new ones set if required, on a level with the new pavement, by the Department of Public Works. The sewer manholes, if below the grade, will be built up to the proper height by said Department.

9. CURB AND GUTTER.—The curb-stones along the line of the work, and the pavements adjoining, and also the gutters of the adjoining pavements as far as may be necessary to obtain proper drainage, shall be readjusted and brought to the grade and lines of the proposed pavements as required. The gutter-stones to be taken up and the pavement extended to the curb-stones. Whenever any curb-stones are required, the Contractor shall furnish them of stone of the following description, to wit:

The curb-stones to be of blue-stone, sound, durable and free from imperfections.

The curb-stones shall be not less than 5 nor more than 8 feet in length, 20 inches in depth for the entire length of stone, and 5 inches in thickness for the full depth of stone.

The top of the curb to be cut to a level of 1 inch, and to an uniform thickness of 5 inches, and to be fine axed; the edge or arris of the sides and ends to be sharp and perfect. The front or sides facing the roadway, when set, to be cut true to the line and without winding, with no projection or depression exceeding one-half of an inch from the working line, to a depth of 14 inches from the top, and the back to be dressed in like manner and parallel to the front, to the depth of 2 inches from the top, the bottom to be roughed off parallel to the top to the full thickness of the stone, which in no case is to be less than 5 inches.

The ends, from top to bottom, and for at least half the thickness of the stone from the face, are to be dressed true and even and truly squared, so that when laid they will make joints not exceeding three-eighths of an inch.

The curb-stone to be laid truly to the established grade and line of the street, with joints not exceeding ¾ inch, to rest, in case of straight curb, on at least 2 stones firmly bedded in the ground and not measuring less than 8 inches on the top in any direction, and to be back-filled and backed up with at least 1 foot of clean, gritty earth, free from clay or loam; the back filling, the ground on which the curb is set, to be thoroughly rammed.

10. CIRCULAR CORNERS.—The curb at the corners of the streets to be circular or curved, the stones to be in lengths of not less than 2 feet 7½ inches, measured on the curved face, 20 inches in depth and 5 inches thick at the joints.

The curb or outer face to be dressed to a curve of 6 feet radius, 5 inches thick at the joints and straight on the back, and to be in all other respects the same as the curb-stones heretofore specified.

The corners to be laid in the same manner as the curb-stones heretofore specified.

All curb-stones in the line of the work that are cracked, broken, or otherwise injured, are to be re-dressed so as to conform practically in form, size and quality, to those originally furnished on the work, or others, conforming to such standard furnished in their place.

Locality of work.

Inspectors.

Materials inspected.

11. INSPECTION OF MATERIALS.—On the day designated by the said Commissioner for the commencement of the work at any point or points on the line thereof, the said Contractor shall, before disturbing or making any alteration in the present roadway, haul upon the line of the line of the work, at each of such points, a sufficient quantity of stone blocks and bridge-stones for the paving of at least the space between any two intersecting streets.

Rejected materials to be forthwith removed.

The stones so brought upon the ground, and before they are laid, will be carefully and thoroughly inspected, as provided for in specification 6, and all rejected stones shall be immediately removed by the Contractor from the line of work. The Contractor will then be required to pile such stones as may have been approved, neatly on the front of the sidewalk, and not within three feet of any fire hydrant, and in such manner as will preserve sufficient passage-way on the line of the sidewalks, and also permit of free access from the roadway to each house on the line of the street. *After this inspection has been made, and after all the rejected stones shall have been removed entirely from the line of the work, and the accepted stones piled in the manner aforesaid, and not until each of these conditions shall have been faithfully fulfilled, will the Contractor be permitted to proceed with the preparation of the road-bed for the new pavement.*

It being expressly understood that the work is to be prosecuted in sections of not less than the space between any two intersecting streets, and that these provisions relative to the hauling, inspection, and removal and piling of stones shall apply to the work on each of said sections on the whole line of the work.

Preparation of foundation

12. PREPARATION OF ROAD-BED, ETC.—All paving and other stones unfit for further use shall be taken up and immediately removed from the line of the work, and shall become the property of the Contractor; the sub-soil or other matter (be it earth, rock, or other material) shall then be excavated and removed by the Contractor to such a depth as that, when the surface is thoroughly compacted by ramming or rolling, it shall be left 16 inches below established grade of the top line of the finished pavement, except where stones of less dimensions are to be used, then to be excavated to such depth as the Commissioner of Public Works shall direct. Should there be any spongy material or vegetable matter in the bed thus prepared, all such material shall be removed, to a depth of not less than two feet below the established grade last aforesaid, and the space filled with clean gravel or sand carefully rammed, so as to make such filling compact and solid. Should any filling be necessary to lay the pavement at the required grade, the Contractor shall supply the same without any extra compensation therefor; such filling to be composed of good wholesome earth, free from ashes, garbage and other foreign matter, and placed upon the road-bed in layers of not more than 3 inches in depth.

CONCRETE FOUNDATION.

Concrete foundation.

13. Upon the foundation thus prepared shall be placed a bed of concrete to the depth of six inches. Where vaults, railroad ties, sewer connections, etc., are encountered, the depth of concrete will be increased or diminished as may be deemed necessary by the Commissioner of Public Works.

The concrete shall be composed of one part of fresh ground American hydraulic cement, of the best quality, two parts of clean, sharp sand, and three parts of broken or screened stone, the proportion to be determined by measurement. The cement and sand shall be first thoroughly mixed dry; then water added in sufficient quantity to form a mortar; the broken stone to be next added and the mass worked and turned over until the broken stone presents no dry surface.

The cement to be capable of resisting a tensile strain of fifty pounds per square inch after thirty minutes' exposure in air, and twenty-four hours' immersion in water. No concrete that has been mixed over three hours will be allowed to be used. The broken or screened stone to be sound and solid trap or gneiss rock, and of a size not larger in any dimension than will pass through a two-inch ring, free from dust and dirt. The concrete shall be placed in proper position and there rammed until it is thoroughly compacted and has a clear mortar surface, which surface, when left, shall be ten inches below the grade of the top of the finished pavement.

The surface to be kept wet until covered with sand, and at least thirty-six hours shall be allowed for the concrete to set before the pavement is laid. When connection is to be made with any layer, set, or partially set, the edge of such layer must be broken down, shall be free from dust and properly wet, so as to make the joints fresh and close.

On this concrete foundation shall be laid a bed of clean, sharp sand, perfectly free from moisture (made so by artificial heat, if deemed necessary), not less than one and one-half inches thick, to the depth necessary to bring the pavement to the proper grade when thoroughly rammed.

Laying the pavement and blocks.

14. LAYING THE PAVEMENT, ETC.—Upon this bed of sand the granite blocks and crosswalks will be laid. The stone blocks are to be laid at right angles with the line of the street, except in special cases, when they shall be laid at such angles as directed, with such crown and at such grade as the Commissioner of Public Works may direct; each course of blocks shall be of uniform width and depth, and so laid that all longitudinal joints shall be broken by a lap of at least two inches, and that all such joints shall not be more than one inch in width top and bottom. As the blocks are laid they shall be covered immediately with clean, hard, dry gravel, artificially dried, which shall be brushed into the joints until all the joints become filled therewith. This gravel shall be free from sand; it shall be such as has passed through a sieve of three-quarters of an inch mesh and retained by a quarter-inch mesh; the blocks shall then be thoroughly rammed. More gravel shall then be brushed in to fill the joints, the blocks again carefully rammed, the process to be repeated until the joints are full and the blocks brought to an unyielding bearing, with uniform surface, true to the roadway on the established grade.

Paving cement to be used in joints of blocks.

15. PAVING CEMENT TO BE USED IN JOINTS OF BLOCKS.—There will then be poured into the joints paving cement as hereinafter described, heated to a temperature of 300 degrees, Fahrenheit, until the joints are full and will take no more, and are filled flush with the top of the blocks. Dry, hot gravel of proper size, heated in pans specially provided by the Contractor for that purpose, will be poured along the joints, filled with paving cement, as above described, and consolidated by tamping with a light rammer, or otherwise.

Description of paving cement.

The paving cement to be used in filling the joints between the paving-blocks and between the crosswalk stones, as herein provided, shall be obtained from the direct distillation of coal tar, and shall be the residuum therefrom, and shall be such as is ordinarily numbered 5 or 6 at the manufactory. It shall be delivered on the work at least one week before being used.

Laying crosswalks.

16. LAYING THE CROSSWALKS, ETC.—The crosswalks across or adjoining the new pavement are to be laid, where required, with new bridge-stones, or the present bridge-stones shall be relaid, as the said Commissioner of Public Works may direct, in which last case they shall be dressed or re-dressed so as to conform with specifications for new bridge-stones in all respects. All the new bridge-stones, and such of the present bridge-stones as may be retained are to be well and firmly bedded on a foundation of clean, sharp sand, to be set and tamped in such a manner that they shall admit of no further settlement; they will be true to a line and grade, and laid with joints not exceeding one-fourth of an inch in width from top to bottom on the ends. The courses to be so laid that the transverse joints will be broken by a lap of at least one foot. The pavements in the intersections adjoining, and also the gutters of the adjoining pavements as far as in the opinion of the said Commissioner may be necessary to obtain proper drainage, will be taken up, brought to the grade of the new pavement and relaid in the manner provided for the new work. The Contractor shall lay one row of paving-blocks of the pavement described herein between the courses of bridge-stones, the joints to be filled with gravel and asphaltic cement, in the same manner as the joints of the paving-blocks.

Old materials.

17. OLD MATERIALS.—All old materials which it becomes necessary to remove, excepting the sewer manhole heads, and the frames and heads to Croton water or gas stop-cocks, shall be considered as the property of the Contractor, and the same shall be immediately removed by him from the line of the work.

Removing surplus materials, rubbish, etc.

18. CLEARING UP.—All surplus materials, earth, sand, rubbish and stone, except such stone as shall be retained by order of the Engineer, are to be removed from the line of work, block by block, as rapidly as the work

progresses. At any time within one month after the completion of the pavement of each block, or of the entire work, if so required by the Commissioner of Public Works, all materials except building material covering the stone blocks shall be swept into heaps and immediately removed from the line of the work; and unless this be done by the Contractor within forty-eight hours after being notified so to do, to the satisfaction of said Commissioner, the same shall be removed by the said Commissioner of Public Works, and the amount of the expense thereof shall be deducted out of any moneys due or to grow due to the party of the second part under this agreement.

Loss or damage to be sustained by contractor.

9. It is further agreed that all loss or damage arising out of the nature of the work to be done under this agreement, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the action of the elements, or from the incumbrances on the line of work, shall be sustained by the said Contractor.

In case any injury is done along the line of the work in consequence of any act or omission on the part of the Contractor, or his employees or agents, in carrying out any of the provisions or requirements of this contract; the Contractor shall make such repairs as are necessary in consequence thereof, at his own expense and to the satisfaction of the Commissioner of Public Works, and in case of failure on the part of the Contractor to promptly make such repairs, they may be made by the Commissioner of Public Works, and the expense thereof shall be deducted out of any moneys to grow due to or retained from the party of the second part under this contract.

Work may be suspended.

20. The prosecution of the work shall be suspended at such times and for such periods as the Commissioner of Public Works may, from time to time, determine; no claim or demand will be made by the Contractor for damages by reason of such suspensions in the work, but the period of such suspensions, to be determined in writing by the said Commissioner, will be excluded in computing the time hereinafter limited for the completion of the work. During such suspensions all materials delivered upon but not placed in the work shall be neatly piled or removed, so as not to obstruct the public travel.

"Contractor," etc., to mean.

21. Wherever the word "Contractor" or the words "party of the second part," or a pronoun in place of either of them, is used in this contract, the same shall be considered as referring to and meaning the party or parties, as the case may be, of the second part to this agreement.

Measurement.

22. The said party of the second part further agrees that the return of the Engineer appointed by the Commissioner of Public Works to superintend and survey the work, shall be the account by which the amount of work done and the materials furnished shall be computed.

Work to commence.

23. The said party of the second part hereby further agrees that he will commence the aforesaid work on such day, and at such point or points as the Commissioner of Public Works may designate, and progress therewith so as to fully complete the same in accordance with this agreement, on or before the expiration of FIVE HUNDRED DAYS next thereafter; and that in the computation of said days, the time (aggregated in days and parts of days) during which the work required by this contract has been delayed in consequence of the condition of the weather, or by any act or omission on the part of the parties of the first part (all of which shall be determined by the said Commissioner of Public Works, who shall certify to the same in writing), and also Sundays and holidays on which no work is done, and days on which the prosecution of the whole work is suspended by written order of the said Commissioner, shall be excluded.

Time of completion.

But neither an extension of time, for any reason, beyond the date fixed herein for the completion of the work, nor the doing and acceptance of any part of the work called for by this contract, shall be deemed a waiver by the said Commissioner of the right to abrogate this contract for the causes provided for in paragraph (26) of this agreement, or of the right to deduct and retain as damages for the non-completion of the work, the moneys mentioned in paragraph (24) of this agreement.

Damages for noncompletion.

24. And the said party of the second part hereby further agrees that the said parties of the first part shall be, and they are hereby, authorized to deduct and retain out of the moneys which may be due or become due to the said party of the second part under this agreement, as damages for the non-completion of the work aforesaid within the time hereinbefore stipulated for its completion, the sum of fifteen dollars for each and every day the said work may exceed the said time allowed for its completion.

Personal attention.

25. The said party of the second part hereby further agrees that he will give his personal attention constantly to the faithful prosecution of the said work; that he will not sublet the aforesaid work, or any part thereof, without the previous written consent of the Commissioner of Public Works endorsed on this agreement, but will keep the same under his own control; that he will not assign, by power of attorney or otherwise, any of the moneys payable under this agreement, unless by and with the like consent, to be assigned in like manner; that no right under this contract, nor to any moneys so become due hereunder, shall be asserted against the Mayor, Aldermen and Commonalty of the City of New York, or any department, bureau or officer thereof, by reason of any so-called assignment, in law or equity, of this contract, or any part thereof; that no person other than the party signing this agreement as the party of the second part has now any claim hereunder; that no claim shall be made excepting under this specific clause, or under article (27) of this agreement; and that he will punctually pay the workmen who shall be employed on the aforesaid work in cash current and not in what is denominated store pay. If at any time any overseer or workman employed by the Contractor shall be declared by the Engineer to be unfaithful or incompetent, the Contractor, on receiving written notice, shall forthwith dismiss such person, and shall not again employ him on any part of the work.

Contract may be declared annulled for violation, etc.

26. The said party of the second part further agrees that if at any time the Commissioner of Public Works shall be of opinion, and shall so certify in writing, that the said work or any part thereof is unnecessarily delayed, or that the said Contractor is willfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, or if the said work be not fully completed within the time named in this contract for its completion, he shall have the power to notify the aforesaid Contractor to discontinue all work, or any part thereof, under this contract, and thereupon the said Contractor shall discontinue said work, or such part thereof, and the Commissioner of Public Works shall thereupon have the power to place such and so many persons as he may deem advisable, by contract or otherwise, to work at and complete the work herein described, or such part thereof, and to use such materials as he may find upon the line of said work, and to procure other materials for the completion of the same, and to charge the expense of said labor and materials to the aforesaid Contractor, and the expense so charged shall be deducted and paid, by the party of the first part, out of such moneys as may be then due, or may at any time thereafter grow due to the said Contractor, under and by virtue of this agreement, or any part thereof; and in case such expense is less than the sum which would have been payable under this contract, if the same had been completed by said Contractor, he shall forfeit all claim to the difference; and in case such expense shall exceed the sum which would have been payable under this contract, if the same had been completed by said contractor, he shall pay the amount of such excess to the parties of the first part, on notice from the said Commissioner of Public Works so to do.

Claims for labor, etc.

27. And it is further agreed by and between the parties hereto that if, at any time before, or within thirty days after, the whole work herein agreed to be performed has been completed and accepted by the parties of the first part, any person or persons claiming to have performed any labor or furnished any materials towards the performance or completion of this contract shall file, with the said Department of Public Works or with the Bureau having charge of said work, and with the head of the Finance Department of the said City of New York, any such notice as is described in the Act of the Legislature of the State of New York, passed May 22, 1878, entitled "An act to secure the payment of laborers, mechanics, merchants, traders and persons furnishing materials towards the performing of any public work in the cities of the State of New York," then and in every such case the said parties of the first part shall retain, anything herein contained to the contrary thereof notwithstanding, from the moneys under their control and due, or to grow due, under this agreement, so much of such moneys as shall be sufficient to pay off, satisfy and discharge the amount in such notice alleged or claimed to be due to the person or persons filing such notice, together with the reasonable costs

of any action or actions brought to enforce such claim or the lien created by the filing of such notice. The moneys so retained shall be retained by the said parties of the first part until the lien thereon created by the said act and the filing of the said notice, shall be discharged pursuant to the provisions of the said act.

28. And the said party of the second part hereby further agrees that he will furnish said Commissioner with satisfactory evidence that all persons who have done work or furnished materials under this agreement, and who may have given written notice to the said Commissioner, at any time within ten days after the completion of the work aforesaid, that any balance for such work or materials is still due and unpaid, have been fully paid or satisfactorily secured.

Amounts claimed retained

29. And in case such evidence be not furnished as aforesaid, such amount as may be necessary to meet the claims of the persons aforesaid shall be retained from any moneys due the said party of the second part under this agreement until the liabilities aforesaid shall be fully discharged, or secured, or such notice be withdrawn.

Indemnification of City.

30. And the said party of the second part further agrees that during the performance of said work he will place proper guards upon and around the same for the prevention of accidents, and at night will put up and keep suitable and sufficient lights, and that he will indemnify and save harmless the parties of the first part against and from all suits and actions, of every name and description, brought against them, and all costs and damages to which they may be put, for or on account or by reason of any injury or alleged injury to the person or property of another, resulting from negligence or carelessness in the performance of the work, or in guarding the same, or from any improper materials used in its construction, or by or on account of any act or omission of the said party of the second part or his agents; and the said party of the second part hereby further agrees, that the whole or so much of the moneys due to him under and by virtue of this agreement, as shall or may be considered necessary by the Commissioner of Public Works and the Comptroller, shall and may be retained by the said parties of the first part, until all such suits or claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the said Comptroller.

Prices for work.

30. And the said party of the second part hereby further agrees to receive the following prices as full compensation for furnishing all the materials and performing all the labor which may be required in the prosecution of the whole of the work to be done under this agreement, and in all respects performing and completing the same, to wit:

For taking up and removing old pavement, excavating foundation and paving with granite paving-blocks on sand bed with joints filled with asphaltic mixture, per square yard, the sum of (\$3.75).

THREE DOLLARS AND SEVENTY-FIVE CENTS.

For concrete foundation as above, per cubic yard, the sum of (\$4.10).

FOUR DOLLARS AND TEN CENTS.

For taking up and removing old crosswalk stones, excavating foundation and setting crosswalks on bed of sand with joints filled with asphaltic mixture, per square foot, the sum of (58 cts.).

FIFTY-EIGHT CENTS.

For taking up and resetting old crosswalks which may be retained on foundation, similar to that for new stone, and filling of joints with asphaltic cement, per square foot, the sum of (20 cts.).

TWENTY CENTS.

For supplying and setting new curb, per lineal foot, the sum of (65 cts.).

SIXTY-FIVE CENTS.

For resetting old curb, per lineal foot, the sum of (10 cts.).

TEN CENTS.

For readjusting pavements adjoining intersections, per square yard, the sum of (60 cts.).

SIXTY CENTS.

It being expressly understood that the measurement of the pavement shall be taken after the laying and setting of the stones, and that the aforesaid prices cover the furnishing of all the different materials and labor, and the performance of all the work mentioned in this specification and agreement.

31. And the said party of the second part further agrees that he shall not be entitled to demand or receive payment for any portion of the aforesaid work or materials until the same shall be fully completed, in the manner set forth in this agreement, and each and every one of the stipulations hereinbefore mentioned shall have been complied with, and such completion is duly certified by the Inspectors employed on the work, and by the Engineer, or other officer designated by the Commissioner of Public Works; whereupon the parties of the first part, under chapter 371 of the Laws of 1885, will pay, and hereby bind themselves and their successors to pay, to the said party of the second part, in cash, on the expiration of thirty days from the time of the completion of the work and acceptance of the same by the Commissioner of Public Works, the whole of the moneys accruing to him under this agreement, excepting such sum or sums as may be lawfully retained under any provision of law or ordinance, or under any of the provisions hereinbefore contained for that purpose. Payments will be made to the said party of the second part by monthly installments of per cent. on the amount of work performed; and provided that the parties of the first part may and shall at all times reserve and retain from said payments, or any of them, all such sum and sums as by the terms hereof, or of any law of the State of New York, or any ordinance or resolution of the Common Council of the City of New York, passed prior to the date hereof, they are or may be authorized or empowered to reserve and retain; and provided that nothing herein contained be construed to affect the right hereby reserved of the said Commissioner of Public Works to reject and withhold payment for the whole or any portion of the aforesaid work, should any of the aforesaid certificates be found or known to be incorrect or inconsistent with the terms of this agreement, or otherwise improperly given.

Seventy per cent. payments.

32. It is further expressly understood and agreed, by and between the parties hereto, that the action of the Engineer by which the Contractor is to be bound and concluded according to the terms of this contract, shall be that evidenced by his final certificate; all prior certificates upon which per cent. payments may be made being merely estimates, and subject to the corrections of such final certificate, which may be made without notice to the Contractor thereof, or of the measurements upon which the same is based.

33. And it is hereby expressly agreed and understood by and between the parties hereto, that the said parties of the first part, their successors and assigns, shall not, nor shall any department or officer of the City of New York be precluded or estopped by any return or certificate made or given by any Engineer, Inspector, or other officer, agent, or appointee of said Department of Public Works or said parties of the first part, under or in pursuance of anything in this agreement contained, from at any time showing the true and correct amount and character of the work which shall have been done and materials which shall have been furnished by the said party of the second part, or any other person or persons under this agreement.

In witness whereof, the said Commissioner of Public Works has hereunto set his hand and seal on behalf of the said parties of the first part, and the said party of the second part has also hereunto set his hand and seal; and said Commissioner and party hereto of the second part have executed this agreement in triplicate, one part of which is to remain with said the Commissioner, one other to be filed with the Comptroller of the City of New York, and the third to be delivered to the said party hereto of the second part, the day and date herein first above written.

Signed and sealed in presence of

(Signed)

JOHN S. ROUTH,

(Signed)

ROLLIN M. SQUIRE,

Commissioner of Public Works.

(Signed)

MATTHEW BAIRD,

Contractor.

STATE OF NEW YORK, CITY AND COUNTY OF NEW YORK, ss.:

On this twenty-eighth day of October, 1885, before me personally came ROLLIN M. SQUIRE, to me known, and known to me to be the Commissioner of Public Works, the person described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same as such Commissioner for the purposes therein mentioned.

(Signed)

JOHN S. ROUTH,
Notary Public, New York County.

STATE OF NEW YORK, CITY AND COUNTY OF NEW YORK, ss.:

On this twenty-eighth day of October, 1885, before me personally came MATTHEW BAIRD, to me known, and known to me to be the person described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same for the purposes therein mentioned.

(Signed)

JOHN S. ROUTH,
Notary Public, New York County.

We, the undersigned members of the Board, appointed under Chap. 371, Laws of 1885, do hereby certify that the acceptance of the foregoing contract will, in our judgment, best secure the public interests and the efficient performance of the work therein mentioned.

Dated, NEW YORK, October 29, 1885.

(Signed)

(Signed)

(Signed)

W. R. GRACE,
Mayor of the City of New York.
EDWARD V. LOEW,
Comptroller of the City of New York.
ROLLIN M. SQUIRE,
Commissioner of Public Works
of the City of New York.

KNOW ALL MEN BY THESE PRESENTS, THAT WE, MATTHEW BAIRD, THOMAS MCMANUS and JAMES EVERARD, of the City of New York, are held and firmly bound unto the Mayor, Aldermen and Commonalty of the said city, in the sum of One Hundred Thousand Dollars, lawful money of the United States of America, to be paid to the said Mayor, Aldermen and Commonalty, or to their certain attorney, successors or assigns; for which payment, well and truly to be made, we bind ourselves, and our several and respective heirs, executors and administrators, jointly and severally, firmly by these presents.

Sealed with our seals. Dated this twenty-eighth day of October, One thousand eight hundred and eighty-five.

WHEREAS, the above bounden MATTHEW BAIRD, by an instrument in writing, under his hand and seal, bearing even date with these presents, has contracted with the said Mayor, Aldermen and Commonalty to furnish all the materials and labor, and in a good, firm and substantial manner, Regulate and Pave with granite-block pavement the carriageway of Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street.

NOW, THEREFORE, the condition of the above obligation is such, that if the said above bounden MATTHEW BAIRD, or his heirs, executors, administrators or assigns shall well and truly, and in a good, sufficient and workmanlike manner, perform all the work, and furnish all the materials mentioned in the aforesaid agreement, in accordance with the terms and provisions therein stipulated, and in each and every respect comply with the conditions and covenants therein contained, then this obligation to be void; otherwise to remain in full force and virtue.

Signed and sealed in presence of

(Signed) JOHN S. ROUTH.

(Signed)

(Signed)

(Signed)

MATTHEW BAIRD. [SEAL.]

THOMAS MCMANUS. [SEAL.]

JAMES EVERARD. [SEAL.]

STATE OF NEW YORK, CITY AND COUNTY OF NEW YORK, ss.:

I, THOMAS MCMANUS, of said City, being duly sworn, do depose and say, that I am a freeholder in the City of New York, and reside at No. 709 Lexington avenue, in said city, and that I am worth the sum of One Hundred Thousand Dollars, over and above all my debts and liabilities, including my liabilities as bail, surety and otherwise, and over and above all my property which is exempt by law from execution.

(Signed)

THOMAS MCMANUS.

Subscribed and sworn to this 28th

day of October, 1885, before me,

(Signed)

JOHN S. ROUTH,

Notary Public, New York County.

STATE OF NEW YORK, CITY AND COUNTY OF NEW YORK, ss.:

I, JAMES EVERARD, of said City, being duly sworn, do depose and say, that I am a freeholder in the City of New York, and reside at the Worth House, in said city, and that I am worth the sum of One Hundred Thousand Dollars, over and above all my debts and liabilities, including my liabilities as bail, surety and otherwise, and over and above all my property which is exempt by law from execution.

(Signed)

JAMES EVERARD.

Subscribed and sworn to this 28th

day of October, 1885, before me,

(Signed)

JOHN S. ROUTH,

Notary Public, New York County.

STATE OF NEW YORK, CITY AND COUNTY OF NEW YORK, ss.:

On the twenty-eighth day of October, 1885, before me appeared the above-named MATTHEW BAIRD, THOMAS MCMANUS and JAMES EVERARD, known to me to be the same persons described in and who executed the above bond, and severally acknowledged that they executed the same for the purposes therein mentioned.

(Signed)

JOHN S. ROUTH,
Notary Public, New York County.

The estimated cost of the within contract is \$429,559.50, chargeable to the appropriation for Repaving Fifth Avenue, as provided by chapter 371, Laws of 1885.

(Signed)

ROLLIN M. SQUIRE, Commissioner of Public Works.

ENDORSEMENT.

No. 7236.

CONTRACT

For Regulating and Paving, with Granite-block Pavement, the Carriageway of Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street.

MATTHEW BAIRD,

Contractor.

Dated, October 28, 1885.

Assigned to.....

APPROVED AS TO FORM.

E. HENRY LACOMBE,

Counsel to the Corporation.

September 25, 1885.

EXAMINED AND FOUND CORRECT AS TO PRICES BID.

E. GRANT MARSH,

Contract Clerk.

Entered in the Comptroller's Office,

November 28, 1885.

JOSEPH HAAG,

First Assistant Bookkeeper.

The adequacy and sufficiency of the sureties on this contract approved by the Comptroller.
September 25, 1885.

E. GRANT MARSH.

EXHIBIT C.

Department of Public Works—Estimate for 1886—Repaving Fifth Avenue, as Provided by Chapter 371, Laws of 1885.

The act provides that the appropriation made for the repaving of Fifth avenue for this year, \$150,000, shall be applied to this work, and that the amount necessary in addition to that sum, as certified by the Commissioner of Public Works, shall be appropriated and included in the tax-levy for 1886. The proposals submitted to the Fifth Avenue Pavement Commission were tested on an estimate furnished by this Department of the quantities of work to be done, and on these quantities the aggregate amount of the proposal which has been accepted by the Commissioner is \$429,559.50. I deem it prudent, however, to allow a small margin for a possible increase in some of the items of the work, and present the following estimate:

For contract work.....	\$435,000 00
For services of one Engineer, 500 days, at \$10 per day.....	5,000 00
For services of two Inspectors, 500 days, at \$3.50 per day each.....	3,500 00
For clerical services.....	500 00

Total.....	\$444,000 00
Less amount of present appropriation.....	150,000 00
	<u>\$294,000 00</u>

EXHIBIT D.

(Copy.)

DEPARTMENT OF PUBLIC WORKS,
COMMISSIONER'S OFFICE, NO. 31 CHAMBERS STREET,
NEW YORK, February 19, 1886.

J. McINTYRE SMITH, Esq.:

SIR—You are hereby appointed Engineer and Surveyor in the matter of repaving Fifth avenue, between Ninth and Ninetieth streets, except between Thirty-third and Thirty-seventh streets, to take effect this date.

Respectfully,
(Signed) ROLLIN M. SQUIRE, Commissioner of Public Works.

(Copy.)

DEPARTMENT OF PUBLIC WORKS,
COMMISSIONER'S OFFICE, NO. 31 CHAMBERS STREET,
NEW YORK, April 5, 1886.

Mr. THOMAS ABBOTT:

SIR—You are hereby appointed Inspector of Repaving Fifth avenue, between Ninth and Ninetieth streets, except between Thirty-second and Thirty-seventh streets.

PAY ALLOWED ONLY FOR THE TIME WORK IS IN PROGRESS.

You will inquire of the Water Purveyor for the specification, how much time the contractor has to finish the work, and report to Commissioner of Public Works when said time has expired.

Weekly reports, in writing, required, for which blank forms will be furnished at this office. You will also report immediately after receiving your appointment, to the Water Purveyor, for orders, otherwise you will not be placed on the pay-roll.

(Signed) ROLLIN M. SQUIRE, Commissioner of Public Works.

Surveyor,.....
Contractor,.....
Assignee,.....

The following are the duties required of every person who shall accept an appointment as Inspector for the Commissioner of Public Works:

1. To make himself fully acquainted with the provisions of the written contract filed in the Office of the Commissioner of Public Works, which sometimes, in consequence of a subsequent agreement, differ from the printed specification.

2. To procure from the Surveyor full and explicit direction, in writing, as to the manner of placing and arranging the work; to use the knowledge thus acquired in giving information to the contractor and the workmen; and to assist the Surveyor in getting an accurate account of the quantity of work and materials, by making measurements and memoranda in his absence.

3. To be constantly on or near the work during working hours; to inspect all materials brought, and if anything be done or furnished, otherwise than in accordance with the contract and the direction of the Surveyor, to notify the Commissioner of Public Works immediately thereof; and in all cases to report the state of the work to the Commissioner of Public Works *once in each week*.

4. To exert himself to prevent any accident or damage from occurring through or by means of the work, or the placing of the materials thereof; and to be certain in all cases that proper guards and lights are placed to prevent accidents at night.

5. To refuse to accept any remuneration from contractors for services rendered in keeping the time of the men, or for any other service or purpose whatever. It is to be understood, that the appointment of any Inspector is to exist during the pleasure of the Commissioner of Public Works; and that being employed, as above mentioned, by the contractor, for any work, is a disqualification for the appointment, and sufficient cause for removal; the compensation for services to be at so much for each day in which the work shall progress—the Inspector's account of the number of days to be confirmed by his affidavit, as required by law.

6. To note his residence in a book provided for that purpose in the Office of the Commissioner of Public Works.

ROLLIN M. SQUIRE, Commissioner of Public Works.
(D. G. B.)

NEW YORK, April 5, 1886.

(Copy.)

DEPARTMENT OF PUBLIC WORKS—COMMISSIONER'S OFFICE,
NO. 31 CHAMBERS STREET,
NEW YORK, April 5, 1886.

Mr. CHRISTOPHER HAVICAN:

SIR—You are hereby appointed Inspector of Repaving Fifth avenue, between Ninth and Ninetieth streets, except between Thirty-second and Thirty-seventh streets.

PAY ALLOWED ONLY FOR THE TIME WORK IS IN PROGRESS.

You will inquire of the Water Purveyor for the specification, how much time the contractor has to finish the work, and report to Commissioner of Public Works when said time has expired.

Weekly reports, in writing, required, for which blank forms will be furnished at this office. You will also report immediately after receiving your appointment, to the Water Purveyor, for orders, otherwise you will not be placed on the pay-roll.

(Signed) ROLLIN M. SQUIRE, Commissioner of Public Works.

Surveyor,.....
Contractor,.....
Assignee,.....

The following are the duties required of every person who shall accept an appointment as Inspector for the Commissioner of Public Works:

1. To make himself fully acquainted with the provisions of the written contract filed in the Office of the Commissioner of Public Works, which sometimes, in consequence of a subsequent agreement, differ from the printed specification.

2. To procure from the Surveyor full and explicit directions, in writing, as to the manner of placing and arranging the work; to use the knowledge thus acquired in giving information to the contractor and the workmen; and to assist the Surveyor in getting an accurate account of the quantity of work and materials, by making measurements and memoranda in his absence.

3. To be constantly on or near the work during working hours; to inspect all materials brought, and if anything be done or furnished, otherwise than in accordance with the contract and the direction of the Surveyor, to notify the Commissioner of Public Works immediately thereof; and in all cases to report the state of the work to the Commissioner of Public Works *once in each week*.

4. To exert himself to prevent any accident or damage from occurring through or by means of the work, or the placing of the materials thereof; and to be certain in all cases that proper guards and lights are placed to prevent accidents at night.

5. To refuse to accept any remuneration from contractors for services rendered in keeping the time of the men, or for any other service or purpose whatever. It is to be understood, that the appointment of any Inspector is to exist during the pleasure of the Commissioner of Public Works; and that being employed, as above mentioned, by the contractor, for any work, is a disqualification for the appointment, and sufficient cause for removal; the compensation for services to be at so much for each day in which the work shall progress—the Inspector's account of the number of days to be confirmed by his affidavit, as required by law.

6. To note his residence in a book provided for that purpose in the Office of the Commissioner of Public Works.

ROLLIN M. SQUIRE, Commissioner of Public Works.
(D. G. B.)

NEW YORK, April 5, 1886.

EXHIBIT E.

THE FIFTH AVENUE REPAVING.

Examination by Commissioner Squire—June 23, 1886.

THOMAS ABBOTT:

You are an inspector on Fifth avenue?

Yes, sir.

What are your duties?

To see that the work is properly done according to contract; what materials are used, and that they are properly laid.

Have you read the article in "The Times"?

No, sir; I have not.

"It is further shown," says the "Times," "in the report of the Commissioners of Accounts, that even the granite blocks used in the paving are below the standard required by the specifications." Is that true, sir?

No, sir; it is not true; they are not below the standard; do you mean in regard to quality?

Just what it says, sir? The "Times" continues: "The engineers say that fully 68 per cent. of the granite-blocks are below the standard required under the specifications." What have you to say to that?

Sixty-eight per cent., I cannot say; there is a few three and a half blocks; they are perfect blocks, three and a half in thickness; that is the only thing; otherwise there is no defect in them.

"No grade stakes appear to have been set or bench marks made with which to fix the grade of the middle line of the avenue, consequently there does not appear to be any official guarantee that the sub-grade upon which the concrete foundation has been laid is at the proper distance below the surface of the street, as it is to be finished, or that the concrete foundation is of a uniform thickness of six inches over the whole road-bed." What have you to say to that?

That grade is taken from the curb, after the curb is adjusted.

And the grade is given you by the engineer?

Yes, sir.

2. "The surface of the road-bed after being excavated to the proper depth has neither been 'rammed' nor 'rolled,' so far from the surface being uniformly compressed, as required, 'the concrete foundation had been laid in many places in a soft and even muddy bed, the results of which must, sooner or later, be unequal settlements.'"

Sir, I never saw a better bed myself; I never saw a more compact bed than that on the avenue; a roller would make no impression on it; it is very hard; there are no soft places in it.

As to the ramming?

The ramming of the concrete; it is stamped till the mortar flushes to the top.

3. "Regarding the character and quality of the materials composing the cement, there is 'not the slightest evidence to show that a single barrel of the cement has ever been inspected or tested as prescribed by the contract. The so-called 'sand' used is an unscreened mixture of 'sand and coarse gravel, which does not in a single particular conform to the requirements of the specifications. The broken stone is largely composed of a soft micaceous and disintegrated 'rock, instead of 'hard traps or gneiss,' is used without 'screening,' although containing a 'large percentage of dust, while much of it is in pieces too large to pass through the standard 'gauge, a two-inch ring, unless the latter were made of rubber.'"

The concrete has been tested, sir; it is tested every week, I believe; the engineer takes a sample from me every week; the sand is Cow Bay sand, and the stone comes from a crushing machine on which there is a screen which makes them come out clean; at first, when they were cleaned by a hand-screen, they were a little dirty.

With regard to the size of the stone pieces?

We have a man on the street with a hammer to break any large stone.

4. "The manner in which the concrete has been and is now being prepared conforms 'neither in the proportion of the ingredients, the method of mixing, nor in the method of laying 'to that provided for by the specifications, while for the covering of sand, 'clean, sharp and 'perfectly free from moisture,' there has been deliberately substituted a bed of coarse, damp 'gravel in which are found numbers of stones weighing from four ounces to one and a half 'pounds.'"

I have not seen any of them that size.

With regard to the substitution of coarse, damp gravel for clean, sharp sand, perfectly free from moisture?

The sand lies on the street, and is dried in the sun as it is carted up.

Have you known of the substitution at any time of coarse, damp gravel in place of what you understand to be clean, sharp sand, perfectly free from moisture?

I never saw what I could call gravel put on the top of the concrete.

5. "Many of the granite blocks now piled on the avenue ready for use do not conform to 'the dimensions fixed by the contract. Of the whole amount so delivered, I estimate that not 'less than twenty-five per cent. would be rejected were they rigidly inspected in the manner the 'contract directs.'"

They are riding these stones from the boats now, and they are five or six blocks away ahead of where we are working; there has been no time to inspect these, because we have been busy with the lower portion of that work; I have walked by them and seen them; there may be a few large stones among them, but when we find them they are thrown out.

Do you carefully inspect the stone yourself before it is laid on the street?

Yes; and if it is laid it is taken out.

6. "During the fifteen days the work of repaving has been under surveillance, no evidence 'has appeared to show that either the engineer or the inspectors have ever made any serious 'objections to the use of the improper materials or the faulty manipulations and bad workman-'ship which have thus far characterized the work. If such objections have been made they 'have been practically unheeded, and have produced no effect whatever.'"

My answer to that is, there are objections made every day; I object to materials and make the men throw them out—that is, all the imperfect stone.

Is it true that your objections are unheeded?

No, sir; the men do as I tell them.

How long have you been an inspector on paving?

Since 1876; I was in the Sewer Department before that.

7. "In the work, as it has been and is now carried on, the interests of the 'Mayor, Alder-'men and Commonalty of the City of New York' would appear to have been and to be entirely 'subordinated to the pecuniary interests of the contractor.'"

What have you to say of the work thus far done on the avenue?

I have to say that it is done properly; I have already certified to that effect.

8. "These facts clearly indicate that the special object and purpose of the law, namely, 'to secure the best description of pavement, of the best material and workmanship, to be laid 'in the most substantial manner and with the best foundation,' have up to this time been 'practically defeated, and that the requirements of the contract that the work specified shall be 'done 'in a good, firm and substantial manner, and strictly in accordance with the fol-'lowing specifications,' have not been complied with.'"

The contract does not call for rolling or ramming, unless it is required; it says it shall be rolled or rammed until it becomes a compact surface; the surface is already compact without it.

With regard to the statement that concrete had been laid on a muddy foundation:

The Witness—In a rainy day like this the ground is damp on top; but I think the concrete is not any better to be laid on dry ground; I think it would be better to have it laid on damp foundation, because it would set quicker and more solid; we don't wait for the road to dry before laying concrete after rain, but there is no traffic on the street and therefore there cannot be mud.

It is charged that, on Monday, May 17, among other places the concrete was spread on soft and even muddy and clayey ground, 75 feet north of the northerly line of Thirty-eighth street?

The ground may have been wet that morning, and we laid the concrete, but there was no mud. It is further charged that the assistant engineer reported the same to be the case over an area of 200 square feet in front of No. 448 Fifth avenue?

No, sir; I did not see any mud.

You do not recollect any ground of that character?

I recollect no muddy ground on that avenue; there has been wet ground after rain, but there has been no mud.

It is also charged that when "the whole truth concerning this scandalous job comes to be known, it will be found that a more deliberate, flagrant and unblushing disregard of a voluntary

proposal, supplemented and enforced by all the formalities of a compact, does not disgrace the history of the Department of Public Works."

I say that, in my opinion, there has never been a better piece of paving done in New York City than the present work on Fifth avenue.

I appointed you because of my knowledge of those who know you better than I do—of your skill in the business in which you are now working, and I want to be sure that no complaints of this character can obtain justly from whatever source they come?

I have been attentive to my work and endeavored to do it properly.

CHRISTOPHER HAVICAN :

Have you read that article in the "Times"?

No, sir.

Have you inspected stone on Fifth avenue?

Yes, sir.

Even what is piled on the sidewalks?

Yes, sir.

Are you familiar with the specifications of the contract?

Yes, sir.

What have you to say with regard to the stone?

I say the stone is according to the specifications; they have stone on the work now that I am eight or ten blocks from, but if there is any not according to specifications it is thrown out; it is all specifications stone that I have seen laid.

Have you anything to say with regard to the character of the cement laid?

No, sir; it is according to specifications; the engineer gives us the grade, which is adhered to. They charge that you have laid cement on soft, muddy ground on the avenue?

That is not true, sir; from Eighty-sixth to Ninetieth street every bit of the ground is almost as hard as flint.

Are there any points yet reached by you on the avenue which can be called soft, muddy, clayey ground?

No, sir.

How long have you been an inspector on paving?

Since 1877.

You have vouched for the character of this work in your report?

Yes, sir.

It is charged that the most of the old pavement is rotten, which old pavement belongs to the contractor, and much of which he uses for making the concrete foundation for the new pavement; what have you to say on that subject?

The stone is as hard as can be; all the stone of bad quality is taken out; there is no soft stone on the line of the work.

It is charged that fully 68 per cent. of the granite-blocks are below the standard required by the specifications; is that true of the stones that have been laid in the streets.

No, sir; it is all according to specifications.

Do you desire to make, under these charges, any correction in your report?

No, sir.

ALSTON CULVER, WATER PURVEYOR :

Have you read the "Times" article?

I have.

What have you to say on that subject?

Well, I have to say that there is no statement in it that is correct, as far as any charges against the work are concerned.

You are aware that under the law your presence upon the work was not pre-requisite to certification?

That is what I understand.

But that under the advice of the Corporation Counsel I specially detailed you to report to me once a week upon the character of the work.

Yes, sir.

And you will recall that when I did so I had a personal interview with you in which I said that if any well-grounded complaints were made to me as to the improper character of the work I should hold you personally responsible. With that understanding between you and me you started out on your supervision of the work.

I did so, sir; I said I would do the best I could, and I have done so; I believe that the terms of the contract are being carried out in every particular.

You will understand that in this article—I now refer to the "Times" article—there is not one single, solitary feature of the work, either in the preparation of the road-bed, the laying of the concrete, or the placing of proper stone—stone within the requirements of the specifications—conceded to be correct.

No, sir, there is not.

Not having time, with my other duties to attend to, to be on the work myself, I have to rely upon the seven or eight men who are there to supervise it under my orders.

I want to say to this, Mr. Commissioner, that since I was assigned to that work on June 3, I have been there once and twice a day on each section; I have watched the work carefully and closely and I have seen the provisions of the contract carried out as nearly as it is possible to carry out the provisions of any contract; as regards the concrete, it is being mixed according to the specifications—1, 2 and 3; I assigned two men especially to stand there over the work, and I am sure they are there from the time the work begins in the morning, as early as eight o'clock in the morning, and as late as six o'clock at night; I have also been there myself; as far as placing the grade stakes is concerned, there is no necessity for it; the grade is taken from the curb; I have tested it myself by stretching a line across the street from curb to curb it is very easy to determine whether the grade is right or not; I have measured myself and find that the concrete is laid as required by the specification—six inches; the concrete is tamped into position, and sand is placed on the top; I know sand when I see it; after it lies for thirty-six hours an inch and a half to three inches of sand are placed on it, and then the blocks are laid; if they are not specification blocks they are thrown out; I have watched the work as carefully as it is possible to do in the time I have had to devote to it; in a great many instances I have ordered changes to be made and given directions and the contractor has always carried them out; the charge that the contractor has never been notified to do anything different is a falsehood, for I have given direction from day to day; the cement I have tested on the ground myself, and I believe that everything going into that work is equal to what is required by the specifications; my opinion is that it is a first-class piece of work.

They make a charge, Mr. Culver, that the road-bed has never been properly rammed or rolled.

The contract says that it shall be rammed or rolled; it does not call for the roller and it would be no use to roll it because it is as hard as it could be; there is only one place that has come under my observation where excavation was necessary, between Forty-second and Forty-third streets, I think; it is rolled where necessary.

Do you know about Abbott and Mr. Havican?

Yes, I do.

How long have they been under your immediate eye?

They were under my directions last year as inspectors on other works.

What is your opinion of their capability?

I think they are good inspectors.

Have you ever had any occasion to find fault with any of their reports made to you?

No, sir; I never have.

The two men you speak of as having detailed, were detailed specially to watch the mixing of the concrete?

Yes, sir.

And they make reports to you?

They make reports to the inspectors; they do not make any written reports to me, because I do not call for them; I go there myself, and see that the proper parts are mixed in the proportion of 1, 2 and 3—cement, sand and broken stone—

Is it true that the stone is larger than that called for in the specifications?

Not as a general thing; I won't say that once in a great while a piece might not get in, but there is a man constantly on hand with a hammer, to break any large piece; the broken stone is what the contract calls for, and is taken out of the foundation of the pavement.

But it was charged that the great majority of them are rotten?

I have seen no rotten stone there; they are screened as they come from the crusher; if there were any soft or rotten stone they would go to pieces in the steam crusher.

JOHN A. LAWRENCE :

You were detailed by Mr. Culver on the Fifth avenue work?

Yes, sir.

To do what?

To see that the concrete is properly mixed, in the prescribed proportions.

The orders given by Mr. Culver to you have been faithfully observed by you?

Yes, sir; I am there from half-past six in the morning to half-past five at night, and I am very attentive to my duties.

It is alleged that the concrete is not mixed according to the specifications?

That is not correct; I see that it is mixed as required by the specifications—so much sand, so much cement, and so much stone.

A. S. PARKER :

You are on the Fifth avenue work?

Yes, sir.

Detailed by Mr. Culver on that work?

Yes.

To do what?

To examine the concrete, and see it laid on the bed.

You are at one end of the work, and Mr. Lawrence at the other?

Yes, sir.

You have nothing to do with anything but the mixing and laying of the concrete?

Yes, sir; the grade of the street.

It is charged that the concrete laid there is not in accordance with the specifications—not deep enough?

It is a mistake; it is laid 6 inches and 6½.

Have you anything to do with the character of the soil underneath; it is charged that some of it is damp, muddy, clayey soil?

That is not correct; the road-bed is hard.

ALSTON CULVER, RECALLED :

What is your idea with regard to the road-bed of Fifth avenue?

We only struck one part that was soft; the road-bed from Fifty-ninth street to Ninetieth street was rolled when the Macadam pavement was put in, with a 15 or 20 ton roller, and road-bed is as hard as a rock.

MR. DEPUTY COMMISSIONER, you have been personally on the work on Fifth avenue?

Yes.

What do you think of it?

I think there was never a better piece of pavement laid in New York.

THE COMMISSIONER, ADDRESSING MR. BAIRD—I am very glad to see you here, sir. I have just been talking with the Engineer and the Inspectors, Mr. Culver and his two detailed men, concerning the character of the work, and submitting to them the charges made by Engineer Balch, who represents the Commissioners of Accounts. Have you read these charges?

Yes, sir.

What have you to say?

They are falsehoods from the beginning to end; there never was a piece of work in this world—in this city, done like that; I defy them to go there and examine it.

THE COMMISSIONER ADDRESSING MR. MCINTYRE SMITH, ENGINEER AND SURVEYOR—Have you read this tirade of the "Times"?

I have, sir.

It is charged in that portion of the article which will probably most interest you, that "an examination of the thickness of the concrete foundation thus far laid shows that it is not up to the standard even in that respect, being uneven and varying in every way at short distances"?

I have not found it so.

Now it is said that there has been no care exercised as to fixing the grade for stones to the centre of the street, and that there is no means of telling whether the concrete in the centre of the roadway is as deep down as it ought to be?

Evidently, the gentlemen who made that statement is not accustomed to City work; the grade is given to the curb-setters who reset the curb; then the pavers take a line and stretch it three inches above the curb, which gives the grade in the centre of the street; I never could see any necessity of putting stakes in the middle of the street; I never did such a thing in my life.

What is your opinion as to the conclusions of Engineer Balch?

I do not think that any charge he has made there could be sustained; I am on the work every day two or three times; I have not seen anything going wrong.

You have seen that portion of the street which has been laid and is now in use, and what is your opinion of that?

I think it is as good a piece of work as I ever saw; everybody who has spoken to me about it says it is the best piece of work that has ever been put down in the world.

Anything else you want to say, Mr. BAIRD?

No, sir; I only contend with regard to the statement that the stone is old and rotten, that if we were to put stone of that kind in the steam crusher, we would never see it again. It would not come out solid stone. The sand I use there I am paying ten cents per yard more for than I pay for building sand, and I am paying fifteen cents more per barrel for the cement than I should have to pay for other cement that would stand the test.

This finished the examination, and the witnesses dispersed.

EXHIBIT F.

Extracts from the Weekly Meteorological Reports of the Department of Parks, showing the Rainfall on the Fifth avenue, New York City, during the seventy-two days from Monday, May 10, to Saturday, July 31, 1886.

REFER TO CITY RECORD	Vol.	Page.	DAY OF THE			TIME OF BEGINNING.	TIME OF ENDING.	DURATION.		QUANTITY OF RAIN, INCHES.
			Week.	Month.	Day			Hours.	Min.	
XIV.	1277		Monday.....	May	10	2.15 P. M.	4.30 P. M.	2	15	.04
"	"		Wednesday.....	"	12	1.15 A. M.	5.15 A. M.	4	00	.14
"	"		Thursday.....	"	13	11.45 A. M.	9.00 P. M.	9	15	1.49
"	"		Saturday.....	"	15	6.45 P. M.	12.00 P. M.	5	15	.07
			Total for week ending May 15.....					20	45	1.74
XIV.	1320		Sunday.....	May	16	0.00 A. M.	7.00 A. M.	7	00	.14
"	"		Wednesday.....	"	19	4.00 A. M.	10.00 A. M.	6	00	.10
"	"		Thursday.....	"	20	9.00 P. M.	10.30 P. M.	1	30	.04
"	"		Saturday.....	"	22	7.00 P. M.	8.45 P. M.	1	45	.52
			Total for week ending May 22.....					16	15	.80
XIV.	1407		Monday.....	May	24	9.45 A. M.	5.00 P. M.	7	15	.19
"	"		Wednesday.....	"	26	1.45 P. M.	2.00 P. M.	..	15	.03
"	"		Thursday.....	"	27	9.30 A. M.	10.30 P. M.	1	00	.03
			Total for week ending May 29.....					8	30	.25
XIV.	1440		Thursday.....	June	3	5.00 A. M.	11.00 A. M.	6	00	.35
XIV.	1499		Wednesday.....	June	9	5.50 P. M.	12.00 P. M.	6	10	.25
"	"		Thursday.....	"	10	0.30 P. M.	2.30 A. M.	2	30	.06
			Total for week ending June 12.....					8	40	.31
XIV.	1547		Monday.....	June	14	4.15 A. M.	2.00 P. M.	9	45	.85
"	"		Tuesday.....	"	15	0.00 A. M.	5.00 A. M.	5	00	.02
"	"		Thursday.....	"	17	2.00 P. M.	4.00 P. M.	2	00	.47
			Total for week ending June 19.....					16	45	1.34
XIV.	1602		Tuesday.....	June	22	4.00 P. M.	9.00 P. M.	5	00	.10
"	"		Wednesday.....	"	23	0.40 A. M.	12.00 P. M.	23	20	1.20
"	"		Thursday.....	"	24	0.00 A. M.	7.00 A. M.	7	00	.05
			Total for week ending June 26.....					35	20	1.35

REFER TO CITY RECORD.		DAY OF THE			TIME OF BEGINNING.	TIME OF ENDING.	DURATION.		QUANTITY OF RAIN, INCHES.
Vol.	Page.	Week.	Month.	Day			Hours	Min.	
	
		Total for week ending July 3.....	....	..	.....	.....	0	00	0.00
XIV.	1708	Saturday	July	10	4.15 A. M.	10.30 A. M.	6	15	.47
		Total for week ending July 10 .....	....	..	.....	.....	6	15	.47
XIV.	1751	Wednesday	July	14	5.00 P. M.	10.00 P. M.	5	00	.38
"	"	Thursday	"	15	6.50 A. M.	7.10 A. M.	..	20	.01
"	"	Friday.....	"	16	2.30 A. M.	9.00 A. M.	6	30	.70
		Total for week ending July 17 .....	....	..	.....	.....	11	50	1.09
XIV.	1789	Sunday	July	18	2.20 P. M.	2.50 P. M.	..	30	.02
"	"	Monday	"	19	11.20 P. M.	12.00 P. M.	..	40	.13
"	"	Wednesday	"	21	0.00 A. M.	1.00 A. M.	1	00	.12
"	"	Thursday	"	22	7.30 A. M.	3.00 P. M.	7	30	.43
"	"	Friday.....	"	23	2.40 P. M.	3.10 P. M.	..	30	.01
		Total for week ending July 24 .....	....	..	.....	.....	10	25	.72
XIV.	1805	Monday.....	July	26	6.50 P. M.	8.00 P. M.	1	10	.04
"	"	Tuesday.....	"	27	8.00 A. M.	11.00 A. M.	3	00	.10
"	"	Friday.....	"	30	4.00 P. M.	4.20 P. M.	..	20	.30
"	"	Saturday.....	"	31	2.00 P. M.	2.30 P. M.	..	30	.01
		Total for week ending July 31 .....	....	..	.....	.....	6	10	.47

EXHIBIT G.

JULY —, 1886.

Hon. WILLIAM R. GRACE, Mayor :

SIR—In compliance with section 49 of the New York City Consolidation Act of 1882, I have the honor to submit the following report of the transactions of the Department of Public Works for the quarter ending June 30, 1886.

REPAVEMENT OF FIFTH AVENUE.

This work was authorized by chapter 371 of the Laws of 1885, which provided that the pavement be of granite-blocks of the best description, material and workmanship, to be laid in the most substantial manner and with the best foundation; that the Commissioner of Public Works should advertise in the CITY RECORD at least ten days for plans, proposals and specifications for such pavement, and that such plans, proposals and specifications, when received, be submitted unopened to a Board consisting of the Mayor, the Comptroller and the Commissioner of Public Works, said Board to select the plan, proposal and specification which, in their judgment, would best secure the purposes of the act. In answer to the advertisement seven proposals were received and were submitted to the Board on July 20, 1885. After various delays, resulting from differences of opinion as to the proper construction of the act, the Board finally passed a resolution on September 17, 1885, accepting the proposal, plan and specification submitted by Mr. Matthew Baird.

One of the unsuccessful bidders then applied to the courts for an injunction restraining the Commissioner of Public Works from executing the contract, but the application was denied by the Supreme Court, and pending the appeal of the applicant to the Court of Appeals, the contract was signed and executed October 28, 1885. The winter season was then near at hand and it was deemed prudent not to begin the work until spring so as to avoid the interference with public travel which would ensue from a partial performance of the work and its suspension during the winter season. The work was begun April 5, last, in two sections, one beginning at Thirty-seventh street and proceeding northward and the other beginning at Ninetieth street and proceeding southward. At the close of the quarter the new pavement had been laid from Thirty-seventh street to Forty-fourth street, and from Ninetieth street to Eighty-sixth street. Though the work has been severely criticised in a report made by an engineer employed by the Commissioners of Accounts, and also by the engineer employed by the Comptroller, I have as yet been unable to discover any facts to show that the work has not been done substantially in accordance with the contract and specifications. Special vigilance has been and will continue to be exercised to secure the best possible performance of this important improvement.

Very respectfully,

ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT G 1.

DEPARTMENT OF PUBLIC WORKS—COMMISSIONER'S OFFICE,
No. 31 CHAMBERS STREET,
NEW YORK, June 3, 1886.

ALSTON CULVER, Esq., Water Purveyor :

SIR—The paving of Fifth avenue being ordered by special statute, which requires the work to be proceeded with pursuant to provisions which contemplate that the same shall be of a superior quality, and performed in a special manner, and a contract having been made and entered into by this Department, with the consent and approval of his Honor the Mayor of the City, and the Comptroller of the City, for the laying of the pavement; and while I have no doubt as to the efficiency and trustworthiness of the engineer and inspectors appointed upon the work, I hereby require, as an additional precaution, to the end that the provisions of the statute and of the contract shall be faithfully complied with so as to secure, in the words of the statute, "the best description of granite-block pavement, laid in the most substantial manner, and with the best foundation," that the Water Purveyor of this Department shall give to this work his personal supervision, and he must see that the material used in the work is of such quality, and that the performance of the work is proceeded with in such a manner as fully and faithfully to carry into effect the provisions of the statute and of the contract, and that the Water Purveyor make weekly report to me, in writing, concerning the work above referred to.

Respectfully,

ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT G 2.

JUNE 10, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—In accordance with instructions received from you dated June 3 instant, in which I am directed, in the matter of the new pavement now being laid in Fifth avenue, to give the same my personal supervision, I beg to report as follows :

The work is now being proceeded with in two sections, the lower commencing at the south side of Thirty-seventh street and working north, the upper commencing at the north side of Ninetieth street and working south. At the lower section the blocks have been laid and the work completed to Fortieth street, a distance of three blocks, and the same is now open to the public; at the upper end the blocks have been laid for a distance of about two blocks.

But two inspectors have been employed on the work; these I considered insufficient, and have detailed two men, one on each section, whose duty it is to attend to the mixture of concrete and to see that the proper proportions of cement, sand and broken stone are maintained; this secures the regular inspectors their full time to devote to the placing of the blocks, ramming and running the joints with cement.

I am satisfied, at this writing, that the work is progressing in a proper manner and that the material is being furnished in conformity with the terms of the contract.

Yours respectfully,

A. CULVER, Water Purveyor.

EXHIBIT G 3.

JUNE 18, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—I beg leave respectfully to report that the work of repaving Fifth avenue, from Ninth to Ninetieth street, is progressing satisfactorily. The blocks are now laid on the lower section from Thirty-seventh street to the block between Forty-first and Forty-second streets, and on the upper from Ninetieth to Eighty-seventh street.

Respectfully,

A. CULVER, Water Purveyor.

EXHIBIT G 4.

DEPARTMENT OF PUBLIC WORKS,
WATER PURVEYOR'S OFFICE, No. 31 CHAMBERS STREET, ROOM 1,
NEW YORK, June 25, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—In the matter of repaving Fifth avenue, from Ninth to Ninetieth street, I have to report that during the past week the work has been progressed on the lower section to the block between Forty-third and Forty-fourth streets, and on the upper section to the block between Eighty-sixth and Eighty-seventh streets.

Since directed by you on the 4th instant to take personal supervision of the work I have found it frequently necessary to order changes made in the manner of doing the work, also to reject considerable material that might otherwise have been used; such directions as I have given I believe have been complied with in every respect.

In view, however, of the recent criticisms of the work, and from the fact that but a small portion of my own time, on account of my various other duties, can be devoted to the work, I respectfully request and recommend that Richard H. Birmingham be appointed a special inspector to take charge of the said work, under my directions—all other inspectors to be subject to his orders.

Respectfully,

A. CULVER, Water Purveyor.

EXHIBIT G 5.

JUNE 26, 1886.

RICHARD H. BIRMINGHAM, Esq. :

SIR—You are hereby transferred as Inspector of repaving Cannon street, from Houston to Grand street, etc., to repaving Fifth avenue, from Ninth to Ninetieth street, to take effect this day. You will report to Alston Culver, Esq., Water Purveyor, for instructions.

Respectfully,

WM. V. SMITH,
Deputy and Acting Commissioner of Public Works.

JUNE 26, 1886.

ALSTON CULVER, Esq., Water Purveyor :

SIR—Richard H. Birmingham has this day been transferred from his present duties as Inspector of repaving of Cannon street, from Houston to Grand street, etc., to the repaving of Fifth avenue, from Ninth to Ninetieth street, under your direction. The other inspectors on the repaving of Fifth avenue will be subject to his orders. The services of Mr. Birmingham will be paid from the appropriation for "Repaving Streets and Avenues—Salaries."

Respectfully,

WM. V. SMITH,
Deputy and Acting Commissioner of Public Works.

EXHIBIT G 6.

DEPARTMENT OF PUBLIC WORKS,
WATER PURVEYOR'S OFFICE, No. 31 CHAMBERS STREET, ROOM 1,
NEW YORK, July 3, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—I beg to report that the work of repaving Fifth avenue, between Ninth and Ninetieth streets, is progressing satisfactorily.

The pavement is now laid on the lower section from Thirty-seventh street north to Forty-fifth street, and on the upper section from Ninetieth street south to the block between Eighty-fifth and Eighty-fourth streets.

Respectfully,

A. CULVER, Water Purveyor.

EXHIBIT G 7.

JULY 10, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—In the matter of repaving Fifth avenue, between Ninth and Ninetieth streets, I beg to report that the work is progressing satisfactorily.

On the lower section the pavement is laid to Forty-sixth street and on the upper section from Ninetieth street southward to Eighty-fifth street.

Very respectfully,

A. CULVER, Water Purveyor.

EXHIBIT G 8.

DEPARTMENT OF PUBLIC WORKS—WATER PURVEYOR'S OFFICE,
No. 31 CHAMBERS STREET, ROOM 1,
NEW YORK, July 16, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—In the matter of repaving Fifth avenue I beg leave to report that during the past week the completed work on the lower section has been advanced to Forty-seventh street, a distance of one block since my last report. The concrete bed is prepared to the south side of Forty-ninth street.

On the upper section the work of laying the blocks has been temporarily suspended by the contractor. The concrete foundation has been laid to the block between Eighty-third and Eighty-fourth streets.

The work has been done in a proper manner.

Respectfully,

A. CULVER, Water Purveyor.

EXHIBIT G 9.

DEPARTMENT OF PUBLIC WORKS—WATER PURVEYOR'S OFFICE,
No. 31 CHAMBERS STREET, ROOM 1,
NEW YORK, July 24, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—As regards the work of repaving Fifth avenue, between Ninth and Ninetieth streets, during the past week, I beg leave to report as follows :

On the upper section, the concrete foundation has been prepared as far south as Eighty-second street. The laying of the blocks has been entirely suspended; the completed work now reaching Eighty-fifth street.

On the lower section, the laying of the blocks has proceeded very slowly, only a portion of a single block having been done since my last report. They are now paving between Forty-seventh and Forty-eighth streets. The concrete foundation has been completed to Fiftyth street. The work has been properly done.

Respectfully,
A. CULVER, Water Purveyor.

EXHIBIT G 10.

JUNE 28, 1886.

Messrs. J. MCINTYRE SMITH, ALSTON CULVER, CHRISTOPHER HAVICAN, THOMAS ABBOTT, JOHN A. LAWRENCE and A. S. PARKER :

GENTLEMEN—Referring to the respective certificates and reports furnished by you to me in reference to the work performed in repaving Fifth avenue, I send you herewith reports received by me from the Comptroller of the City, furnished to him by Engineers McLean and Colonel George T. Balch.

There appears such a discrepancy between the reports of these engineers and the certificates and reports furnished by you to me, that I have to request that you forthwith reconsider the questions raised, and report to me, in view of the statements made by Messrs. McLean and Balch, upon the condition of this pavement as laid, and the various matters in detail, specified in the enclosed reports.

I request that this action be taken by you forthwith, and that without loss of time, your report be furnished to me.

Respectfully,
ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT G 11.

JUNE 28, 1886.

MATTHEW BAIRD, Esq., Contractor :

SIR—You are aware from the statements published in the daily papers that exception has been taken to the work performed by you under your contract for repaving Fifth avenue.

I have received from the Comptroller of the City reports furnished to him by Mr. Eugene E. McLean, of his Department, and Colonel Balch. These reports I have placed in the hands of the Engineer upon this work, Mr. Smith, and Mr. Culver, the Water Purveyor, and their assistants, can have full access to, and inspection of the same.

I submit these papers to you that you may furnish me with whatever comments thereon the facts in the matter may demand.

Respectfully,
ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT G 12.

DEPARTMENT OF PUBLIC WORKS—WATER PURVEYOR'S OFFICE,
NO. 31 CHAMBERS STREET, ROOM 1,
NEW YORK, July 31, 1886.

Honorable ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—In the matter of repaving Fifth avenue, for the week ending this date, I beg leave to report as follows:

The work of laying the blocks on the upper section has been entirely suspended; the concrete has been laid to the block between Eighty-first and Eighty-second streets.

On the lower section the concrete foundation has been laid to the block between Fifty-first and Fifty-second streets, and the pavement completed to the block between Forty-eighth and Forty-ninth streets, except the intersection of Forty-eighth street.

The work has been performed in a proper manner.

Respectfully,
A. CULVER, Water Purveyor.

EXHIBIT G 13.

To Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—I have the honor to make the following report on the Fifth avenue pavement, in answer to your letter of inquiry of June 28, 1886.

I have examined the report of Messrs. McLean and Balch, and am familiar with the criticisms passed on the work as contained therein.

My connection with the work commenced with my appointment on the 19th day of February, 1886. The first duty that I had to perform, in connection with the actual work, was to furnish the inspectors with a sketch showing the crown of the street. I have, from time to time, furnished them with the necessary data for the resetting of the curb where the same needs readjustment.

As I have been upon the work from time to time I have been enabled to see that this part of the work was done according to my directions, and in like manner for the data given thereon, I have been enabled to see that the work of paving the avenue, as well as the excavation, was proceeding on the proper grade.

The method of securing the proper curve is one so simple in its character that I am surprised that any engineer should have it indispensable that grade stakes should be necessary as a guide to the workmen, either for the depth of the sub-grades, the upper surface of the concrete, or any other portion of the work.

Mr. Balch, in his report, correctly states that "the position of the curb, as reset and re-aligned, form the grade of the avenue along their front edges." This data being obtained, the rest of the problem is a simple one, easy to be carried out by any skilled workman or inspector, and needing no scientific knowledge, but only such experience as the regular foreman on the work possesses.

It is practiced every day by such men, without difficulty and with perfect success.

The method thus pursued and which leads invariably to correct results, is as follows: the depth of the pavement below the curb having been given to the inspector, with the crown of the street, as was done in this case, the inspector has only to see that the foreman of the pavers sets his gutter-stones at the proper depth. By stretching a line across the street, a centre-stone is inserted at the height of the crown, or the "longitudinal axis" of the street, midway between this stone and the gutter-stone on either side another stone is placed.

This gives the most satisfactory grade stakes that, in my experience, can be required.

By a series of these line or bond stones, along the avenue in advance of the work of paving, the pavers have a correct guide to which to bring their pavement.

As the depth of the excavation below the surface of the pavement is fixed by the concrete, as soon as the crown of the street with the depth of the gutter below the curb is fixed the process enables the inspector to see that the excavation is right to the sub-grade, with its proper crown.

To a mind so constituted that a simple matter of this kind should be incomprehensible, I am not surprised that he should "regard this manner of executing this portion of the work as open to the gravest objection."

It should be, of course, constantly borne in mind that when this report was made the work was actually progressing under the eyes of this engineer and his assistant, who could see what the method of procedure was, and I can point to the finished part of the work as the most conclusive answer to the criticism.

Perhaps, however, the fact that Mr. Balch admits that he has only been six times on the Avenue may account for his manifest want of acquaintance with the subject.

As to the detailed performance of the work, it is impossible for me to speak definitely as to some of "specific charges," as I was not on the work for the whole of each day. I can, however, speak generally with regard to the work and I am happy to say that the work has been most satisfactorily performed and that your Department has no reason to fear criticism in regard to its performance.

It was my practice to go on the work from two to three times in the course of each day. I was enabled, in this way, to see whether the curb had been reset, the work of excavation done to the proper depth and a proper crown made, and the line or bond stones set upon the true crown of the street, and that the pavement was brought to this true crown. While I was on the work I frequently saw the concrete mixed and always found the same being properly done. It was spread, so far as I observed, of the proper thickness, except at one point in the avenue, at the entrance to the park at Ninetieth street, when only a thickness of about three inches was laid, under the following circumstances:

The entrance to the park at this point is depressed below the surface of the avenue, and a sunken curb, flush with the pavement, holds the pavement in place; the park side being a dirt road between the curb and the park-line.

After the road-bed had been excavated to the proper depth, uniform with the rest of the avenue, there was, on account of this depression, a less depth to be occupied by the concrete and the pavement, and, in my judgment, a better result could be obtained by lessening the thickness of the concrete at this point rather than by using shallower stones, as authorized by the contract. This is

undoubtedly the spot referred to in the report, between Eighty-ninth and Ninetieth streets, where a lesser depth of concrete was specified as being used than what the contract called for. I think it especially to the credit of the work that on the upper part of the avenue only this one departure from the full depth of the specifications has been pointed out, after so minute an examination of the work as appears to have been given it. And in this connection, I think I ought also to say that the same minute examination of the work has revealed only a few specific places at which it is claimed the concrete has not been placed to the full depth on the avenue.

As to the use of rotten stone in the concrete, I think I can safely say that this charge is preposterous. The stone used for this purpose is taken from the Telford foundation of the pavement on the upper part of the avenue. This was of hard gneiss. Had there been any rotten stone in it, that which was broken by the crusher would have been reduced to powder, while that which was broken by hand would be so pulverized that it could not be handled as this was, with forks specially prepared for handling broken stone.

How any dirt or dust which could adhere to the stones handled under such circumstances could affect their use for concrete, I cannot understand.

The sand to which objection is made is from the well-known sand-pits at Cow Bay, it is clean, sharp sand, intermixed with gravel, especially suited for paving or concrete purposes. The presence of this gravel, in my opinion, is of special benefit in making concrete, and I should select this gravel in preference to what is usually known as building sand. It is in like manner better adapted for the bed of the paving-stones, as being more substantial in character than the softer building sand. I desire in this connection to add only one word about a matter in criticising this part of the work: That, by the terms of the contract, it is provided that gravel of a size that will pass through a three-quarter inch mesh, free from sand, shall be brushed into the joints, after the stones are laid. In view of the provision of the contract as to the surface of the pavement, I am unable to perceive the force of that kind of criticism which objects to a sand with a gravel in it as a proper bed for the stones.

As to the stones themselves and the manner of inspection, I do not understand that either of the engineers charge that stone of improper size is used in the work. The complaint is, as I understand, that such stones are found piled upon the sidewalk.

It being impossible after the actual work of paving commenced for the inspector to be where he was most needed, viz., supervising the work of laying the concrete and the paving of the avenue, to be also four blocks away, where stone was being delivered on the work, it therefore became necessary to inspect the stone as it was being actually used.

The inspector then has the opportunity to see that the stones, as they are taken from the piles, are of the proper dimensions.

It frequently happens that stones are broken in the handling, and stones of the peculiar shape shown in the report could undoubtedly be found along the line of the work, but such stones could be used in the intersections where diagonal courses of pavement were laid.

These diagonal courses require that the stones should be broken to make mitre joints, and such joints could not be made with stones of full length. An inspection of these intersections will afford you a better idea of what I intend to express than any language I could use.

The amount of stones culled from the piles during the progress of the work shows how faithfully the work of inspection has been performed. After reading the two reports of Messrs. McLean and Balch, I am forced to the conclusion that the sole endeavor of the latter gentleman has been to pick flaws, even though ever so minute, in the work. The first objection raised by Mr. Balch as to the grade stakes and bench marks betrays a want of practical acquaintance with the paving work which impairs the value of the remainder of his criticism. No such objection has been made by Mr. McLean, who has much practical experience.

The next objection made by Mr. Balch is that the road-bed was not rolled or rammed. Mr. McLean says that the foundation was properly prepared, and the ramming was unnecessary. Mr. Balch says the sand is not clean and sharp and not fit for the purpose. Mr. McLean says it is clean and sharp and is good for the purpose.

Mr. Balch says that the concrete is defective, both as to materials and as to its manner of preparation.

No complaint is made by Mr. McLean of the materials, but only as to the method of preparation, which he now pronounces good.

In this connection I desire to call your attention to the fact that Mr. McLean, in specifying the instances where the concrete was not up to the standard, shows that the contractor had done better work in some cases, if he had failed in others. And Mr. McLean appears to be of the opinion that with the progress of the work better results are constantly being attained.

It would not be unnatural to suppose that after the working force had been at work for a short space of time, and enough had got in good running order, such should be the case.

I feel clear in my own mind, however, that no just cause of complaint can be made to the work in question. The work and materials have been in substantial compliance with the specifications.

The contractor has evidenced a readiness and willingness to conform to the requirements of the contract. The inspectors have been diligent and faithful in the performance of their duties, and have made daily reports to me of the progress of the work. When the avenue is completed, the City, in my opinion, will be in possession of the best paved street within the bounds of the municipality, fully up to the requirements of law, and the contractor, as well as the engineers, will have reason to be proud of this work. I hesitate to add one word personal to myself, but the un-called reference in Mr. Balch's report to my relationship to the Deputy Commissioner compels me to say that his statement that I am or ever was a partner of my brother is unqualifiedly false.

I have tried to make, in the brief time allotted me, a substantial review of these charges against this pavement, and I think they have all been met satisfactorily.

I am, with great respect,
J. MCINTYRE SMITH, Engineer in Charge.

EXHIBIT G 14.

DEPARTMENT OF PUBLIC WORKS—WATER PURVEYOR'S OFFICE,
NO. 31 CHAMBERS STREET, ROOM 1,
NEW YORK, July 2, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works :

SIR—In answer to yours of June 28, addressed to Messrs. J. McIntyre Smith, Christopher Havican, Thomas Abbott, John A. Lawrence, A. S. Parker and myself, referring to the respective certificates and reports furnished by the aforesaid to you in reference to the work performed in repaving Fifth avenue, and stating "There appears such a discrepancy between the report of the engineers, and the certificates and reports furnished by you to me, that I have to request that you forthwith reconsider the questions raised and report to me," and requesting that this action be taken forthwith, etc., I beg to say :

Such delay as may appear in making this reply has been caused largely by the pressing duties of my Bureau.

Replying specifically to your request my statement is, that upon the receipt of your communication of June 3, ultimo. I assumed personal supervision of the work mentioned, and so far as was possible I have since that date given it all the time that the various duties of my Bureau would permit.

Nothing contained in the report of Engineer Balch comes within the period of my supervision, and I cannot therefore report as to the statements contained therein.

The report of Engineer McLean commences from June 1, ultimo, three days before I went upon the work under your order.

When I did assume supervision as directed, I found, upon a thorough inspection, that in several respects the work was not being conducted to my satisfaction, and I ordered certain changes, which were accordingly made.

On June 8, ultimo, I requested and obtained from you authority to detail two men to inspect the mixing of concrete.

Engineer McLean reports that since June 9, the "concrete has been made in proper proportions by actual measure."

Regarding the statement that a batch of concrete was made from an old bed of concrete, the latter being used in place of sand, I would say that I have no knowledge that such is the fact. Inspector reports to me that a mixture of sand and old concrete was seen by him near Forty-second street, and by him ordered off the work; that he saw it removed, and that none of it was, to his knowledge, used in the foundation.

Regarding the statement that on June 6, ultimo, a batch of concrete was measured by Mr. Withington, and the proportion of the ingredients not found to be according to specification, I would state that Inspector Havican says, he was present at all the measurements made by Mr. Withington, and that he knows the proper proportions of sand, cement and broken stone were used.

Regarding the granite blocks that have been put into the pavement, I would say that so far as my supervision has extended, they seem to substantially conform to the contract, and my directions have been to cull any blocks that are not up to the specifications, and to see that work conforms strictly to the specifications.

Should any granite blocks be found out not in strict conformity with the specifications, they have been used in violation of my instructions, and during my necessary absence while performing other duties in my Bureau, but I believe a general inspection of the work will show that there has been a substantial compliance with the contract in this particular since the matter has been under my supervision, and I think it will be found that during such period the blocks have been laid in a regular and straight courses as granite block can well be, and that they are properly rammed to a

solid bed. Gravel has been placed in the joints in the manner required by the specifications, and the interstices run with paving cement, and a further pouring of hot gravel along the joints consolidated with a light rammer as required.

Regarding the bridge-stones, I would say: Some of them are rougher than they should be, but these were placed in position to be afterwards dressed. This dressing was in progress until objection was made by Engineer McLean. After this objection I ordered them removed. Some few bridge-stones were so placed, that the joints did not break the required twelve inches.

All such, however, have some time since been ordered to be taken up and relaid as required by the specifications.

My first report to you was dated June 10, the second report was dated June 18, the third, June 25, in each of which I stated that the work was progressing satisfactorily; and in that of June 25 I requested the appointment of Mr. Richard H. Birmingham as a special inspector to take charge of said work under my direction, all other inspectors of the work to be subject to his orders, which request was acted upon and granted by you, and Mr. Birmingham is now upon said work. I respectfully submit that a comparison of my reports to you, with the report of Engineer McLean, fails to show any discrepancy.

I desire to state in the most positive terms, that since the 3d day of June, 1886, no time or effort has been spared by me, consistent with my other duties in the Department, towards securing a strict performance of this contract. So far as this Bureau is concerned its conduct of this supervision has been most rigid and exact with the means at its command.

I am, very respectfully yours,

A. CULVER, Water Purveyor.

EXHIBIT G 15.

To Hon. ROLLIN M. SQUIRE, Commissioner of Public Works:

In obedience to your request under date of June 28, that I report to you in reference to the condition of the pavement as laid on Fifth avenue, in view of the reports made thereon by the Engineers McLean and Balch, I beg leave to submit the following statement:

I was appointed an inspector on such work on the 5th day of April, 1886, and went to work on the 10th day of the same month, and have been on such work ever since; my duties have covered only that portion of the avenue on which work was to be done from Thirty-seventh street going north.

As I understand, the charge made in these reports as to the paving-stones, is to the effect that stones of sizes not in conformity with the specifications were found piled upon the sidewalk on the line of the avenue, and it is therefore claimed that the work of inspection has been insufficiently performed. With regard to this charge, I beg to say, that it is physically impossible for a proper inspection to be made of the stones as they are delivered on the work and piled on the street. The performance of my duties require that I spend the largest portion of my time on that portion of the work where the paving is actually being laid.

It should be borne in mind that work is going on at the same time over several blocks along the line of the avenue.

The old pavement has to be torn up, the earth underneath has to be removed to sub-grade, the concrete has to be mixed and spread in advance of the work of the paving proper. This preliminary work generally is going on over a space of about four blocks in advance of the paving. The stones themselves are delivered and piled on the sidewalk in advance of tearing up the old pavement.

The most perfect inspection of the stones is, however, made when they are being used, while I am in the vicinity, and when the inspections can be most thoroughly done.

At this time it is possible for the inspector to see whether the stones are of the specification size, and to reject those which are not within the limits permitted by the specification; these are then removed from the works by the contractor.

This has been the method of procedure and I am satisfied that no reasonable complaint can be made, either with the quality of the stones themselves, or with their want of conformity to the specifications as to the size.

The number of stones which have been rejected from the piles and carted away from the avenue attests the faithful inspection of the stones.

I have been an inspector in the Department of Public Works for a number of years, and ever since 1876 have been assigned to the paving contracts, and I feel safe in saying that the stones not only used on the work, but even those delivered, are of more uniform character, both as to quality and size, than has ever been met with by me in the course of my experience.

And in support of this statement I think the merest inspection of the surface of the completed work would be the best evidence. I have no doubt that plenty of broken stone of the shape shown in his report can be found in the piles after they have been delivered, as it is a common matter for the stones to be broken into similar shape as they are dumped on the streets. All such stones can be used at the intersections where the paving-stones have to be cut to a mitre joint, as they are then laid in diagonal courses to pave the intersection.

I therefore, in answer to this charge, unhesitatingly assert that the paving-stones used in the work are in conformity with the specifications, and that there has been no neglect of duty on my part in failing to give proper inspection of the same.

Another of the charges made is as to the grades of the avenue to which the work should conform and the absence of any grade stakes.

I have been furnished by the Engineer with the proper data for the resetting of the curbs where needed and wherever the curb has to be reset it has been done under my supervision by the curbs-setters, a distinct set of workmen from the other workmen employed on the work.

Before the curbs were reset to the proper lines the excavation had been practically made from side to side of the avenue.

It has been my practice, then, to stretch a line from curb to curb and to fix a point in the gutter 22 inches below the curb and 13 inches in the centre.

This gave me the proper depth and the true curve of the avenue.

I had been furnished by the Engineer, before the work of paving commenced, with a sketch showing the crown of the avenue and the depth of the surface of the pavement in the gutter below the curb.

The centre of the avenue appears from this sketch to be 3 inches above the surface of the curb, and the surfacing on the paving in the gutter to be 6 inches below the curb.

The proper depth being thus established, whatever further excavation to properly trim or grade the avenue to the sub-grade was done before the concrete was spread.

In like manner the grade for the surface of the pavement was thus established.

The foreman of pavers, under my direction, established a line on the side of the curb-stones by snapping a chalk-line alongside the curb 6 inches below the surface of the curb. The gutter-stones are then set to this line, and I then stretch a line across the avenue from curb to curb and have him place a stone in the centre of the avenue and three inches above the line to get the proper curve and one on either side of the centre stone midway between the centre stone and the curb.

These line or bond stones, as they are called, become in fact actual grade stakes for the work and are established every forty feet lengthwise of the avenue, and then intermediate the last line on bond-stones and the one just established, stones are placed about a yard apart lengthwise the avenue on the line of the ones thus established, as a guide to the pavers in doing their work. This may not appear to be a scientific way of getting the true grade and the true curb of the avenue, but it is a practical way, and I am pleased to say that it has received the approval of Engineer McLean, who inquired of me how I got the grade and curve, and to whom I fully explained the method of accomplishing this part of the work.

Another of the charges relates to the preparation of the road-bed, and rests entirely upon the statement that it has not been either rolled or rammed.

This is true, and as I understand the contract, it is not needed, except where spongy material or vegetable matter is met with in the line of the work, and this is to be excavated, and its place filled. The specifications in this contract in this respect are the same as are usually found in all paving contracts, and I have never understood that it was required. The surface of the street after the excavation has been made and trimmed to a smooth surface was hard, firm and compact, and was in as good a condition for receiving concrete as could be desired.

No spongy material or vegetable matter was found on the line of the work; on the contrary the earth, which was found under the old pavement, as would naturally be expected, was of extraordinary toughness and resisted the pick. Occasionally wet spots would occur along the line of the work, principally in the gutters from leaking from the hose which was used in wetting the concrete material; at these places I had the concrete matter stiffer.

No precautions were omitted which could in any way interfere with the proper preparing of the road-bed for the concrete. In my opinion a slight moisture of the surface of the earth in this way would be beneficial as it would prevent the concrete from drying out too quick.

No concrete was laid on any soft, clayey ground or ground which had become muddy, either from rain or any other cause, at the places mentioned in the report of Engineer Balch or elsewhere. The specifications of the contract call for the upper surface of the concrete to be kept wet until covered with sand and such a moistening of the surface of the road-bed from the hose could not therefore in my opinion have any injurious effect. The concrete when placed upon the moistened surface would of its own weight sufficiently compress the surface thus moistened.

In my judgment wherever occasion arose for a ramming of the surface of the road-bed, it was done. As an instance of this, I call your attention to the fact that several excavations were made by the Steam-heating Company, in spots (test pits, as I understood), between Fortieth and Forty-second streets. These excavations were filled and rammed thoroughly.

On the block between Thirty-eighth and Thirty-ninth streets, an excavation was made for a water-pipe connection, across the whole width of the avenue, and when it was filled up by the con-

tractor who made the excavation, I felt that the earth was not sufficiently solid, and Mr. Baird, the contractor, at my request, and under my direction, sent men with rammers to compact the earth so as to form a solid bed for paving.

Similar excavations were made elsewhere on the avenue during the progress of the work, and in all cases the road-bed was properly prepared by ramming.

One of these excavations was made at a point about seventy-five feet north of Thirty-sixth street, and in order to ram the earth, which had been filled in, as firm as possible, water was freely used to wet the earth so as to settle it while it was being rammed, and special pains were taken to make this place suitable to receive the concrete. On the block between Thirty-ninth and Fortieth streets, was located a hydrant from which water was taken by a hose for making the cement (this is the same block on which No. 448 Fifth avenue is located), and leaks occurred at the places where the hose was coupled. This leak made the surface wet, and the earth was so hard that it did not soak up the water, it showed on the surface, but this did not interfere in the least with the proper performance of the work.

These are the spots, I think, to which Engineer Balch intends to refer in his report.

Another of the charges relates to the concrete and the material of which it was made—the cement, sand and stone, as well as the method of mixing the same.

As to the cement, I have no personal knowledge as to any tests being made of it by the Department; I can only speak of it from seeing its action when being used, and this was entirely satisfactory. I tested the first cement that came upon the work by the usual water test, mixing up some of it with water, letting it set, and then putting it in a pail of water, and it stood this test; I have repeatedly sent samples which I have taken at random from the work as the barrels were opened, and have been furnished with information from the Department that it stood the test satisfactorily.

The sand I considered eminently desirable for the purpose of making concrete; the presence of the gravel in it being especially desirable in concrete work. The sand is what is known as paving sand, and comes from Cow Bay, opposite City Island; is entirely free from clay or loam. It was brought there on the work with trucks and was not mixed while on the work with any clay or loam.

As I understand, complaint is only made of clay and loam being mixed with sand at one point within my district, and that is mentioned in the report of Engineer Balch as sample "O."

The other samples taken along the line of my part of the work refer to the gravelly character of the sand, which is the same as has been for years, and is now being used for paving purposes in other contracts for paving in progress in this city.

What I have said with regard to this sand equally applies to its fitness for use as the bed for the paving-stones or covering for the concrete.

As to the broken stone, it came from a crusher from the upper end of the avenue and was brought to my portion of the work, where it was screened and handled with forks in order that any particles of dust and dirt should be removed. If any samples were taken from piles in the line of the work, as stated in the report of Engineer Balch, they were taken from piles which had been delivered on the work before it was prepared for use as I have described.

As to the mixing of the concrete, it was for the first few days all mixed dry—sand, cement and stone thoroughly mixed before the water was added, and then a large gang of men, from twelve to fourteen in number, mixed the whole mass together, forming a mass of thoroughly well-made concrete.

Subsequently, by direction of the Deputy Commissioner, the concrete was mixed as required by the specifications. The sand and cement mixed first and the stones stirred in afterwards. The result is, that the cement and sand when thus mixed with the water set so rapidly that as thorough mixture is impossible as when done the other way. This can be seen by examining the mixing boards where the cement and sand can be seen firmly attached to the boards, showing that all the cement mixture has not been incorporated with the broken stone.

The concrete which has been prepared and spread from the beginning of the work has been of good quality and has made a good firm bed for the pavement.

When spread it was tamped by the men with the back of their shovels, and with sufficient force to compact it thoroughly and leave a clear mortar surface, as required by the contract.

I desire to say that I have tried faithfully to perform my duty in the work to which I have been assigned, and that I believe the work done to be the best paving work that I have any experience of, and that a number of citizens who have watched the progress of the work have expressed themselves to me as highly gratified at the superior character of the work.

In conclusion, I may observe that from about the beginning of the work, it was evident that some examination was being made of the work by outside parties; a party whom I now believe to be the assistant to Mr. Balch was there making observations, and taking memoranda of the work in a somewhat surreptitious manner, apparently avoiding those in charge of the work and never going off the sidewalk. I was, therefore, aware that the character of the work was under examination, and I am pleased to know that nothing has been developed which indicates any substantial departure from the terms of the contract.

Respectfully submitted,

THOMAS ABBOTT, Inspector.

EXHIBIT G 16.

To Hon. ROLLIN M. SQUIRE, Commissioner of Public Works:

In obedience to your request, under the date of June 28, that I report you in reference to the condition of the pavement as laid on Fifth avenue, in view of the reports made thereon by Engineers McLean and Balch, I desire to make the following statement:

I was appointed an inspector on the 5th day of April, 1886, and went to work on the 7th day of the same month, and have been upon the work ever since. My duties have covered that portion of the avenue on which the work was to be done from Ninetieth street going south.

I have read the report made by the other inspector, Thomas Abbott, and I desire to say that all his statements relative to the paving-stones, their conformity to the specifications, and the manner in which the same have been inspected, and all improper stones which were delivered on the work rejected, apply to my portion of the work, as fully as if I had repeated them in my report. I desire to add, however, that as to the stones first delivered upon the work, before the actual work of paving commenced, Mr. Abbott and myself inspected the same as they were delivered, and the same were further inspected by me while they were actually being used in the course of the work.

I also desire to say, that the manner in which the sub-grade is ascertained, and the paving brought to its proper crown as finished, has been the same upon my part of the work as he described at length in his report upon the portion thereof.

As to the charge with regard to the preparation of the road-bed, the excavation of the Telford-McAdam pavement, on the line of the work where I have been inspector, brought it to the proper depth for sub-grade without needing the further removal of any earth, except to do a little trimming.

As the road-bed for the Telford-McAdam pavement had been rolled, to my personal knowledge, with a heavy steam-roller, we found it in a very hard, firm and compact condition, and suitable for the laying of the present pavement without any further rolling or ramming. No spongy material or vegetable matter was found upon the line of my part of the work.

As to the charge relative to the concrete, and the materials of which it was composed, the cement, sand and stone, as well as the manner of mixing the same, I desire to say that the cement has acted properly, while the concrete was being made, and I have been informed that proper tests of the same were made in the Department.

The sand was what is known as paving-sand, and from a long experience in connection with sand, having been a sand contractor for a number of years, I am prepared to say that the sand used upon the work, either for the paving or for the concrete, was of the very best character; it is what is known as Cow Bay sand. I am personally acquainted with the gravel pits from which this sand was taken; I have been frequently there, have seen the sand in banks, and have taken it away in vessels for sale elsewhere.

Sand from these pits was taken by me to the fortifications at Sandy Hook and used there by the United States Government. The presence of the gravel in the sand is an advantage both for the concrete and for the paving, and is more expensive than the finer sand, which was referred to in the Engineer's report, as well as more suitable for the purpose for which it was used.

No clay or loam was found to any extent upon my portion of the work, except that which came from the trimming of the avenue. The Engineer states in his report that he took a sample of the sand from Fifth avenue, twenty-five feet south of the south line of Ninetieth street, on Sunday, May 23, 1886, which he says was largely mixed with clay and loam, and that sand from this pile was used Monday, May 24, for making concrete. This last statement is absolutely false.

Monday, May 24, was stormy, and no work was done on the avenue.

No rotten stone was used in making the concrete.

The stone used in making concrete on my portion of the work was broken by hand, and instead of being handled by shovels, was handled by forks made for purpose of handling Macadam stone, so that the dirt and dust from the breaking would drop out as the same was handled. At the beginning two batches of concrete were made by mixing the sand and cement and broken stone all together, before adding water, when the same was handled by a gang of men, thoroughly mixing the same. This method of mixing the concrete was stopped by the Deputy Commissioner, who instructed me thereafter to see that the concrete was mixed according to the specifications, which has ever since been done, except on one occasion, when by direction of Mr. McLean, the Engineer from the Comptroller's office, I mixed two batches of concrete by taking the sand and cement and stone, and thoroughly incorporating them together, as we did at first, and then adding the water and thoroughly mixing the mass with shovels. Mr. McLean expressed himself to me that this was the more desirable and better method than the other, but I informed him that I had been instructed by the Deputy Commissioner to mix it according to the specifications, and have done so ever since.

In the beginning the concrete was mixed under my directions, but latterly a special inspector having been appointed to supervise the mixing of the concrete, I have received daily reports from him as to the manner in which the work was done, and hereto annexed will be found a sample of such reports.

The concrete has been spread to full depth and has been properly tamped by the men with the backs of their shovels, until a proper mortar surface was produced, as required by the specifications. At only one place in my part of the work has a less depth of concrete been laid than that called for by the specifications, and that is the place evidently referred to in the report of Mr. Balch, as between Eighty-eighth and Ninetieth streets. This was done under the supervision of the Engineer, and was required because of the depression of the roadway at this point, in order to meet and form a proper junction with the Ninetieth street entrance to the park; there being a less depth from the bottom of the sub-grade to the surface of the pavement, on account of this depression.

I desire to say, in conclusion, that the work has been done, in all respects, according to the contract and specifications, and that the pavement is the best one I have ever seen laid.

During the progress of the work a person whom I suppose to be Mr. Coryell, the assistant of Engineer Balch, has been over the line of the work during the day time, but never off the sidewalk, making observations and memoranda, and at time inquires of me how I got the grades, which information I furnished to him.

He has seemed at all times to be desirous of avoiding coming in contact with anybody having charge of the work. On one occasion when the engineer was approaching, and I pointed the engineer out to him, he ran away so as not to meet him.

Respectfully submitted,
CHRISTOPHER HAVICAN, Inspector.

EXHIBIT G 17.

(Fifth avenue.)

NEW YORK, July 29, 1886.

Report of concrete made and used on the above date.
(6 boxes), each containing 4 barrels of cement.
12 wooden barrows of sand and 23 iron barrows of stone.
Manner of preparing: (1st.) 12 wooden barrows of sand spread on top of box, then 4 barrels of cement spread on top of sand, both mixed together and then made into mortar, after which 23 iron barrows of cracked stone spread on top of mortar, all mixed together and pounded 6 inches deep on grade of avenue.
Total, 24 barrels of cement.
72 wooden barrows of sand.
138 iron barrows of stone.

J. A. LAWRENCE.

EXHIBIT H.

CITY OF NEW YORK—FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
June 26, 1886.

W. P. SHEARMAN, Esq., *Commissioner of Accounts:*

SIR—In reply to your letter of the 24th instant, asking to be informed of certain facts relating to the execution of the contract for paving Fifth avenue, I have to state that Mr. E. E. McLean, Civil Engineer of the Department, commenced his examination of that work on the first day of June; that his first report was made on June 4, and that his final and full report is dated June 23, 1886.

As requested by you, copies of both reports are herewith furnished, together with copies of correspondence on the subject with the Commissioner of Public Works, and also a copy of the seventy per cent. certified voucher of the Department of Public Works, covering the first monthly estimate in favor of the contractor, Matthew Baird, and accompanying papers.

The communications to the Department of Public Works show the official action taken in this matter by this Department.

Yours, respectfully,
EDWARD V. LOEW, Comptroller.

EXHIBIT H 1.

CITY OF NEW YORK—FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
June 8, 1886.

Hon. ROLLIN M. SQUIRE, *Commissioner of Public Works:*

SIR—Herewith I inclose a copy of a report of an examination made by Mr. E. E. McLean, Civil Engineer of this Department, showing a material departure from the conditions of the contract for paving Fifth avenue, now in progress, to the great detriment of the City, in regard to the proportions of ingredients of the concrete for the foundation of the pavement.

Your attention is respectfully called to this violation of the contract.

Yours, respectfully,
EDWARD V. LOEW, Comptroller.

EXHIBIT H 2.

CITY OF NEW YORK—FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
June 4, 1886.

Hon. E. V. LOEW, *Comptroller:*

SIR—The result of an actual measurement of a batch of concrete, made up this morning, for use in the Fifth avenue repaving, is as follows:

- 1 part of cement.
- 3 52-100 parts of sand.
- 7 46-100 parts of broken stone.

The contract calls for
1 part of cement.
2 parts of sand.
3 parts of broken stone.

The measurement was made by Mr. Withington.

Respectfully,
EUGENE E. McLEAN, Engineer.

P. S.—Calculation of the expense of concrete made in accordance with the terms of the contract, and that made by him in the proportions shown by the above actual measurement. Assuming the following prices of material, viz.:

Cement, \$1.25 per barrel; sand, \$1.50 per cubic yard, and broken stone, \$2 per cubic yard, and for one block, say 210 feet long and 40 feet roadway, the concrete six inches thick, gives the following result:

Concrete by the proportions of the contract:	
294 7-10 barrels of cement, at \$1.25 per barrel.....	\$378 37
81 82-100 cubic yard of sand, at \$1.50 per cubic yard.....	122 73
124 cubic yards of broken stone, at \$2 per cubic yard.....	249 60
	<hr/>
	\$750 70
As actually made by the contractor:	
140 barrels of cement, at \$1.25 per barrel.....	\$175 00
68 44-100 cubic yards sand, at \$1.50 per cubic yard.....	102 64
145 15-100 cubic yards broken stone, at \$2 per cubic yard.....	290 36
	<hr/>
Total.....	\$568 00
Difference in favor of the contractor.....	<hr/>
	\$182 70

Respectfully,
EUGENE E. McLEAN, Engineer.

EXHIBIT H 3.

DEPARTMENT OF PUBLIC WORKS—COMMISSIONER'S OFFICE,
No. 31 CHAMBERS STREET,
NEW YORK, June 15, 1886.

Hon. EDWARD V. LOEW, *Comptroller:*

SIR—I duly received your letter of 8th instant, enclosing copy of a report made to you by Mr. E. E. McLean, C. E., alleging that the proportions of cement, sand and broken stone for the concrete for the foundation of the new Fifth avenue pavement are not as required by the contract, to the great detriment of the City and to the advantage of the contractors. In reply I have to say that I have the statements of the Water Purveyor, who frequently visits the work and has general supervision of it; of Mr. J. McIntyre Smith, the Engineer in charge of the pavement, who visits the work at least twice a day, and of Thomas Abbott and Christopher Havican, Inspectors, whose whole time is taken up in the supervision of the work, and who give special attention to the proper composition and laying of the concrete, that all the concrete which has been used on the work is composed of materials as prescribed by the contract, viz.: One part of cement, two parts of sand and three parts of broken stone. In view of the positive statements of these four officers of the Department, who not only have better opportunities for overseeing and examining the work than any engineer employed by your Department, but who also have control and direction of the work, I must regard the report of your Engineer as properly subject to revision and correction.

Very respectfully,

ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT H 4.

CITY OF NEW YORK—FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
June 25, 1886.

Hon. ROLLIN M. SQUIRE, *Commissioner of Public Works:*

SIR—Herewith I transmit a copy of a report received from his Honor the Mayor, made by Col. George T. Balch, upon the work of paving Fifth avenue, now being executed under a contract made and entered into by the Department of Public Works with Matthew Baird; and also copy of a report to myself upon the same work by Eugene E. McLean, Civil Engineer, attached to the Finance Department.

These reports are submitted to you for your information regarding the execution of the work of paving Fifth avenue by said contractor, in a manner, as alleged therein, at variance with the specifications and in violation of the terms and conditions of said contract.

I hereby notify you, therefore, that in consequence of such alleged violations of said contract, I shall, for the time being, withhold the payment of any bills which have been or may be presented to this Department for payment on account of the work certified by the Department of Public Works as having been performed thereunder, and shall not pay any such bills without evidence of the faithful performance of said work in accordance with the specifications and the terms and conditions of the said contract for its execution.

Yours respectfully,

EDWARD V. LOEW, Comptroller.

EXHIBIT H 5.

CITY OF NEW YORK—FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
June 23, 1886.

Hon. E. V. LOEW, *Comptroller:*

SIR—Under your instructions I have made a close examination of the work now being done on the contract for repaving Fifth avenue.

The work is being prosecuted from Thirty-seventh street northward, and from Ninetieth street southward.

The requirements of the contract relative to stone blocks are as follows:

To be of granite of a durable and sound quality, each measuring on the face or upper surface not less than 10 nor more than 12 inches in length, not less than 4 nor more than 4½ inches in width, not less than 7 nor more than 7½ inches in depth, to be split and dressed so as to form when laid end joints not exceeding 1 inch wide, and side joints not exceeding 1 inch wide, with fair and true surfaces on top and bottom, and are to be, in all respects, equal to the specimen blocks at the office of the Commissioner of Public Works.

The requirements of the contract relative to bridge-stone are as follows:

"The new bridge-stones to be blue stones, equal to the best quality of North river blue stone, free from seams and imperfections. Each stone to be not less than 4 nor more than 8 feet long, except in cases where especially permitted, and 2 feet wide, and not less than 5 nor more than 8 inches thick in any part, and dressed to a face on top not varying in evenness by more than ¼ inch, and on the bottom headed with sides and ends square and full, and to be cut so as to lay to a joint not exceeding ¼ inch, from top to bottom on the ends and ½ inch from top to bottom on sides."

The requirements of the contract relative to concrete are as follows:

"On the foundation thus prepared there shall be placed a bed of concrete to the depth of six inches"—may be increased or diminished as may be required by Commissioner of Public Works (at vaults, railroad ties, sewer connection, etc.)—"concrete to be composed of one part of freshly-ground American hydraulic cement, of best quality, two parts of clean, sharp sand and three parts of broken or screened stone; the proportions to be determined by measurement. The cement and sand shall be thoroughly mixed dry, then water to be added in sufficient quantity to form a mortar, the broken stone to be next added and turned over until the broken stone presents no dry surface."

"The broken or screened stone to be solid trap or gneiss rock, and of a size not larger in any dimension than will pass through a two-inch ring, free from dust and dirt. The concrete shall be placed in proper position and there rammed until it is thoroughly compacted and has a clear mortar surface, which surface, when left, shall be ten inches below the grade of the finished pavement."

"On this concrete shall be laid a bed of clean, sharp sand, etc."

The following are the requirements of the contract for laying the pavement:

"The stone blocks to be laid at right angles with the line of the street, except in special cases." "Each course of blocks shall be of uniform width and depth, and so laid that all longitudinal joints shall be broken by a lap of at least two inches, and that all such joints shall be more than one inch in width top and bottom." "Dry gravel to be brushed into the joints until all the joints become filled therewith; gravel to be free from sand"; "the blocks to be then thoroughly rammed, more gravel shall then be brushed in to fill the joints, the block again carefully rammed, the process to be repeated until the joints are full and the blocks brought to an unyielding bearing, with uniform surface true to the roadway on the established grade."

Paving cement to be then poured in, to fill up the joints, and gravel then to be poured along the joints and consolidated with a light hammer, or otherwise.

My inspection has covered twenty-three days, the first visit to the work having been made on the 1st instant.

The foundation appears to me good, though it is not rolled or rammed as called for, the excavation to the proper depth being all that is necessary in the part exposed during my inspection.

I have found the concrete full in thickness, slight deficiencies being made up by slight excesses.

The stone used in making the concrete is that found on the line of the work. It is not fully up to the requirements of the contract, either as to size or, perhaps, hardness and strength, though I consider it sufficiently strong for the purpose. Very little attention was given to the size at first, but it is more looked after now.

The cement used, as tested roughly by myself, is good. I have seen a number of test samples in the Water Purveyor's office made, as stated, from cement on the line of the work, which were of good quality. My opinion is that the cement is good.

The sand ordinarily used on the work is what may be called gravelly sand. It is clean and sharp, and I consider it good for the purpose. It is used unsifted, and there are some stones in it rather larger than ought to be there, unless they are allowed for in the proportion of stone. I should not object to this sand in the work under consideration if the proportions of the different materials, as prescribed by the contract were adhered to, those proportions making a very rich concrete.

The first batch of concrete I saw mixed was made from an old bed of concrete in front of the bank at Forty-second street, this material taking the place of sand. I do not consider the material good for the purpose, inasmuch as old concrete which has either failed to set and harden, or has had its set broken up, is not much, if any, better than common earth.

4 barrels of cement, and 4 inches in depth of this material, mixed on a platform 13 feet square, formed the mortar, and would give this proportion: 1 cement to 3 15-100 of sand. I did not see the broken stone added.

On the 4th instant an actual measurement was made of a batch of concrete by Mr. Withington, a report of which was made. On the 6th a batch was measured by Mr. Withington at Ninetieth street, which gave the following result: 1 cement, 2.40 of sand and 6.20 of broken stone.

On the 7th I found them mixing at Eighty-ninth street, by actual measurement, by barrels and in the proportions prescribed by the contract.

On the 9th I saw a batch mixed near Forty-second street. It was very rich, being 1 cement, 1.89 sand and 2.36 of broken stone.

Since that time the concrete has been made in proper proportions.

I am of the opinion that, until my inspection was commenced, there was no definite measurement of the materials, and that the mortar was weak and the amount of broken stone excessive. The broken stone was not screened or handled with the care necessary to extract the dust and dirt. It is now screened at the crusher at Seventy-seventh street, and it is handled with more care, forks instead of shovels being used.

The concrete is not rammed as called for, but dressed to a wet surface by the shovel.

The granite blocks, as arranged in piles on the sidewalks, are generally within the limits of the specifications as to size, but I found a considerable proportion not so. The widths run from $3\frac{1}{2}$ to 5 inches, with a small proportion of 3 inches and the depths from 6 inches to 8 inches. A small portion of the whole are excessive in length, being $12\frac{1}{2}$ inches, and I found some of 13 inches and a few of 15 inches.

When I first went on the ground I found that the courses were not laid true across the street, nor was the uniformity in each course in width and depth attended to.

There has been considerable improvement in this respect, but nothing like perfection has been reached. Stones of different widths and depths are placed in the same course, but much care is given to straightening the blocks after they are laid by the pavers.

I cannot state positively that there is an insufficiency of ramming, but it appears to me that it is done more with a view to an even surface than to a firm foundation. In order that this foundation should be perfect, it is quite essential that every stone should be rammed with the same amount of force, and the small margin allowed in the depth is intended to insure this result, as it has been found impossible of attainment in the limits heretofore allowed.

The stiffness and incompressibility of the joints brought about by the use of gravel and cement will prevent any defect from this cause showing itself quickly, but it must appear in the course of time if there is an insufficient ramming. The surface of the finished work is good, and the joints are properly filled with cement and gravel, in accordance with the specifications, except that until the 9th, there was no hot gravel poured over the joints, and tamped in with a light rammer, as called for. This is now being done.

There are six kinds of granite used in the pavement, viz.:

1. The Rockport.
2. The Fox Island, coarse grained.
3. The Fox Island, fine grained.
4. The Mill-stone Point, Conn.
5. Westerly, R. I.
6. Long Cove, Tenant's Harbor, Me.

These are the samples exhibited at the Department of Public Works. They were selected from the piles along the line of the work, as I understand from Mr. Culver, the Water Purveyor. The original samples exhibited to the Commissioners I have not been able to find. They were left at the Mayor's office for a considerable time, and then taken away by an agent of the contractor. Two of the samples are 8 inches deep.

These samples, and the blocks on the work, are all of "sound and durable granite," but they vary much in hardness, and consequently in durability. As no special variety is called for in the specifications, I do not see how the City can complain if all the varieties are used in the pavement. I will state, however, that when I first inquired for the samples at the Department of Public Works, two blocks were pointed out to me, both of which were of the hardest variety.

I find many crosswalk stones laid which do not come up to the requirements of the specifications, being imperfect on account of seams and consequent roughness on the surface. It is alleged that these stones are to be dressed in place, but in my opinion, they can never be made to come up to the contract, which describes a faultless stone. So far from being faultless, many of them are very rough and common.

In laying them, the one-foot limit of break in joints is not adhered to.

RECAPITULATION.

1. The foundation is properly prepared, though it is not rolled or rammed, that being unnecessary.
2. The concrete at first was not made in the required proportions, the mortar being weaker and the quantity of stone too great. It is now being properly made. It has been laid of the required thickness.
3. The granite blocks vary in width from $3\frac{1}{2}$ to 5 inches, instead of from 4 to $4\frac{1}{2}$ inches, and in depth from 6 inches to 8 inches, instead of from 7 inches to $7\frac{1}{2}$ inches, and are so laid.
The separate courses are not laid of uniform width and depth.
Of the six samples deposited in the Department of Public Works, two are fully 8 inches in depth.

The ramming is carefully done as to the surface, and the joints are filled in in accordance with the specifications, though at first the final pouring of hot gravel over the joints, and tamping it in, was not attended to.

4. Many of the crosswalk stones are rough and unsightly on the surface, and entirely below the requirements of the specifications, which call for a faultless stone.

Many of them are laid without preserving the limit of one foot in the break of the joints.

Respectfully submitted,

EUGENE E. McLEAN, Engineer, etc.

EXHIBIT H 6.

CITY OF NEW YORK—FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
July 13, 1886.

WM. P. SHEARMAN, Esq., J. B. ADAMSON, Esq., Commissioners of Accounts:

GENTLEMEN—I am in receipt of your letter of the 10th instant, inquiring when I took steps to communicate to the Commissioner of Public Works, or his Deputy, the results of Engineer McLean's report upon the execution of the contract for repaving Fifth avenue.

Mr. McLean's first report upon the "proportion of ingredients of the concrete for the foundation of the pavement" was made to me on June 4, and on the same day I sent a messenger to the Commissioner of Public Works, requesting him verbally to call at this office to see me in relation to the Fifth avenue contract. Deputy Commissioner Wm. V. Smith came to see me the next day, June 5, when I stated the facts to him orally, and Mr. McLean's report was furnished him at the same time.

No further communication was made until my letter to the Commissioner of Public Works of June 8, accompanied also with a copy of Mr. McLean's report.

Respectfully yours,

EDWARD V. LOEW, Comptroller.

EXHIBIT I.

Form 2.

"70 PER CENT. PAYMENT."

THE CITY OF NEW YORK

To MATTHEW BAIRD, Dr.

For work done in the matter of paving with granite-block pavement Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street.

On account of the appropriation of Repaving (under chap. 476, Laws of 1875),
Chap. 410, Laws of 1882, sec. 189; Revised Ordinances, 1880, chap. 6, art. 1, sec. 8.
Chap. 410, Laws of 1882, sec. 317.

DATE.	AMOUNT AND KIND OF WORK.	PRICE.	AMOUNT.	
			Dolls.	Cts.
1886.				
June 10	5,000 square yards pavement, five thousand	\$3 75	18,750	00
	2,700 square feet new bridge-stone laid, twenty-seven hundred	58	1,566	00
	800 cubic yards concrete, eight hundred	4 10	3,280	00
	Estimated cost, \$429,559.50.			
	Amount, twenty-three thousand five hundred and ninety-six and $\frac{80}{100}$ dollars		23,596	00
	Thirty per cent. retained, seven thousand and seventy-eight $\frac{80}{100}$ dollars		7,078	80
	Heretofore earned, \$			
	Heretofore certified.			
	Balance now due, sixteen thousand five hundred and seventeen $\frac{80}{100}$ dollars		15,517	20

J. S. R. T. F.

I certify that I have duly examined the above account, and compared it with the contract and the Engineer's certificate, and that it is correct and the amount justly due.

(Signed)

A. CULVER, Water Purveyor.

(Signed) J. McINTYRE SMITH, Engineer in Charge.

I hereby certify that I have examined the above account and believe it to be correct; that the prices charged are in accordance with the terms of the contract for paving Fifth avenue, from Ninth to Ninetieth street, except between Thirty-second and Thirty-seventh streets, dated October 28, 1885; and such services as therein specified have been properly performed according to the certificates of the officers of this Department, duly appointed to supervise the same.

(Signed)

ROLLIN M. SQUIRE, Commissioner of Public Works.

Received at the office of the Comptroller, in the City of New York, this day of 1886, from Edward V. Loew, Comptroller, a warrant upon the Chamberlain for the sum of sixteen thousand five hundred and seventeen $\frac{80}{100}$ dollars in payment of the above amount.

\$16,517 $\frac{80}{100}$.

(Copy.)

ENDORSEMENT.

No. 1.

70 per cent. Payment.

Voucher No. 547
Requisition No. 16780.

Department of Public Works.

Bureau of Water Purveyor.

Matthew Baird.

Paving Fifth avenue, from Ninth to Ninetieth street, except between Thirty-second and Thirty-seventh streets.

June 10, 1886.

\$16,517.20.

Repaving Fifth avenue (under chap. 371, Laws of 1885), chap. 410, Laws of 1882, sec. 189 and 317; Revised Ordinances, 1880, chap. 6, art. 1, sec. 8.

EXHIBIT I 1.

(Copy.)

ENGINEER'S CERTIFICATE.

No. 1.

I HEREBY CERTIFY that the following amount of work has been done in the matter of paving with granite-block pavement, etc., Fifth avenue, from Ninth to Ninetieth street (except between Thirty-second and Thirty-seventh streets), Matthew Baird, Contractor.

Since the commencement of the work—

5,000 square yards of pavement, five thousand.

2,700 square feet of new bridge-stone laid, twenty-seven hundred.

800 cubic yards of concrete, eight hundred.

Making the amount done since the day of 1886, the date of my last certificate, viz.:

Square yards of pavement.

Square feet of new bridge-stone laid.

(Signed)

J. McINTYRE SMITH, Engineer in Charge.

Date, June 10, 1886.

To ALSTON CULVER, Water Purveyor.

ENDORSEMENT.

Department of Public Works,

Engineer's Certificate,

Date, June 10, 1886.

Paving Fifth Avenue, between Ninth and Ninetieth Streets.

J. McINTYRE SMITH, Engineer in Charge.

EXHIBIT I 2.

(Copy.)

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF WATER PURVEYOR, NO. 31 CHAMBERS STREET,
June 10, 1886.

I CERTIFY that I have personally examined and inspected the work mentioned in the annexed voucher and that the same has been well done in full compliance with the contract for paving with granite-block pavement, etc., Fifth avenue, from Ninth to Ninetieth street (except between Thirty-second and Thirty-seventh streets), and the specifications therefor.

(Signed)

THOMAS ABBOTT, Inspector in Charge.

EXHIBIT I 3.

(Copy.)

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF WATER PURVEYOR, NO. 31 CHAMBERS STREET,
June 10, 1886.

I CERTIFY that I have personally examined and inspected the work mentioned in the annexed voucher, and that the same has been well done in full compliance with the contract for paving with granite-block pavement, etc., Fifth avenue, from Ninth to Ninetieth street (except between Thirty-second and Thirty-seventh streets), and the specifications therefor.

(Signed)

CHRISTOPHER HAVICAN, Inspector in Charge.

Form 2.

EXHIBIT J.

"70 PER CENT. PAYMENT."

THE CITY OF NEW YORK

To MATTHEW BAIRD, Dr.

For work done in the matter of paving with granite-block pavement Fifth avenue, from Ninth street to the northerly line of Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street.

On account of the appropriation of Repaving (under chap. 476, Laws of 1875.)

Chap. 410, Laws of 1882, sec. 139.

Chap. 410, Laws of 1882, sec. 317; Revised Ordinances, 1880, chap. 6, art. 1, sec. 8.

5th ave., as provided by chap. 371, Laws of 1885.

DATE.	AMOUNT AND KIND OF WORK.	PRICE.	AMOUNT.	
			Dollars.	Cts.
1886.				
July 27	10,600 square yards of pavement, ten thousand six hundred.....	\$3 75	39,750	00
	2,300 square feet new bridge-stone laid, twenty-three hundred.....	58	1,334	00
	1,800 cubic yards of concrete, eighteen hundred.....	4 10	7,380	00
	Estimated cost, \$429,559.50.			
	Amount, forty-eight thousand four hundred and sixty-four and $\frac{80}{100}$ dollars.....		48,464	00
	Thirty per cent. retained, fourteen thousand five hundred and thirty-nine and $\frac{80}{100}$ dollars.....		14,539	20
	Heretofore earned, \$23,596.00.			
	Heretofore certified, \$16,517.20.			
	Balance now due, thirty-three thousand nine hundred and twenty-four and $\frac{80}{100}$ dollars.....		33,924	80

J. S. R.

I certify that I have duly examined the above account, and compared it with the contract and the Engineer's certificate, and that it is correct, and the amount justly due.

J. MCINTYRE SMITH, Engineer in Charge.

(Copy.)

I hereby certify that I have examined the above account, and believe it to be correct; that the prices charged are in accordance with the terms of the contract for paving Fifth avenue, from Ninth to Ninetieth street, except between Thirty-second and Thirty-seventh streets, dated October 28, 1885; and such services as are therein specified have been properly performed, according to the certificate of this Department duly appointed to supervise the same.

ROLLIN M. SQUIRE, Commissioner of Public Works.

Received at the office of the Comptroller, in the City of New York, this day of 1886, from Edward V. Loew, a warrant upon the Chamberlain for the sum of thirty-three thousand nine hundred and twenty-four $\frac{80}{100}$ dollars.

\$33,924 80-100.

(Copy.)

ENDORSEMENT.

No. 2.

70 per cent. Payment.

Voucher No. 606.
Requisition No. 16881.

Department of Public Works,
Bureau of Water Purveyor.
Matthew Baird.

Paving Fifth avenue, from Ninth to Ninetieth street, except between Thirty-second and Thirty-seventh streets.

July 27, 1886.

\$33,924 80-100.

Repaving Fifth avenue (under chap. 37, Laws of 1885), chap. 410, Laws of 1882, secs. 189 and 317; Revised Ordinances, 1880, chap. 6, art. 1, sec. 8.

EXHIBIT J 1.

ENGINEER'S CERTIFICATE.

No. 2.

I hereby certify that the following amount of work has been done in the matter of paving with granite-block pavement Fifth avenue, from Ninth to Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street, Matthew Baird, Contractor.

Since the commencement of the work:

15,600 square yards of pavement. Fifteen thousand six hundred.
5,000 square feet of new bridge stone laid. Five thousand.
2,600 cubic yards of concrete. Twenty-six hundred.

Making the amount done since the 10th day of June, 1886, the date of my last certificate viz.:

10,600 square yards of pavement. Ten thousand six hundred.
2,300 square feet of new bridge-stone laid. Twenty-three hundred.
1,800 cubic yards of concrete. Eighteen hundred.

J. MCINTYRE SMITH, Engineer in Charge.

Date, July 27, 1886.

To ALSTON CULVER, Water Purveyor.

ENDORSEMENT.

(Copy.)

Department of Public Works,
Certificate,
Date, July 27, 1886.

Paving Fifth avenue, between Ninth and Ninetieth streets.

J. MCINTYRE SMITH, Engineer in Charge.

EXHIBIT J 2.

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF WATER PURVEYOR, NO. 31 CHAMBERS STREET,
July 27, 1886.

I certify that I have personally examined and inspected the work mentioned in the annexed voucher, and that the same has been well done in full compliance with the contract for Paving Fifth avenue, from Ninth to Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street, and the specification therefor.

THOMAS ABBOTT, Inspector in Charge.

(Copy.)

EXHIBIT J 3.

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF WATER PURVEYOR, NO. 31 CHAMBERS STREET,
July 27, 1886.

I certify that I have personally examined and inspected the work mentioned in the annexed voucher, and that the same has been well done, in full compliance with the contract for Paving Fifth avenue, from Ninth to Ninetieth street, except the five blocks from the north side of Thirty-second street to the south side of Thirty-seventh street, and the specifications therefor.

CHRISTOPHER HAVICAN, Inspector in Charge.

(Copy.)

EXHIBIT K.

JUNE 29, 1886.

ROLLIN M. SQUIRE, Esq., Commissioner of Public Works,
No. 31 Chambers Street, New York:

DEAR SIR—It having been recently stated in the public prints that the cement used by the contractor on the work of repaving Fifth avenue has been all duly inspected, we have to request that you will furnish this office with the following information, covering the period from the 10th day of May to the 26th day of June, both inclusive:

Name and position of the officer who inspected the cement.
The brand so inspected.
The date on which each barrel of each brand was so inspected.
The locality where each inspection took place.
The details of the method of conducting such inspections.
The results in each case.
The number of barrels so tested in each lot will be given.

Respectfully yours,

W. P. SHEARMAN, } Commissioners of
J. B. ADAMSON, } Accounts.

EXHIBIT K 1.

DEPARTMENT OF PUBLIC WORKS,
COMMISSIONER'S OFFICE, NO. 31 CHAMBERS STREET,
NEW YORK, July 1, 1886.

Messrs. W. P. SHEARMAN and J. B. ADAMSON, Commissioners of Accounts:

GENTLEMEN—Your favor of the 29th inst. received, in which you inform me that it has been recently stated in the public prints that the cement used by the contractor on the work of repaving Fifth avenue had all been duly inspected, and requesting that I furnish your office with information in reference thereto, in answer to the inquiries specified by you.

I am not advised by you as to the public prints from which you obtained the information referred to, but whether you have acted with or without the aid of the public prints in this particular, you are right in assuming that whatever by contract becomes a part of the public duties of this Department, it is my intention and desire fully and faithfully to perform, and it would have been well if you had acted on this assumption before addressing yourselves, over the signature of Mr. George T. Balch, the communication in which you so recklessly insinuate to the contrary.

Whatever information is in the possession of the officers of this Department shall at all times be furnished to you when desired, and I have accordingly, in compliance with your present request, directed that the information requested in the communication referred to, so far as the facts apply, be furnished to you.

Such direction will be in due course complied with.

Respectfully,

ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT K 2.

JULY 6, 1886.

ROLLIN M. SQUIRE, Esq., Commissioner of Public Works,
No. 31 Chambers Street, City:

DEAR SIR—The information called for in regard to the inspection of the cement used in the work of repaving Fifth avenue, noted in our letter of June 29 has not as yet been received, although in your communication of the 1st instant acknowledging the receipt of that letter you advise us as follows:

"Whatever information is in the possession of the officers of this Department shall at all times be furnished you when desired, and I have accordingly, in compliance with your present request, directed that the information in the communication referred to, so far as the facts apply, be furnished to you."

Such direction will be in due course complied with.

As nine days have elapsed since our request was made, and as we are in need of the data asked for, we beg to call your attention to the matter, and we request an early reply.

Respectfully yours,

W. P. SHEARMAN, } Commissioners of
J. B. ADAMSON, } Accounts.

EXHIBIT K 3.

DEPARTMENT OF PUBLIC WORKS—COMMISSIONER'S OFFICE,
NO. 31 CHAMBERS STREET,
NEW YORK, July 9, 1886.

Messrs. W. P. SHEARMAN and J. B. ADAMSON, Commissioners of Accounts:

GENTLEMEN—In response to your communication of yesterday, I have the honor to inclose to you a copy of the report of Assistant Engineer J. O. B. Webster, before whom your letter of date June 29 was laid. I am aware it should have been sooner forwarded to you, but owing to the press of other matters, it escaped my notice until your communication of yesterday morning came to hand, to which please accept this as a response.

Very respectfully,

ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT K 4.

(Copy.)

DEPARTMENT OF PUBLIC WORKS,
OFFICE OF THE ENGINEER IN CHARGE OF SEWERS,
NO. 31 CHAMBERS STREET, ROOM 9,
NEW YORK, July 6, 1886.

Hon. ROLLIN M. SQUIRE, Commissioner of Public Works:

SIR—In answer to the letter of the Commissioner of Accounts, under date of June 29, 1886, to wit:

"It having been recently stated in the public prints that the cement used by the contractor on the work of repaving Fifth avenue has been duly inspected, we have to request that you will furnish this office with the following information, covering the period from 10th day of May to the 26th day of June, both inclusive:

"1st. The name and position of the officer who inspected the cement."
"2d. Brands so inspected."
"3d. The date on which each barrel of each brand was so inspected."
"4th. The locality where each inspection took place."
"5th. The details of the method of conducting each inspection."
"6th. The result in each case."
"7th. The number of barrels so taken in each lot will be given."

In answer to the above questions I report as follows:

1st. J. O. B. Webster, Assistant Engineer, Department of Public Works.

DATE OF INSPECTION.	NAME OF CEMENT.	NUMBER OF BRIQUETTES INSPECTED.	TENSILE STRENGTH PER SQUARE INCH, AVERAGE POUNDS BREAKING.	DATE OF APPOINTMENT.	DESCRIPTION OF WORK.		ESTIMATED COST.
					Nature.	Location.	
1886. May 17 " 24 June 3 " 7 " 14 " 16 " 21 2d, 3d, 4th and 6th.	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	4	56	April 28	Paving	Sixty-seventh street, between Second and Third avenues....	*\$4,200 00
	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	4	82	" 28	"	Ninety-third street, between Ninth and Tenth avenues....	*6,832 50
	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	4	55	May 4	"	Eighty-fifth street, between Eighth and Ninth avenues....	*6,832 50
	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	4	55	" 4	"	One Hundred and Fourteenth street, between Eighth and New avenues.....	*Not graded.
	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	5	70	" 4	"	Washington street, between Little West Twelfth and Fourteenth streets.....	*4,782 50
	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	3	77	" 20	"	Seventy-third street, between Avenue A and First avenue..	*5,277 50
	New York and Brooklyn Bridge; New York and Rosendale Cement Company, Hiram Snyder, President.....	2	65	June 9	"	One Hundred and Thirty-first street, between Sixth and Seventh avenues.....	*6,622 50
	Lawrenceville Cement Company, Wm. M. Beach, President.....	5	55	" 25	"	Ninety-sixth street, between First and Third avenues.....	*17,332 00
				" 25	"	Ninety-seventh street, between Ninth and Tenth avenues..	*5,466 00

All of the above samples were inspected at No. 31 Chambers street.

5th. The manner of conducting the tests has been in strict accordance with the specifications. The cement being tested was mixed to the consistency of a stiff paste, put in moulds and exposed to the air for thirty minutes, then immersed in water for twenty-four hours; taken from water bath and subjected to a tensile strain, per square inch, on the Reihle Bros. testing machine, with results as above.

7th. The samples of cement were taken from the different lots as brought on the line of the work, the cement at each inspection being taken from two to four barrels, and delivered to me by the engineer in charge of the work for examination.

The samples inspected were American hydraulic cement.

Respectfully submitted,

JOS. O. B. WEBSTER, Assistant Engineer.

EXHIBIT K 5.

Department of Public Works,
Received
August 9, 1886,
Commissioner's Office,
New York.

DEPARTMENT OF PUBLIC WORKS,
OFFICE OF ENGINEER IN CHARGE OF SEWERS,
No. 31 CHAMBERS STREET, ROOM 9,
NEW YORK, August 9, 1886.

ROLLIN M. SQUIRE, Esq., Commissioner of Public Works:

SIR—In answer to the letter of Commissioner of Accounts, of August 9, 1886, viz.:

"Please furnish this office with the following information in regard to the inspection of the cement used in repaving Fifth avenue, from the 21st June to 24th July, inclusive, being a continuation of Mr. Webster's report on the same subject, dated July 6, 1886:

"1st. Name and position of officer who inspected the cement.

"2d. Brands so inspected.

"3d. The date on which each barrel was so inspected.

"4th. The locality where each inspection took place.

"5th. Result in each case.

"6th. Number of barrels which each lot so taken represented."

In answer to the above questions I report as follows:

1st. J. O. B. Webster, Assistant Engineer, Department of Public Works.

Nos. "2," "3," "4," "5," and "6":

DATE OF INSPECTION.	NAME OF CEMENT.	Number of Brickets inspected.	Tensile Strength per Square Inch, Average Pounds Breaking.	Cement taken from Barrels.	LOCATION ON AVENUE.
1886.	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	6	86	..	
June 28	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	4	82	..	Near Eighty-fifth street.
July 1	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	4	69	..	Near Forty-fifth street.
" 6	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	3	61	..	Near Eighty-fifth street.
" 9	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	4	73	3	Between Forty-seventh & Forty-eighth streets.
" 9	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	4	72	4	Between Eighty-third & Eighty-fourth streets.
" 12	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	4	89	5	Near Forty-eighth street.
" 13	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	6	73	5	Near Eighty-fourth street.
" 20	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	5	82	4	Between Forty-ninth & Fiftieth streets.
" 21	New York and Brooklyn Bridge; New York and Rosendale Cement Co., Hiram Snyder, President..	5	81	4	Between Eighty-second & Eighty-third streets.

All of the above samples were inspected at No. 31 Chambers street.

The samples so tested were American hydraulic cement.

Respectfully submitted,

JOS. O. B. WEBSTER, Assistant Engineer, etc.

EXHIBIT L.

Statement of Contracts for Paving, Repaving, Regulating and Grading Streets, Authorized, in Force or Unfinished on the 1st day of January, 1886, or which have been authorized up to July 1, 1886, grouped by the names of the City Surveyors in charge of the same.

DATE OF APPOINTMENT.		DESCRIPTION OF WORK.		ESTIMATED COST.
		Nature.	Location.	
1886.		CITY SURVEYOR J. MCINTYRE SMITH.		
Feb.	18	Paving	One Hundred and Thirty-third street, between Seventh and Eighth avenues.....	\$5,658 59
"	18	"	Madison avenue, between Eighty-sixth and One Hundred Thirty-fifth streets.....	*93,750 00
"	18	"	Ninth avenue, between Seventy-seventh and One Hundred and Tenth streets.....	161,728 77
"	18	"	Tenth avenue, between Seventy-fourth and One Hundred and Tenth streets.....	188,392 00
"	18	"	Eighty-second street, between Avenues A and B.....	4,638 00
"	18	"	Eighty-third street, between Boulevard and Riverside Drive.....	8,618 74
"	18	"	Eighty-eighth street, between First and Second avenues....	6,181 80
"	18	"	Ninety-third street, between Eighth and Ninth avenues....	*5,488 00
"	18	"	Ninety-sixth street, between Third and Lexington avenues..	*6,034 00
"	18	"	One Hundred and Second street, between Fifth and Lexington avenues.....	15,166 66
"	18	"	One Hundred and Seventh street, between Third and Lexington avenues	3,339 25
"	18	"	One Hundred and Twenty-ninth street, between Twelfth avenue and North river.....	*Not graded.
"	18	"	One Hundred and Fifty-second street, between St. Nicholas avenue and place.....	830 80
April	28	"	Sixty-fifth street, between Tenth and Eleventh avenues....	*Not graded.
AGGREGATE COST OF FIFTY CONTRACTS LET.....				
ESTIMATED AGGREGATE COST, 32 WORKS TO BE LET...				
TOTAL				

DATE OF APPOINTMENT.		DESCRIPTION OF WORK.		ESTIMATED COST.
		Nature.	Location.	
CITY SURVEYOR ROBERT L. WATERS.				
April 28	Paving	Seventy-first street, between Eastern Boulevard and East river		*\$4,680 00
May 4	"	One Hundred and Twelfth street, between Eighth and New avenues		*Not graded.
June 25	"	One Hundred and Ninth street, between Fourth and Madison avenues.		*2,736 00
" 25	"	Thirty-ninth street, between First avenue and East river....		*Not graded.
1884.				
Jan. 8	Regulating and grading..	One Hundred and Thirty-second street, between Tenth avenue and Broadway		9,468 56
April 10	" ..	William street, between Duane and North William streets..		3,053 20
Dec. 20	" ..	Washington street, between Little West Twelfth and Fourteenth streets		3,572 21
1885.				
Feb. 28	" ..	One Hundred and Fifty-fifth street, between Eighth avenue and McComb's Dam lane.....		12,064 70
May 16	" ..	One Hundred and Thirty-third street, between Eighth and St. Nicholas avenue.....		1,524 68
Dec. 7	" ..	Ninety-third street, between West End avenue and Riverside Drive.....		33,987 73
" 7	" ..	Ninety-fourth street, between Boulevard and Riverside Drive.....		33,311 60
1886.				
Feb. 9	" ..	One Hundred and First street, between Eighth and Manhattan avenues.....		*3,644 00
" 27	" ..	One Hundred and Fifty-fifth street, between Eighth avenue and first new avenue west		8,114 30
May 4	" ..	One Hundred and Twelfth street, between Eighth and New avenues.....		*4,833 20
June 9	" ..	One Hundred and Thirty-seventh street, between Eighth and St. Nicholas avenues.....		*1,835 00
" 25	" ..	Sixty-fifth street, between Tenth and Eleventh avenues....		*2,435 20
AGGREGATE COST OF EIGHT CONTRACTS LET				\$105,096 98
ESTIMATED AGGREGATE COST SIX WORKS TO BE LET...				*20,163 40
TOTAL				*\$125,260 38
CITY SURVEYOR R. J. DODGE.				
April 28	Paving	Sixty-fourth street, between First and Second avenues		\$6,807 70
May 4	"	Seventieth street, between First avenue and Avenue A.....		*4,200 00

NOTE.—For work let the figures are in black. For work to be let, the figures as estimated, are in red. [Figures in the original in red are here preceded by an asterisk (*).]

EXHIBIT M.

STATUE OF LIBERTY—OFFICE OF ENGINEER-IN-CHIEF,
NO. 1 BROADWAY (ROOM 40),
NEW YORK, July 8, 1886.

To the Honorable the Commissioners of Accounts, New York City:

GENTLEMEN—I am in receipt of your letter of July 7th instant, requesting that you may "be furnished with a brief official description of the manner in which the concrete work on the Bartholdi pedestal has been executed under your (my) orders; the kind of cement, sand and broken stone used, with the tests applied, the proportion of the parts, the number of cubic feet in a batch and the method of mixing and laying being clearly brought out."

In compliance with your request, I have the honor to give you the following statement:

I.—That portion of the foundation mass of the pedestal which is underground is of concrete, of the following composition, viz.:

2 parts by volume Norton's Rosendale cement.
2 parts by volume clean, sharp sand.
7 parts by volume broken trap-rock, all required to pass through a 2-inch ring, and 3 of the 7 parts to pass through 1-inch ring.

II.—Cement.

The cement was received in cargoes direct from the manufacturer, the cargoes varying from 500 to 1,200 casks. Each cargo was inspected to see that the packages were dry and in good condition, and testing samples were taken from every tenth barrel. These samples were carefully tested for tensile strength, both the neat cement and also the cement mixed with sand, in the same proportions in which it entered into the work. The cement was also tested to ascertain the fineness, being for that purpose passed through one sieve of 2,500 meshes per square inch, and another of 6,400 meshes per square inch. No cement was used of which as much as ten per cent. was rejected by the sieve of 2,500 meshes per square inch. The usual percentage of rejection by that sieve was under five.

III.—Sand.

The sand used was required to be clean and sharp, and all cargoes exhibiting clear evidence to the eye of containing loam or other impurities were rejected without further test. The sand received was, in all cases before me, carefully tested by washing, and if found by test to contain loam or organic matter, was rejected and condemned. Such sand as was found otherwise good, but which contained many large gravel stones, was screened before use.

IV.—Broken Stone.

The broken stone came from the Palisade on the Hudson river, and was required to be of the required sizes and in the prescribed proportions of sizes. No loam or other impurities were permitted to be mixed with this material, and the contractors were required to exercise great care in handling and storing to preserve the cleanliness.

V.—Proportion of Parts.

This was prescribed with a view to produce an artificial stone capable of offering great resistance to crushing force. The matrix was therefore made as exactly as possible to completely fill the voids in the mass of broken stone and yet be in itself very strong. As the Rosendale cement will not carry a large proportion of sand and make a strong stone, it was loaded with only one volume of sand. In these proportions the matrix gained, in four days from the time of placing, a strength sufficient to resist a crushing force of about fifteen tons per square foot; and in eight months, strength to resist a crushing force of more than fifty tons per square foot.

VI.—The Number of Cubic Feet in a Batch.

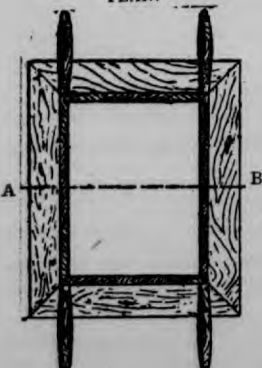
In order to spare expense to the contractor the batches were made as large as was considered practicable with work, viz., sixty-four cubic feet of loose materials in each batch, which, when well rammed in place formed forty-four cubic feet of concrete. So large a batch could only be allowed when a careful separate mixture of the matrix was made.

VII.—The Method of Mixing and Laying.

The concrete of the foundation-mass was mixed by hand in the following manner, viz.: A platform more than twenty feet square was carefully laid; measuring boxes of exactly the dimensions necessary to hold the quantity of each material prescribed for one batch were placed on the platform.

These boxes were constructed without bottoms and with flaring sides, thus:

PLAN.



SECTION.



SIDE ELEVATION.



The boxes for the broken stone were made larger and much more shallow than those for cement and sand, so that after they had been filled and were seized by the handles and lifted, the broken stones were left on the platform in a bed about six or eight inches deep and ready to be washed to receive the matrix paste.

Men specially designated for the purpose opened the cement barrels and removed the empty barrels as soon as the cement was emptied into the measuring boxes.

The cement and sand were dumped into their respective measuring boxes, which were struck as in measuring grain; thus each batch received the exact measure of each material. Eight men were usually employed in mixing the batch, three of whom mixed the cement and sand, and five mixed the broken stone with the matrix, and after mixing shoveled the concrete into the barrows.

The broken stone was wheeled to its measuring box by other men than those of the mixing gang, so that each set of men had one duty only to perform, and worked steadily at that.

The dry sand and cement when discharged from the boxes on to the platform were rapidly mixed dry, and when thoroughly mixed, were sprinkled with water by one of the men, using for the purpose either a watering-pot or a hose furnished with a rose, while the other two worked rapidly with hoes to thoroughly mix the water with the mixture of cement and sand; this was continued until the mixture was formed into a moist paste of about the consistency of good brown sugar. Great care was exercised to prevent the admixture of too much water; meantime, the bed of broken stone was carefully washed by means of a hose furnished with a rose, the water being under pressure, and the surface of each piece of stone was made clean and damp ready to receive the matrix.

The matrix was then spread over the layer of damp, clean broken stone, and the mixers shoveled from two opposite edges right and left, mixing the cement and sand paste thoroughly with the broken stone; they then shoveled the two masses back to the centre. By these operations, each piece of broken stone became covered by a film of the matrix paste; and this latter was evenly distributed through the mass. The concrete was then shoveled into the barrows and wheeled to its resting place, where, under the eye of an inspector, it was spread to a thickness which would make a finished layer of six inches and rammed until perfectly compact.

Each platform had its inspector to see that the prescriptions for mixing were perfectly complied with; and if any defect escaped the eye of the platform inspector, the one who received the concrete on the work was required to reject any which reached him improperly mixed.

Trial blocks of concrete were frequently made during the progress of the work, generally one from each layer, the material for the blocks being taken from the barrows.

The progress of the work of mixing was so regulated as to always have a batch of stone ready at the moment when the mixture of matrix had a charge ready; and while the concrete mixers were engaged in turning and shoveling into barrows, the outside men filled the broken stone box and the matrix mixers worked on the next batch.

The above-named composition was used only in the portion of the foundation-mass which remains under ground, that is the lower fifteen feet and eight inches of the mass. In the portion above ground, Portland cement was in part used, but the manner of mixing and placing was the same.

The fine beton of the pedestal proper was mixed by a machine, and was made of Portland cement and fine crushed trap-rock.

It may be, perhaps, well to state that a sample block of the concrete made for the underground portion of the foundation-mass, of the composition indicated in I, subjected to compression (Block 12" x 12" x 12") at the age of about twenty-eight months, sustained, before yielding, a crushing force of 104 tons, net, to the square foot.

Very respectfully, I am, gentlemen, your most obedient servant,

CHAS. P. STONE, Engineer-in-Chief.

EXHIBIT M I.

STATUE OF LIBERTY,
OFFICE OF ENGINEER-IN-CHIEF, NO. 1 BROADWAY (ROOM 140),
NEW YORK, July 21, 1886.

Colonel GEORGE T. BALCH, Office of the Commissioners of Accounts, N. Y. City:

DEAR SIR—In reply to your inquiry as to how much material entered into the construction of the concrete foundation-mass of the pedestal of the Statue of Liberty, I would state that the mass weighs about twenty-three thousand and five hundred tons, net.

The cement weighed very nearly 3,670 tons.

The broken stone and sand, very nearly 19,830 "

23,500 tons.

About 21,000 casks of cement were used, say 12,000 casks Norton's Rosendale, weighing 300 lbs. per cask, and the balance Portland cement, weighing 400 lbs. per cask.

The cement used was equivalent to, say 24,400 casks of Rosendale, in weight.

In the pedestal proper, built on the above-named foundation, more than 6,000 casks of Portland cement, and more than 3,500 yards of crushed trap-rock were used. No ordinary sand entered into the construction of the pedestal proper.

Very respectfully, your most obedient servant,

CHAS. P. STONE, Engineer-in-Chief.

EXHIBIT N.

In the Matter

of
The Special Examination of the Accounts and Methods of the
Department of Public Works by the Commissioners of Accounts.

NEW YORK, July 21, 1886, 3 P. M.

Present—The Commissioner of Accounts.

J. MCINTYRE SMITH, being duly sworn and examined by Commissioner Shearman, testified as follows:

Q. Where is your residence?

A. No. 973 Sixth avenue.

Q. What is your occupation?

A. City Surveyor, civil engineer.

Q. You are employed by the Department of Public Works?

A. Yes, sir.

Q. How long have you been a City Surveyor?

A. I could not say exactly.

Q. About as near as you can say?

A. Six or seven years.

Q. Where did you study surveying?

A. With my father, when I was a boy, and ever since in New York City.

Q. Your father was a City Surveyor?

A. Yes, sir; my grandfather was Commissioner of Public Works at one time.

Q. You studied at no special school?

A. No, sir.

Q. And received no certificate or diploma?

A. No, sir.

Q. You are also a civil engineer?

A. So far as one can be a civil engineer from studying all the time; I have no diploma as a civil engineer.

Q. Where did you study civil engineering?

A. Here in New York.

Q. Whereabouts?

A. The same as I studied city surveying.

Q. With your father?

A. With my father and with my brother.

Q. Your brother, Mr. William V. Smith, the present Deputy Commissioner of Public Works?

A. Yes, sir.

Q. And you say you have no certificate or diploma as a civil engineer?

A. No.

Q. Were you employed during the year 1885 as City Surveyor upon any of the works of the Department of Public Works—this last year?

A. Yes, sir.

Q. Do you remember how many jobs you were employed upon?

A. I really could not tell you without consulting my records—my memoranda.

Q. Were there many or few?

A. I think there were quite a number that I was employed on.

Q. Were any of those works unfinished on the first day of January, 1886?

A. I could not tell you.

Q. You could not, without consulting your memoranda—you could answer by consulting your memoranda, could you?

A. Certainly, sir.

Q. So that if hereafter we should want you to testify upon that, you would be able to do it from memoranda that you have?

A. Yes, sir.
 Q. How many works or jobs—different jobs are you now employed upon in the Department of Public Works?
 A. I could not tell you that.
 Q. Are there many or few?
 A. There are quite a number.
 Q. Ten?
 A. More than that.
 Q. Twenty?
 A. I guess about that number.
 Q. Not more than thirty?
 A. I could not state one way or the other.
 Q. Could you name those works?
 A. I cannot until I look at my books; my books are at your service if you want them at any time so far as I am concerned.
 Q. You cannot state from memory just where the works are that you are engaged upon at present?
 A. It would be impossible.
 Q. You are engaged upon the Fifth avenue repavement?
 A. Yes, sir.
 Q. Can you tell us who made the survey or surveys and estimate or estimates upon which the contract was let?
 A. I did.
 Q. About what time were they made?
 A. I think they were made—it must have been in February or March; if I had known what you wanted to ask me about I could have brought my memoranda with me.
 Q. It was in February or March, 1886?
 A. Yes, sir.
 Q. How was that survey made—in other words tell us, if you please, what you did in making the survey?
 A. I will tell you how we made the survey; we started from the official set bolts which were established by the Department of Public Works some years ago.
 Q. That is a sort of bench mark?
 A. Yes, sir; we took levels every fifty feet along the avenue and wherever else was necessary to determine the grades; we measured the avenue at each end of every block and also wherever it was necessary to measure it in the centre.
 Q. And what instrument did you use in measurement?
 A. Steel tape.
 Q. That is the ordinary way?
 A. Yes, sir; that is all there is.
 Q. Did you make any map or plan?
 A. Yes, sir.
 Q. What did you do with that plan?
 A. Filed it in the Department, I believe.
 Q. You filed it?
 A. Yes, sir.
 Q. And certified it?
 A. Yes, sir.
 Q. Did you make any notes of your survey?
 A. None whatever, except what were necessary to make the map.
 Q. Where are the field-notes that you made?
 A. They are in my private possession.
 Q. Those you do not consider belong to the public records?
 A. No, sir.
 Q. And you made them so that you might make from those notes the map which became a public record?
 A. Yes, sir.
 Q. That is your idea, is it?
 A. Yes, sir.
 Q. Would you have any objection, in case we want to see those field-notes, to showing them to us?
 A. None whatever, that is, if I can find them; I guess I can, but I won't be certain.
 Q. You are the Engineer of the Fifth avenue repavement?
 A. Yes, sir.
 Q. How far has the work proceeded towards completion; that is, how much of the pavement has been put down?
 A. I could not tell you, except within a day or two.
 Q. That would be near enough?
 A. (Witness looks at book) It is paved from Ninetieth street south to Eighty-fifth street.
 Q. That is completed and finished?
 A. No, sir; it is not finished until I turn it in as such.
 Q. And you have not certified that part of the work yet as finished?
 A. I have certified a certain amount of work to the Commissioner of Public Works, but I have kept back from the contractor more than enough to make the repairs that are, in my judgment, necessary; and I have done that on purpose, as, I knew very well, that in starting a new road no contractor, or no set of men in the world, could ever make it perfect on the start at all; that has been my experience in working all my lifetime.
 Q. How many estimates have you certified to?
 A. One single one.
 Q. And that one was about \$16,000, if I remember rightly.
 A. About that; that is, the work has been finished more than that; it was finished from Ninetieth street to Eighty-fifth street, and from Thirty-seventh street to Forty-sixth street, with the exception of the Forty-second street intersection, where the cars pass; it is finished a great deal further than that now; but that is the last memoranda I have in my book.
 Q. Has the contractor called upon you to certify any estimate?
 A. Yes, sir; he did to-day, and I refused to do so.
 Q. Have you heard a rumor that the contractor intended to stop all work on Saturday night of this week; do you know anything about that?
 A. No, sir.
 Q. He has not communicated any such thing to you?
 A. No, sir.
 Q. There are several streets on the east side being paved, are there not?
 A. East side of town?
 Q. Yes.
 A. Yes.
 Q. Where are you surveyor?
 A. I do not think there are any but the repaving jobs where I am surveyor that are being paved now.
 Q. How far have those works proceeded, if you can recall some of the streets?
 A. What I do on those streets is to give them the grade for the curb; I go there when I think it is necessary to see that the street is graded properly; as I understand the thing and always have understood it, and as it has been the practice in the city, the Water Purveyor has charge of the stone and the absolute work; I give my instructions to the inspectors and they superintend the work; it is an impossibility for a man who has got not only charge of the City work but also his own private business to attend to, to be every minute on his work, and the men who are the inspectors on that work of the Department of Public Works are thoroughly reliable.
 Q. All experienced men?
 A. Yes, sir; every one of them; I have known the majority of them for years.
 Q. And in your opinion the work is being well done?
 A. Yes, sir.
 Q. According to contract and specifications?
 A. Yes, sir.
 Q. What do you understand these words, "regulating a street," to mean—to regulate a street, what does that mean? You see it in the contracts "regulate and grade," "regulate and pave"; practically what is the meaning of that, what do you do when you regulate a street? Perhaps that will bring the question a little more close?
 A. When you regulate and grade a street, if it is a cut, you take the street out to the set grade as established by the Commissioner of Public Works or rather by the grade maps.
 Q. That is in opening a new street?
 A. Yes, sir; you set the curb and you put the flag on the line as ordered by the Department; that is all; if it is a fill you fill the street to the established grade and set your curb and flag as ordered by the Department; that is all I understand by regulating and grading.
 Q. In case of repaving a street what does regulating mean? If the term is used in the contract, what, according to your understanding, is meant by that? To regulate a street that has already been once or more than once paved—now what would you do?
 A. To leave the street as near as possible as it is at present so as not to destroy the property, and not to put the City of New York to any more expense than is necessary; the street has already been laid and it has been regulated and all that is necessary to do is to bring the curb as near as possible to the street-line, so as to get your pavement and not destroy the property; I do not propose to put the City of New York to the expense of forty or fifty thousand dollars by suits against them for destroying sidewalks or property.

EXHIBIT O.

No. 159 EAST NINETIETH STREET, N. Y. CITY, }
 June 25, 1886. }

Hon. ROLLIN M. SQUIRE:

DEAR SIR—I see the secular papers are criticising you severely over the paving of Fifth avenue. I have watched carefully the work as it has progressed, having visited the Park about every pleasant day. I have, on every occasion, remarked to friends what an admirable piece of work it was. Great has been my surprise at the adverse criticism. I do not claim to be an expert in such matters. This would not be expected of a clergyman, but the impression made on my mind has been most favorable, of the work and material used.

Respectfully yours,

GEO. H. GOODSSELL.

EXHIBIT O I.

JULY 9, 1886.

Rev. GEORGE H. GOODSSELL, No. 159 East Ninetieth street:

SIR—Permit me to take this late opportunity to thank you for your kind favor, conveying your approval of the work done in the repavement of Fifth avenue, and please accept my apology for the delay in answering your letter, which is principally due to the immense pressure of business at this office. You disclaim any expert knowledge in such matters, but from the unfair criticisms made on the work, I am perfectly satisfied that your qualifications to judge of it are at least equal to those of the critics.

I am, yours very truly,

ROLLIN M. SQUIRE, Commissioner of Public Works.

EXHIBIT P.

DEFINITIONS.

SAND—GRAVEL—SHINGLE.

"HAND-BOOK OF GEOLOGICAL TERMS—GEOLOGY AND PHYSICAL GEOGRAPHY," BY DAVID PAGE, F. R. S. E., F. G. S., 2d edition, W. Blackwood & Sons, Edinburgh and London, 1865.

"Sand," page 395.

"Any aggregation of water-worn particles, derived from pre-existing rocks and other mineral substances.

"Sand is generally composed of quartz-grains (quartz being one of the hardest of simple minerals and longest resisting the processes of attrition); but it may also consist of particles of shells, corals, etc., hence such terms as 'shell-sand,' 'coral-sand,' and the like."

"Gravel," page 225.

"The familiar, as well as the technical, term for accumulations of water-worn rock fragments, where the pebbles vary from the size of a pea to that of a hen's egg.

"It is generally composed of the harder and more silicious rocks—those longest resisting the process of attrition.

"Accumulations of finer detritus, whose particles are less than a pea, are known as sands; those whose fragments are larger than a hen's egg, are generally termed shingle."

"Shingle," page 405.

"Loose, imperfectly-rounded stones and pebbles, as distinguished from gravel and sand.

"The shingle-beaches which are piled along certain portions of our coasts and the 'shingle barriers' which occur at the mouths of rivers, are merely masses of rock-debris in the process of attrition to gravel and sand."

DANA'S "MANUAL OF GEOLOGY," octavo edition, 1864.

"Sand," page 55.

"Is quartz in loose, incoherent grains."

(Page 74) "Sand is comminuted rock of any kind; but common sand is mainly comminuted quartz," while

"Gravel" is the same mixed with pebbles or stones."

DANA'S "MANUAL OF MINERALOGY," octavo edition, 1864.

"Sand," page 366.

"Is usually pulverized quartz."

BERNHARD VAN COTTA, "ROCKS CLASSIFIED AND DESCRIBED, A TREATISE ON LITHOLOGY," 1866.

"Sand."

"In common sandstone the grains of sand are the size of a mustard seed.

"Gravel" is classified with rounded stones.

BRANDE'S DICTIONARY OF SCIENCE, LITERATURE AND ART, Harper Brothers, 1853.

Gravel.

"Small stones which vary in size from a small pea to a walnut, or something larger.

WEBSTER'S "UNABRIDGED DICTIONARY," 1884.

"Sand."

1. "Fine particles of stone, especially of silicious stone, but not reduced to powder or dust; comminuted stone in form of grains, which are not coherent when wet; coarse dust or soil."

"Gravel."

1. "Small stones, or fragments of stone; very small pebbles often intermixed with particles of sand."

URE'S "DICTIONARY OF THE ARTS AND SCIENCES," Appleton, 1877.

"Sand," vol. 2, page 583.

"The name given to any mineral substance in a hard, granular, pulverulent form, whether strewn upon the surface of the ground, found in strata at a certain depth, forming the beds of rivers, or the shores of the sea."

"NOTES ON BUILDING CONSTRUCTION," Rivington, London, 1879.

"PART III. MATERIALS."

"Screening, when sand contains lumps or stones, it should be screened, or if required of great fineness, passed through a sieve."

"Examination of Sand, clean sand should leave no stain when rubbed between moist hands; salts may be detected by the taste; the size and sharpness of the grains, by the eye."

INSPECT—INSPECTION—INSPECTOR.

WEBSTER'S UNABRIDGED DICTIONARY, ETC., 1885.

Inspect, v. t.

1. To look upon; to examine for the purpose of determining quality, detecting what is wrong and the like; to view narrowly and critically; as to inspect conduct.

2. To view and examine officially, as troops, arms, goods offered for sale, work performed for the public, etc.; to oversee, to superintend.

Inspection, n.

1. The act of inspecting, prying examination, close and careful survey; official view or examination. With narrow search and with inspection deep, considering every creature. Milton.

Inspector, n.

One who inspects, views, or oversees; a superintendent; one to whom the examination of any work is committed for the purpose of seeing it faithfully performed; one who makes an official view or examination, as a military or civil officer.

DICTIONARY OF THE ENGLISH LANGUAGE, STORMONTH, Harper Bros., N. Y., 1885.

Inspect, v.

F. *inspector*, to examine, from L. *inspectere*, to look into from *in*, into; *specio*, I look or view.

To view or oversee for the purpose of examination or correction of errors, to look into and examine; o superintend.

Inspection.

Careful examination; an official survey.

Inspector.

One who looks into or oversees; a superintendent.

DICTIONARY OF THE ENGLISH LANGUAGE, WORCESTER, 1878.

Inspect, v. a.

1. To view or order to correct errors, or to learn the quality of, to look into by way of examination, to pry into.
2. To oversee, to survey, to superintend.

Inspection, n.

1. The act of inspecting, prying examination, narrow and close survey.

Inspector.

One who inspects, a superintendent.

ENGINEERING—ENGINEER.

WEBSTER'S UNABRIDGED DICTIONARY, 1885.

Engineering.

The science and art of utilizing the forces and materials of nature is divided into *military* and *civil engineering*.

Civil Engineering is the science and art of designing and constructing machinery and public works, such as roads and canals.

Civil Engineering refers, according to modern usage, strictly to the construction of fixed public works, such as railways, canals, aqueducts, bridges, light-houses, docks, embankments, breakwaters, dams, sewers, tunnels, etc.,

Engineering is further divided into steam engineering, hydraulic engineering, gas engineering, agricultural engineering, topographical engineering, etc.,

Engineer.

1. A person skilled in the principles and practice of engineering, either civil or military.

THE INSTITUTION OF CIVIL ENGINEERS OF ENGLAND is described in the certificate given to each member as "a society for promoting that species of knowledge which constitutes the profession of a Civil Engineer, whereby the great sources of power in nature are converted, adapted and applied for the use and convenience of men." In view of this aim a

CIVIL ENGINEER is one who converts, adapts, and applies the great sources of power in nature to the use and convenience of man.

TO SURVEY—SURVEYOR.

WEBSTER'S UNABRIDGED DICTIONARY, 1885.

To survey. v.t. (from *sur-over*, *voir* to view.)

4. To determine the form, extent, position, etc., of, as a tract of land, a coast, harbor, or the like, by means of linear and angular measurements, and the application of the principles of geometry and trigonometry; as to survey land or a coast.

Surveyor.

3. One who measures land, or practices the art of surveying.

EXHIBIT R.

Analyses of Sands.

COMPONENT PARTS.	NUMBER OF MESHES TO THE SQUARE INCH.		1			2			3			4			5			6			7			8			9			10																													
			MIXED SILICIOUS SAND.			YELLOW MUSTARD SEED. SEE VAN COTTA DEF. OF SAND, PAGE 2 OF EXHIBIT P.			SAMPLE "A" OF REPORT OF MAY 26, 1886.			CRUSHED TRAP-ROCK USED IN CONCRETE FOUNDATION OF STATUE OF LIBERTY.			A FINE SAND, FROM OPPOSITE NO. 1322 FIFTH AVENUE, JUNE 14, 1886.			MIXTURES OF SAND AND GRAVEL, SIMILAR TO SAMPLES 31, 33. PROCURED JUNE 2, 1886. Cow Bay.			SAND FROM FIFTH AVENUE, OPPOSITE ENTRANCE TO WINDSOR HOTEL, PROCURED JULY 2, 1886. Cow Bay.			MIXTURE OF SAND AND GRAVEL, FROM FIFTH AVENUE, NEAR EIGHTY-FOURTH STREET, PROCURED JULY 3, 1886. Cow Bay.			MIXTURE OF SAND AND GRAVEL, FROM FIFTH AVENUE, NEAR EIGHTY-THIRD STREET, PROCURED JULY 13, 1886. Cow Bay.			MIXTURE OF SAND AND GRAVEL, FROM FORTY-NINTH STREET, EAST OF FIFTH AVENUE, PROCURED JULY 15, 1886. Cow Bay.																													
			SEE "LIMES," CEMENTS AND MORTARS, BY GILLMORE, PAGE 178.			Volume tested, 32.28 cubic inches.			Volume tested, —			Volume tested, 60 cubic inches.			Volume tested, 80 cubic inches.			Volume tested, 90 cubic inches.			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.																													
		From	To	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.	Reference Letter and Number.	Ounces, Avoirdupois.	Percentages.																												
OFFICE NUMBER of sample	80	"A"	50	65																											
CHEMIST'S NUMBER of sample	1921	1894	1903	1897	1893	1915	1912	1924	1926																										
WEIGHT of original sample	.....	.....	.....	.....	14.44	.....	.....	29.56	.....	.....	81.15	.....	.....	83.86	.....	.....	96.91	.....	.....	152.52	.....	.....	174.68	.....	.....	128.39	.....	.....	113.29	.....	.....																										
WEIGHT of surplus after taking out specimen for analysis	.....	.....	.....	.....	.....	.....	.....	.....	.....	No. 1	9.17	.....	No. 1	6.26	.....	No. 1	2.19	.....	No. 1	45.99	.....	No. 1	64.70	.....	No. 1	21.48	.....	No. 1	3.31	.....	.....																										
WEIGHT OF SPECIMEN FOR ANALYSIS	.....	.....	.....	.....	14.44	.....	.....	29.56	100.00	.....	71.98	100.00	.....	77.60	100.00	.....	94.72	100.00	.....	106.53	100.00	.....	109.98	100.00	.....	106.91	100.00	.....	109.98	100.00	.....																											
Weight of earthy and organic matter	.....	.....	.....	.....	.....	.....	.....	.....	.....	No. 2	2.59	3.59	No. 2	3.67	4.73	No. 2	1.58	1.67	No. 2	3.95	3.71	No. 2	2.31	2.10	No. 2	2.93	2.74	No. 2	3.09	2.82	.....																											
Weight of loss	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.52	.72	.....	.19	.26	.....	.....	.....	.....	.12	.11	.....	.07	.06	.....	.30	.28	.....	.13	.11	.....																											
TOTAL EARTHY MATTER, ETC.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.11	4.31	.....	3.86	4.99	.....	1.58	1.67	.....	4.07	3.82	.....	2.38	2.16	.....	3.23	3.02	.....	3.22	2.94	.....																											
Grains would not pass a 1/4-inch mesh	1.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No. 7	5.85	6.18	Nos. 3 & 4	4.18	3.93	Nos. 3 & 4	6.70	6.09	No. 3	1.80	1.68	No. 3	3.37	3.06	.....																											
Grains between 1/4 inch and No. 2	1.69	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No. 3	7.09	9.14	" 6	6.78	7.16	No. 5	3.55	3.33	No. 5	5.64	5.13	" 4	2.86	2.68	" 4	3.01	2.73	.....																											
Grains between No. 2 and No. 4	4	16	.....	.....	.....	.....	.....	.....	.....	No. 3	7.02	9.75	" 4	5.36	6.91	" 5	9.79	10.33	" 6	6.75	6.34	" 6	14.18	12.90	" 5	8.57	8.02	" 5	10.86	9.87	.....																											
Grains between No. 4 and No. 8	16	64	.....	.....	.....	.....	.....	.....	.....	" 4	15.15	21.05	" 5	2.85	3.67	" 4	11.11	11.73	" 7	9.91	9.30	" 7	15.91	14.47	" 6	12.98	12.14	" 6	16.76	15.24	.....																											
GRAVEL ABOVE THIS LINE	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22.17	30.80	.....	15.30	19.72	.....	33.53	35.40	.....	24.39	22.90	.....	42.43	38.59	.....	26.21	24.52	.....	34.00	30.90	.....																											
Grains between No. 8 and No. 12	64	144	.....	1	7.02	48.61	"A"	0.035	.118	No. 5	9.15	12.73	No. 6	1.30	1.67	No. 3 A	6.24	6.59	No. 8	6.30	5.91	No. 8	8.43	7.66	No. 7	7.74	7.74	No. 7	9.84	8.95	.....																											
Grains between No. 12 and No. 18	144	324	14.0	2	7.37	51.04	"B"	0.72	2.436	" 6	6.08	8.45	" 7	1.37	1.76	" 3 B	6.21	6.56	" 9	6.14	5.76	" 9	8.04	7.31	" 8	7.53	7.04	" 8	8.87	8.06	.....																											
Grains between No. 18 and No. 24	324	576	17.5	3	0.05	0.35	"C"	3.68	12.449	" 7	6.63	9.21	" 8	4.46	5.74	" 3 C	17.43	18.40	" 10	13.77	12.93	" 10	14.35	13.05	" 9	15.43	14.43	" 9	15.73	14.30	.....																											
Grains between No. 24 and No. 30	576	900	58.4	.....	.....	.....	"D"	3.75	12.686	" 8	2.47	3.43	" 9	4.47	5.76	" 3 D	13.39	14.13	" 11	8.89	8.35	" 11	8.11	7.37	" 10	9.13	8.54	" 10	8.43	7.66	.....																											
Grains below No. 30	900	.....	.....	.....	.....	.....	"E"	21.375	72.311	.....	.....	.....	.....	.....	.....	" 3 E	16.34	17.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....															
Grains between No. 30 and No. 40	900	1,600	4.3	.....	.....	.....	.....	.....	.....	No. 9	3.16	4.39	No. 10A	12.55	16.18	.....	.....	.....	No. 12	14.96	14.04	No. 12	11.50	10.46	No. 11	12.80	11.97	No. 11	10.86	9.87	.....																											
Grains between No. 40 and No. 50	1,600	2,500	1.9	.....	.....	.....	.....	.....	.....	" 10	2.45	3.40	" 10 B	11.58	14.93	.....	.....	.....	" 13	10.76	10.10	" 13	6.66	6.06	" 12	9.71	9.08	" 12	6.86	6.25	.....																											
Grains between No. 50 and No. 60	2,500	3,600	0.8	.....	.....	.....	.....	.....	.....	" 11	2.19	3.04	" 10 C	10.26	13.22	.....	.....	.....	" 14	6.70	6.29	" 14	4.16	3.78	" 13	7.35	6.89	" 13	4.60	4.18	.....																											
Grains between No. 60 and No. 70	3,600	4,900	3.1																											
Grains between No. 70 and No. 80	4,900	6,400																															" 12	1.25	1.74	" 10 D	3.70	4.77	" 15	2.17	2.04	" 15	1.04	0.95	" 14	2.20	2.06	" 14	1.22	1.11	" 15	1.20	1.09	" 15	1.20	1.09
Grains between No. 80 and No. 90	6,400	8,100																															" 13	0.79	1.10	" 10 E	0.91	1.18	" 16	1.48	1.39	" 16	0.52	0.47	" 15	1.22	1.14	" 15	1.20	1.09	" 16	1.06	0.96	" 16	1.06	0.96
Grains between No. 90 and No. 100	8,100	10,000																															" 14	1.15	1.60	" 10 F	1.56	2.01	" 17	1.50	1.41	" 17	0.56	0.51	" 16	1.18	1.10	" 16	1.06	0.96	" 17	0.48	0.45	" 17	0.62	0.56
Grains between No. 100 and No. 120	10,000	14,440																															" 15	0.85	1.18	" 10 G	1.34	1.72	" 18	0.95	0.89	" 18	0.26	0.23	" 17	0.70	0.66	" 17	0.48	0.45	" 18	0.28	0.25	" 18	0.28	0.25
Grains between No. 120 and No. 130	14,440	16,900																															" 16	0.35	0.48	" 10 H	1.07	1.38	" 19	0.55	0.52	" 19	0.10	0.09	" 18	0.32	0.30	" 18	0.28	0.25	" 19	0.62	0.56	" 19	0.62	0.56
Grains between No. 130 and No. 200	16,900	52,400																															" 17	1.25	1.73	" 10 I	1.00	1.28	" 20	0.92	0.86	" 20	0.30	0.27	" 19	0.56	0.52	" 19	0.62	0.56	" 20	1.02	0.95	" 20	1.55	1.42
Grains below No. 200	52,400																															" 18	4.68	6.50	" 10 J	2.20	2.83	" 21	1.92	1.80	" 21	0.65	0.60	" 20	1.02	0.95	" 20	1.55	1.42	" 21	0.58	0.54	" 21	1.26	1.05
Grains below No. 200	52,400																															" 19	4.25	5.91	" 10 K	0.67	0.86	" 22	1.06	0.99	" 22	0.49	0.44	" 21	0.58	0.54	" 21	1.26	1.05	" 22	0.49	0.44	" 22	0.49	0.44
Total Sand in Specimen																															100.00	14.44	100.00	29.56	100.00	46.70	64.89	58.44	75.29	59.61	62.93	78.07	73.28	65.17	59.25	77.47	72.46	72.76
AGGREGATE IN SPECIMEN	.....	.....	100.00	.....	14.44	100.00	.....	29.56	100.00	.....	71.98	100.00	.....	77.60	100.00	.....	94.72	100.00	.....	106.53	100.00	.....	109.98	100.00	.....	109.91	100.00	.....	109.98	100.00	.....																											

EXHIBIT S.
Analyses of Gravels.

COMPONENT PARTS.	NUMBER OF MESHES TO THE SQUARE INCH.		1			2			3			4			5		
			WHITE GRAVEL, FROM NORTH-EAST CORNER FIFTH AVENUE AND FORTY-FIRST STREET, PROCURED MAY 30, 1886.			WHITE GRAVEL, FROM SOUTH-EAST CORNER FIFTH AVENUE AND EIGHTY-SEVENTH STREET, PROCURED JUNE 20, 1886.			WHITE GRAVEL, FROM NORTH-WEST CORNER FIFTH AVENUE AND FORTY-FIFTH STREET, PROCURED JULY 2, 1886.			WHITE GRAVEL, FROM NORTH-EAST CORNER FIFTH AVENUE AND EIGHTY-FIFTH STREET, PROCURED JULY 3, 1886.			WHITE GRAVEL, FROM FIFTH AVENUE AND EIGHTY-FIFTH STREET, PROCURED JULY 4, 1886.		
			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.			Volume tested, 100 cubic inches.		
			TEST BY WEIGHT.			TEST BY WEIGHT.			TEST BY WEIGHT.			TEST BY WEIGHT.			TEST BY WEIGHT.		
			From	To	Reference Letter and Number.	Ounces, Avoirdupois.	Per cent.	Reference Letter and Number.	Ounces, Avoirdupois.	Per cent.	Reference Letter and Number.	Ounces, Avoirdupois.	Per cent.	Reference Letter and Number.	Ounces, Avoirdupois.	Per cent.	Reference Letter and Number.	Ounces, Avoirdupois.	Per cent.
OFFICE NUMBER of sample.....	....	....	41	....	....	60	....	....	66	....	....	71	....	....	75	....	....
CHEMIST'S NUMBER of sample.....	....	....	1896	....	....	1904	....	....	1914	....	....	1913	....	....	1920	....	....
WEIGHT of original sample.....	....	....	....	106.63	....	....	149.75	....	....	199.65	....	....	188.57	....	....	114.22	....
WEIGHT of surplus after taking out specimen for analysis.....	....	....	No. 1	8.29	....	No. 1	48.43	....	No. 1	98.17	....	No. 1	87.41	....	No. 1	13.48	....
WEIGHT OF SPECIMEN FOR ANALYSIS...	....	....	....	98.34	100.00	....	101.32	100.00	....	101.48	100.00	....	101.16	100.00	....	100.74	100.00
WEIGHT of earthy and organic matter.	....	....	....	....	...	....	....	....	No. 2	.25	.25	No. 2	.46	.45	No. 2	.03	.03
WEIGHT of loss.....	....	....	....	....	....	....	.04	.03	....	.02	.02	....	.16	.16	....	.02	.02
TOTAL EARTHY MATTER, ETC.....	....	....	....	....	....	....	.04	.03	....	.27	.27	....	.62	.61	....	.05	.05
Grains which would not pass a 3/4-inch sieve.....	1.69	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Grains between 3/4 inch and No. 2....	1.69	4	....	....	....	....	....	....	No. 3	5.61	5.53	No. 3	2.26	2.23	No. 3	7.58	7.52
Grains between No. 2 and No. 4....	....	....	No. 3	59.36	60.36	No. 2	47.85	47.23	....	....	....	....	....	....	....	....	....
	4	16	....	....	....	....	....	....	No. 4	49.06	48.34	No. 3	41.09	40.62	No. 4	60.35	59.91
TOTAL ABOVE No. 4.....	....	....	....	59.36	60.36	....	47.85	47.23	....	54.67	53.87	....	43.35	42.85	....	67.93	67.43
Grains between No. 4 and No. 8....	16	64	No. 2	38.98	39.64	No. 3	46.82	46.21	No. 5	42.99	42.36	No. 5	47.72	47.17	No. 5	21.35	31.12
Grains between No. 8 and No. 12....	64	144	....	....	....	" 4	2.40	2.38	" 6	1.80	1.77	" 6	3.93	3.89	" 6	0.92	0.91
Grains between No. 12 and No. 18....	144	324	....	....	....	" 5	1.80	1.78	" 7	0.83	0.82	" 7	1.46	1.44	" 7	0.21	0.21
Grains between No. 18 and No. 24....	324	576	....	....	....	" 6	1.22	1.30	" 8	0.55	0.54	" 8	1.16	1.15	" 8	0.28	0.28
Grains between No. 24 and No. 30....	576	900	....	....	....	" 7	0.35	0.34	" 9	0.25	0.25	" 9	0.35	0.35	....	....	....
Grains between No. 30 and No. 40....	900	1,600	....	....	....	....	....	....	....	....	....	" 10	0.48	0.47	....	....	....
Grains between No. 40 and No. 50....	1,600	2,500	....	....	....	No. 8	0.74	0.73	No. 10	0.07	0.07	" 11	0.33	0.33	....	....	....
Grains between No. 50 and No. 60....	2,500	3,600				" 12	0.26	0.26
Grains below No. 60.....	3,600	....	....	....	....	....	....	....	" 11	0.05	0.05	{No. 13 to 20, }	1.50	1.48	....	....	....
TOTAL BELOW No. 4.....	....	....	....	38.98	39.64	....	53.43	52.74	....	46.54	45.86	....	57.19	56.54	....	32.76	32.52
TOTAL OF SAMPLE.....	....	....	....	98.34	100.00	....	101.32	100.00	....	101.48	100.00	....	101.16	100.00	....	100.74	100.00

EXHIBIT T.

REVIEW OF THE OFFICIAL HISTORY OF THE WORK OF REPAVING FIFTH AVENUE FROM THE 10TH OF MAY TO THE 4TH OF AUGUST, 1886.

The better to understand the attitude of the Department of Public Works towards any investigation of the work of repaving Fifth Avenue,

A review of the official history of the question is necessary.

In no other way can false statements be corrected, or the neglect of duty of the Commissioner of Public Works exposed.

The better to understand and appreciate the attitude taken by the Department of Public Works towards any official investigation of the manner in which it has permitted the repaving of the Fifth Avenue to proceed, from the commencement of that work up to the date of this report, I have thought it proper, in view of the fact that all the most important official papers having any bearing on the question are spread upon the record in the foregoing exhibits, to review, in the light they shed upon the whole transaction, and especially upon the animus of the Commissioner of Public Works, the official history of the work, from the day when the Commissioners of Accounts first became connected with it, up to the date of this report.

It is only by such an analysis of these papers that the many false and misleading statements with which some of them abound can be corrected, and the most reprehensible neglect of duty on the part of the head of the Department of Public Works in this important matter can be exposed.

Action of the Mayor and Comptroller.

The Mayor and Comptroller are to be thanked for any good work on Fifth Avenue.

Both were members of the Commission which awarded the contract.

If the work had been permitted to be completed as it was commenced, the contractor would have easily earned a fortune.

And the City would have had a "sham pavement."

The vigorous measures adopted compelled the Department of Public Works to at least correct the worst faults of the job, and make a show of doing its duty.

I made my first examination May 11.

Engineer McLean made first examination June 1. First report June 4. Second report June 23.

For whatever there has been of good work done in repaving Fifth Avenue up to the present time, the public who will hereafter use that thoroughfare, and the taxpayers who will pay the bill, have only to thank his Honor the Mayor and the Comptroller.

These officers having been members of the Commission authorized by the act of May 28, 1885, which awarded the contract to Mr. Baird, were naturally solicitous that so important and expensive a work, for the inception of which they were in a certain sense sponsors, should be executed in strict conformity with both the spirit and letter of the statute; and as will be shown, each actuated by the same impulse gave his orders accordingly.

The commencement of the work was marked by a reckless disregard of the rules of engineering and of the obligations of the agreement, which bid fair, if permitted to go on unchecked, to put an easily-earned fortune into the pocket of the contractor, and leave the municipality with nearly four miles of sham "first-class pavement" on one of its principal avenues; but the vigor with which the duty of detecting and exposing the great irregularities which characterized the job up to the 4th of June was carried on under the instructions of these two officials, forced the Department of Public Works to abandon the policy of obliviousness to the short-comings of its subordinates, to gradually correct the worst features of the work of construction, and from that date forward, to at least, make a show on paper of doing its whole duty.

As noted in my preliminary report, under the instructions of his Honor the Mayor, transmitted through the Commissioners of Accounts, I made my first examination of the work on the 11th of May.

Under the orders of the Comptroller, Engineer E. E. McLean commenced his examination on June 1; made his first written report on the 4th of that month,¹ and his second and principal report on the 23d of June.²

¹ See EXHIBIT H, page 1. ² See EXHIBIT H 2. ³ See EXHIBIT H 3.

Effect of this Action on the Conduct of the Work.

Engineer McLean personally well known in Department of Public Works. Effect of his appearance on avenue.

Water Purveyor detailed for duty on Fifth Avenue. To personally supervise the work.

To report weekly.

To be held personally responsible for the character of the work. Went on duty June 3. Considering the character of this interview, the instructions given, the opinion of the Corporation Counsel in the matter, and

That an engineer had been appointed, and had been on duty since 19th February. The inquiries suggest themselves, What had the Engineer been about? Why was not he sent for and held personally accountable for work he was paid to do? And why this lack of confidence in his ability?

As Engineer McLean is personally well known to all the officers and to many of the subordinates of the Department of Public Works, his sudden appearance on the Avenue did not fail to attract attention. The Commissioner of Public Works was not slow to appreciate its significance and at once took action accordingly.

On the 3d of June, the Commissioner had an interview with the Water Purveyor,¹ which resulted in this officer being detailed for duty on the Fifth Avenue, for the purpose of giving "to this work his personal supervision" and of seeing "that the material used in the work is of such a quality and that the performance of the work is proceeded with in such a manner, as fully and faithfully to carry into effect the provisions of the statute and the contract."²

The Purveyor was directed to report weekly, and in case any well-grounded complaints were made as to the character of the work done, he was to be held "personally responsible."³ The written instructions under which he has since acted were dated the same day.

Considering the character of this interview, the nature of the instructions, and the fact that the Counsel to the Corporation had advised⁴ that "the ordinary provisions of law and ordinance which applied to other works of the City of like description," did not "apply to the performance of this work"; that if proper care were exercised in the selection of an engineer and inspectors, the Commissioner of Public Works would have sufficient information in their certificates to enable him to pass intelligently upon the question, whether or not he could accept the work performed under the "contract"; that such an "engineer" had been appointed, and had been on duty since the 19th of February, last—the inquiries very naturally suggest themselves—what had this engineer been about up to this time? why was not he, the only executive officer and professional expert whom the law recognized in this business, sent for, and held "personally accountable" for the character of the work, to oversee which he was then being paid ten dollars per day, instead of loading so grave a responsibility on the shoulders of the head of an important bureau, who had on this work no standing whatever in the eye of the law; why this evident lack of confidence in his ability "fully and faithfully to carry into effect the provisions of the statute and the contract"? The facts presented in the foregoing report and in Exhibit "L" readily suggest replies to these queries.

Commissioner of Public Works officially notified of the Defects in the Work.

4th of June, Comptroller sends for Commissioner of Public Works.

Deputy Commissioner responded on the 5th.

On the 4th of June, in view of the nature of a report made to him by Engineer McLean, upon the "proportion of ingredients of the concrete for the foundation of the pavement," the Comptroller sent a messenger to the Commissioner of Public Works, requesting him verbally to call at his office in relation to the Fifth Avenue contract. In response to this request, the Deputy Commissioner called on June 5, when the facts were stated to him orally, and he was furnished with a copy of Engineer McLean's report.⁵

¹ See EXHIBIT E, page 10. ² See EXHIBIT G 1, page 1. ³ See EXHIBIT E, page 10. ⁴ See letter of Corporation Counsel of May 11, 1886, APPENDIX B, preliminary report of May 26, 1886. ⁵ See EXHIBIT H 6.

On June 8 Comptroller sent Commissioner of Public Works official copy of Engineer McLean's report of June 4. The tenor of the Commissioner's reply indicates that McLean's statements are untrue, but it is significant that the day after the report was received two additional inspectors were appointed on the work.

On the 8th of June, the Comptroller enclosed to the Commissioner of Public Works, an official copy of Mr. McLean's report of the 4th, and called his attention to "this violation of the contract."

Notwithstanding that the tenor of the Commissioner's reply to this communication would indicate that the statement of Engineer McLean, to which his special attention was called, was absolutely untrue, and was indeed quite unworthy of consideration, it is significant that the day after its reception, two laborers, namely, A. S. Parker and John A. Lawrence, were detailed for duty as inspectors on the Fifth Avenue work, to "attend to the mixture of concrete, and to see that the proper proportions of cement, sand, and broken stone are maintained." If the Commissioner's own statements under date of June 15 are to be believed, the detailing of these men for this duty was a work of supererogation, involving a useless and most unnecessary expense.

Water Purveyor's First Weekly Report.

Water Purveyor made his first report June 10.

On the 10th of June, in accordance with his instructions of the 3d, the Water Purveyor made his first report.³ In it he notes the progress of the work, explains why Messrs. Parker and Lawrence were detailed as additional inspectors, and states that he is satisfied that "the work is progressing in a proper manner, and that the material is being furnished in conformity with the terms of the contract."

This report relates to what occurred after June 3; McLean's report to what occurred prior to June 4.

The important fact must not be overlooked that this report relates exclusively to what occurred after June 3, while Engineer McLean's report of June 4 distinctly refers to the progress of the work prior to that date, before the Water Purveyor had been detailed on the job.

Reply of the Commissioner of Public Works to the Charges of the Comptroller.

On 15th of June the Commissioner of Public Works replied to Comptroller's letter of the 8th of June. Substance of the reply.

On the 15th of June, the Commissioner of Public Works replied to the Comptroller's letter of the 8th,⁴ to the effect that he had received a copy of a report made "by Mr. E. E. McLean, C. E., alleging that the proportions of cement, sand and broken stone for the concrete for the foundation of the new Fifth Avenue pavement, are not as required by the contract, to the great detriment of the City, and to the advantage of the contractors." That in reply he would say he had "the statements of the Water Purveyor, who frequently visits the work and has general supervision of it; of Mr. J. McIntyre Smith, the Engineer in charge of the pavement, who visits the work at least twice a day, and of Thomas Abbott and Christopher Havican, Inspectors, whose whole time is taken up in the supervision of the work and who give special attention to the proper composition and laying of the concrete, that all the concrete which has been used on the works is composed of materials as prescribed by the contract."

Thinks that in view of the statements of four officers of Department of Public Works Engineer McLean's report is properly subject to revision and correction.

And that, "in view of these positive statements of these four officers of the Department, who not only have better opportunities for overseeing and examining the work than any engineer employed by your Department, but who also have control and direction of work, I must regard the report of your engineer as properly subject to revision and correction."

The Reply Reviewed.

Considering that the Water Purveyor's report does not refer to the period in question, that the Commissioner had, by his own action, discredited the statement of the Engineer, and that using the materials prescribed by the contract does prove they were properly used, the force of evidence offered is impaired.

Considering that the Water Purveyor, by his own showing in his report of June 10,⁵ had not visited the work at all, during the period referred to in the Comptroller's complaint, and had made no statement as to what was done on the work during the period in question; that the Commissioner had by his order of June 3, in practically displacing the "Engineer" by the Water Purveyor, most effectually discredited any testimony which that officer might give, and that the mere fact that the concrete was made of "materials as prescribed by the contract," was by no means conclusive proof (as has been clearly shown in the report) that these materials had been properly manipulated, the value of the evidence adduced is decidedly impaired.

In view of the evidence of my own senses, I am compelled to admit that a greater disregard for truth than is exhibited in this reply could not well be penned.

Overlooking these little discrepancies however, if it were possible to disbelieve the evidence of one's own senses many times repeated, after so sweeping a denial of a charge which I also had made, I might feel compelled to accept the evidence presented as authoritative and final; but remembering the character of the concrete foundation as it was laid prior to June 4, I am compelled to admit that a more impudent and unblushing disregard of the truth, than is exhibited in this reply of the Commissioner, could not well be penned.

A "Chief Inspector" Recommended and Appointed.

In his weekly report, dated June 25, the Water Purveyor recommends that Mr. Birmingham be appointed Chief Inspector on the work, and All other inspectors to be under his orders. Recommendation approved and carried into effect June 26.

On the 25th of June, in making his weekly report of progress on the work of repaving Fifth Avenue, in view of the recent "criticisms of the work," and that but a small part of his own time, on account of other duties, could be devoted to the work, the Water Purveyor recommended "that Richard H. Birmingham be appointed a special inspector to take charge of the work, under his (my) directions—all other inspectors to be subject to his orders."⁶

In a communication dated June 26, sent by the Deputy Commissioner of Public Works to the Water Purveyor in reply to the foregoing, the latter's recommendation was approved, and on the same day Mr. Birmingham was directed to report accordingly.⁷

This Action Reviewed.

This action a gross insult to the Engineer and A direct violation of the terms of the contract.

This action of the Department was not only an insult to the "Engineer," of the most offensive character, depriving him as it did of any authority over the inspectors, but was in direct violation of the provisions of the first paragraph of the contract, where it says "that the said Commissioner of Public Works shall be and is hereby authorized to appoint an engineer and such person or persons, not exceeding two in number, as he may deem necessary to properly inspect the materials to be furnished and the work to be done under this agreement, and to see that the same correspond with the specifications hereinafter set forth, which are, and are to be taken as forming part of this contract."

Engineer and two inspectors duly appointed. If engineer had devoted his whole time to the work, there would have been no necessity for additional inspectors.

The "engineer" and the two persons so authorized were duly appointed, and had the former devoted his whole time to the duties indicated in the above extract, as he was in honor bound to do until every cause of complaint was removed, assuming that he was master of his profession, there would have been no need of more inspectors.

First Monthly Certificate of Work Done.

Certificates given by Engineer and

On the 10th of June the "Engineer" gave the contractor his first monthly certificate⁸ for a portion of the work completed up to that date.

Two Inspectors. And by Water Purveyor and Commissioner of Public Works.

This certificate was accompanied by those of Inspectors Abbott and Havican.⁹ Upon these three certificates there was prepared in the Department of Public Works "70 per cent. payment" Voucher No. 1, for the sum of \$16,517.20.¹⁰

Papers sent to Comptroller on June 18.

After being duly certified by the Water Purveyor and by the Commissioner of Public Works, the voucher with its accompanying papers was on the 18th of June sent to the Comptroller for audit and payment.

The uninitiated would accept these certificates at their face value.

An examination of these five certificates by a person unfamiliar with the practice and official methods of procedure of the Department of Public Works as administered to-day, would very naturally impress him with a sense of the extreme care exercised by that Department to prevent fraud, and to jealously guard the public interest. But in view of the facts set forth in my report of May 26, and Engineer McLean's reports of June 4 and 23, and that some 300 cubic feet of the 800 cubic feet of concrete charged for were of the quality I described and condemned, they far more forcibly illustrate the perfunctory and indeed unscrupulous manner in which many such certificates are signed and delivered, and as a consequence indicate their utterly unreliable character.

But they really illustrate the perfunctory manner in which such certificates are often signed.

What I said in my report on the contract for opening Ninety-fifth street regarding these certificates applies most aptly to this case.

Remarks made in my report on the contract for opening Ninety-fifth street applicable here.

¹ See EXHIBIT H 1. ² See EXHIBIT G 2. ³ See EXHIBIT G 2. ⁴ See EXHIBIT H 3. ⁵ See EXHIBIT G 2. ⁶ See EXHIBIT G 4. ⁷ See EXHIBIT G 5. ⁸ See EXHIBIT I 1. ⁹ See EXHIBITS I 2 and I 3. ¹⁰ See EXHIBIT I.

Referring to the very loose ideas which appeared to prevail in the Department of Public Works as to the real object and meaning of an official certificate, I said:

"The formal certification of the correctness of a statement is to place upon it the seal of official integrity and truthfulness, and, in the highest sense of the word, such formal certification is tantamount to, and has the force of an oath. It is the perfunctory discharge of this high duty which has prostituted the use of the certificate and brought this form of official approval, so far, at least, as the Department of Public Works is concerned, into a condition of discredit and disrepute, well voiced by the current phrase, the 'certificate is not worth the paper it is written on.'"

Publication of the "Conclusions" of Report of May 26—Action of Commissioner of Public Works.

June 23, a synopsis of my first report published.

On the 23d of June, the daily morning newspapers of the city published a synopsis of my report of May 26; *The "Times"* printing the "Conclusions" in full.

Ex parte examination in Commissioner of Public Works' office same day.

Without waiting for the full text of the report, the same day the Commissioner of Public Works, in view of the "conclusions" as given in *The Times*, assembled at his office the officers and inspectors connected with the Fifth Avenue repaving contract and also invited the contractor to be present.

Drift of the evidence taken.

An *ex parte* examination was held, the evidence taken at which was reported in form,¹ and while enough was inadvertently admitted to prove the truth of the most important charges I had made, yet the whole drift of the testimony was to the effect that the charges were unqualifiedly false; that the pavement so far laid was "the best in the city"—in fact, "the best in the world"; that up to that date the "engineer" "had not seen anything going wrong," and that so far as the work had progressed "it was believed that the terms of the contract had been carried out in every particular."

Extract from testimony of Water Purveyor.

One of the most significant statements made at this examination was that of the Water Purveyor, who among other things testified as follows:²

The contract is carried out as nearly as it is possible to carry out any contract.

"I want to say this, Mr. Commissioner, that since I was assigned to that work on June 3, I have been there once or twice a day on each section. I have watched the work carefully and closely and I have seen the provisions of the contract carried out as nearly as it is possible to carry out the provisions of any contract."

The Testimony Reviewed.

It is evident that what these witnesses understand by inspection is radically different from my understanding of the word.

It is perfectly evident from the character of this testimony that the views of the witnesses quoted, as to the meaning of the word *inspection*, as to the requirements of the portion of the contract under consideration and even as to the facts cited, are radically at variance and are irreconcilable with my own.

Still I do not doubt the sincerity of these witnesses.

Anomalous as it may appear, after such a statement, I am not disposed to doubt either the sincerity with which those witnesses have spoken, or their serious belief that up to this time (notwithstanding the manifest inconsistency of some of the evidence) they have performed their entire duty; for I am satisfied these diverse views are largely due, indeed are in the main the direct result of the different schools in which we have been respectively educated and trained.

This diversity of view is due to the different manner in which we have been trained.

The superficial and perfunctory methods of inspection which as I have already remarked, have been the rule, rather than the exception, in the Department of Public Works, of late years, have not been calculated to encourage or promote critical exactness in enforcing contracts, or to instruct inspectors in the best rules and practice of civil engineering.

The statement that this contract is carried out as nearly as any contract can be strikes the keynote of the situation. Fair inferences from this statement.

Mr. Culver's statement to the Commissioner, that he has "seen the provisions of the contract carried out as nearly as it is possible to carry out the provisions of any contract," seem to me to strike the keynote of the situation and to afford the real explanation of the difference to which I refer, since it implies, *judging from his own experience*, 1st, that no contracts are ever enforced; and 2d, that in the case of the Fifth Avenue pavement contract, the Department having made an agreement which it is not practicable to carry out to the letter, it is necessarily left to the judgment of the inspectors to determine how far its provisions can be enforced by the standard of what "it is possible" for them to do.

The practical application of the principle here enunciated is the prime cause of the looseness of method observable in this contract. Demoralizing effect of such methods.

It is the practical application of the principle thus enunciated by Mr. Culver, in this matter of inspection, which has been the prime cause of the inconsequential and loose methods of procedure, which have from the first characterized this Fifth Avenue repaving job.

As matters stand either the contracts must be drawn to suit the capacity and tone of the inspectors, Or the character of the inspectors must be such as that they shall be able to enforce contract as now written.

So long, however, as such methods are countenanced and even encouraged by the officers of the Department, under the plea of necessity, so long will its efficiency become gradually impaired and its *esprit du corps* lowered; professional experience, professional rules and professional morality will be more and more disregarded by its employés, until it will become simply impossible for them either to appreciate, or to execute a thoroughly good and honest piece of work.

As matters stand to-day, therefore, in order that they may be executed, contracts must be drawn to conform to the capacity, sense of responsibility and amount of engineering knowledge possessed by the officers and inspectors entrusted with their execution. The other alternative is to require that officers and inspectors shall have sufficient professional knowledge, general intelligence, moral principle and courage to enforce contracts as they are written. It cannot take long for the public, but especially taxpayers, to decide which of these methods of procedure it is wisest to follow, or which will most conduce to the public good.

Comptroller's Notice to Commissioner of Public Works.

June 25 Comptroller notifies Commissioner of Public Works that he will not pay voucher in view of report of Engineers McLean and Balch, copies of which are transmitted.

On the 25th of June, the Comptroller transmitted to the Commissioner of Public Works, "for his information regarding the work of repaving Fifth Avenue," official copies of my report of May 26, and of Engineer McLean's of June 23,³ accompanied by a notification to the effect "that, in consequence of such alleged violations of said contract," he should, "for the time being, withhold the payment of any bills, which may have been, or may be presented to this Department for payment on account of the work certified by the Department of Public Works as having been performed thereunder, and shall not pay any such bills without evidence of the faithful performance of said work in accordance with the specifications and the terms and conditions of the said contract for its execution."⁴

Until he has evidence that work has been done in accordance with contract.

No evidence of the "faithful performance of said work in accordance with the specifications, terms and conditions of said contract" having yet been presented, payment of Voucher No. 1 is withheld.

No such evidence yet furnished.

Second Certificate for Work Done.

Engineer's second certificate.

On the 21st of July, the "Engineer" testified before the Commissioners of Accounts that on that day, when called upon by the contractor to certify an estimate of work done, he had refused to do so.⁵

Refused to sign a certificate on the 21st July.

Sometime during the succeeding six days, however, he seems to have "experienced a change of heart," and to have been converted to the belief that it would be judicious and proper to reconsider that decision, for, on the 27th of July, he gave the contractor his second certificate⁶ for a portion of the work completed to this date, less the amount certified to on the 10th of June.

But concluded it would be advisable.

All that portion of the work executed between the 10th and the 23d of June, and which is referred to and condemned in Engineer McLean's report of this last date, is necessarily included in that covered by this second certificate.

Work condemned by Engineer McLean included in this certificate.

This certificate was accompanied by those of Inspectors Abbott and Havican.⁷ Upon these three certificates there was prepared in the Department of Public Works "70 per cent. payment" Voucher No. 2, for the sum of \$33,924.80.⁸

Second voucher, \$33,924.80.

After being duly certified by the Water Purveyor and by the Commissioner of Public Works, on the 3d of August, the voucher with its accompanying

¹ See Exhibit E. ² See EXHIBIT E, page 10. ³ See EXHIBIT H 5. ⁴ See EXHIBIT H 4. ⁵ See EXHIBIT N, page 5, line 26. ⁶ See EXHIBIT J 1. ⁷ See EXHIBITS J 2, J 3. ⁸ See EXHIBIT J.

These certificates no more reliable than those attached to Voucher No. 1.

papers was forwarded to the Comptroller for audit and payment. It is now before this officer.
Considering the nature of the evidence presented in the foregoing report as to the manner in which certain of the specifications, terms and conditions of the contract have been disregarded by the contractor up to the date of this report, it is safe to say that the certificates attached to this voucher are no more to be relied on, and are as unworthy of confidence as those attached to Voucher No. 1.

The Work Commended.

The risk run by persons who assume to pass judgment on the merits of a piece of engineering work, or on the manner of executing a contract, from superficial indications, without any knowledge of the principles of its construction, or of the terms of the agreement, is well illustrated in the following correspondence, which as a part of the official history of this case deserves a passing notice.

Rev. G. H. Goodsell to the Commissioner of Public Works.

On the 25th of June, the Reverend Geo. H. Goodsell wrote to the Commissioner of Public Works,¹ expressing his surprise at the adverse criticisms made on the work on the Fifth Avenue, and while disclaiming any expert knowledge in such matters, took occasion to say what an admirable piece of work it was, and to inform the Commissioner that the impression made on his mind, both by the work and the materials used, was most favorable.

Reply of the Commissioner.

Such an endorsement of the merits of this work and of his "vigilance" in the matter, could not but be very gratifying to the Commissioner after the harsher criticisms of this office; and hence in replying to his reverend correspondent on the 9th July, he thanks him for his kind favor in which he had conveyed his approval of the work done in repaving Fifth Avenue, and expresses his perfect satisfaction that his correspondent's qualifications for judging of the merits of the work were at least equal to those of the critics.²

Official Nepotism.

W. V. Smith appointed Deputy Commissioner. Appointment of Mr. J. McI. Smith.

On the 18th of February last, the Commissioner of Public Works appointed Mr. William V. Smith, Deputy Commissioner.

On the same day, Mr. J. McIntyre Smith, a brother of the Deputy Commissioner, was appointed Engineer and Surveyor on 13 jobs for paving streets and 19 jobs for regulating and grading new streets.

On the 19th of February he was put in charge of the work of repaving 3 streets and avenues, one of which was the repaving of the Fifth Avenue, which forms the subject of this report.

On the 24th of April last, new responsibilities were accepted by him in the shape of appointments to take charge of the work of repaving 34 avenues, places and streets.

On other odd dates, between the 18th of February and the 1st of July last, he was appointed to take charge of 18 other jobs for paving, repaving, regulating and grading streets.

Up to the 4th of August but 50 of these works had been let, the aggregate contract price of which amounted to \$1,627,337 12 The estimated cost of 32 other works then in Mr. Smith's charge, yet to be let, is 520,931 06

Estimated cost of works in his charge.

MAKING THE ESTIMATED AGGREGATE COST OF THE WORKS FOR WHICH HE IS RESPONSIBLE..... \$2,148,268 18

Thus there was placed within the short period of four months, in the hands of a man who, by his own testimony, had only been in business as a City Surveyor for "six or seven years,"³ more than two million dollars' worth of work, requiring the most careful and judicious professional oversight, works simply to visit each of which once a day would be almost impossible, even with the aid of a private conveyance.

Including certain unfinished works brought over from 1885, and such as were given out from the 18th of February to the 1st day of July last, the aggregate estimated cost of works undertaken or in progress during this period was \$2,284,536.26, of which, as has been shown, Mr. Smith was given the supervision of 94.03 per cent. Of the remaining 5.97 per cent., Mr. R. L. Waters, an old and experienced surveyor (whose official record for accuracy of estimating was one of the highest among those of the thirteen surveyors engaged in regulating and grading streets from 1882 to 1885, inclusive), received 5.48 per cent, and Mr. R. L. Dodge less than one-half of one per cent.

After what has been stated in this report of the manner in which Mr. Smith has discharged his professional duties on the Fifth Avenue during the past four months, it is not difficult to estimate the value of his services, or to measure the fidelity with which he has fulfilled the other trusts committed to his care.

Concluding remarks.

When the taxpayers of this city, to not a few of whom the financial iniquities of the Tweed régime are even now but matters of history, have had a few more costly experiences, such as the opening of Ninety-fifth street and this Fifth Avenue repaving job, they may be prepared to admit that incapacity in high officials, even if unaccompanied by venality, is vastly more expensive in the long run than the most thorough and exacting administrative methods guided by capacity and scientific knowledge, and that no government is so ruinously expensive and extravagant as that administered by half-educated ignorance.

When they have learned this lesson, and have put a summary end to such a travesty on departmental management, as that which has made such a job as the Fifth Avenue repaving, described in this report, possible; when scientific business methods, carried forward with entire singleness of purpose are in order, then and not until then, will they have reached the beginning of that real reform in our municipal government, which is the subject of so much public discussion, but which is too often unsupplemented and unsupported by that personal influence and those persistent efforts by which alone the much to be desired end will ever be attained.

Such real reforms will only come to stay, however, when professional ability, personal integrity and unapproachable uprightness of character are made the indispensable requisites for high office; so long as a lower tone prevails in any administration, so long as the contractor is "solid" with the Department which employs him, it must not be expected that either the most stringent contracts will be observed, or that the emphatic tone of public opinion will have any terrors for him.

G. T. B.

EXHIBIT U.

OBJECTIONS TO COAL TAR PITCH AS A PAVING CEMENT.

In my first report I objected to the use of this coal tar residuum.

In my preliminary report, in speaking of the technical merits of the contract as drawn, I commended its terms, with the exception of the specification relating to the use of the coal tar residuum as a paving cement, to which I decidedly objected. I did so because this material, as ordinarily found in the market, is very far from being the "best" which could be employed for this purpose and cannot possibly fulfill the conditions imposed by the statute.

Reasons for objecting.

When common coal tar pitch is continuously exposed to the action of the elements, as it will be in the joints of this pavement, the small quantity of mineral oil it contains—to the presence of which is entirely due any elasticity and water-resisting property it may possess when first used—will gradually volatilize, causing the surface to dry, crack and become pervious to water; so that under the blows and grinding of traffic, the exposed part, filling the upper portion of the joints, will soon break up, disintegrate and disappear, leaving the latter unprotected and the pavement exposed to the serious consequences which I have indicated.

Defects of this material for paving purposes.

As this is the same material heretofore so extensively employed for cheap gravel roofs, with the brief life and early tendency to leak of which all builders are familiar, it is apparent that as in such roofs and under the much

Same material as is used for cheap gravel roofs.

¹ See EXHIBIT O.

² See EXHIBIT O 1.

³ See EXHIBIT N, page 1.

Why this grade of pitch is of inferior quality.

Product in one ton gas coal.

What 140 pounds of coal tar yields by distillation.

Use of coal tar colors in the arts.

Number of yards which can be dyed with the colors derived from one ton of coal.

Price of anthracine and alazarin.

Best paving cement.

Responsibility for the selection of poor material rests with the Department.

more unfavorable conditions to which it is subjected in a street pavement, it must soon crack and become worthless.

The better to understand why this grade of pitch is so inferior it is necessary to consider its mode of manufacture.

One ton of ordinary gas coal will produce,

10,000 cubic feet of gas;
20 to 23 gallons of ammonia water, say 30 pounds;
12 gallons, or 140 pounds of coal tar, and
3/4 of a ton of coke.

The destructive distillation of the 140 pounds of coal tar will yield;

1. Benzine, 1.1 pounds; aniline, 1.1 pounds.
2. Toluene, 0.9 pounds; toluidine, 0.77 pounds.
3. Phenol, 1.5 pounds; aurine, 1.2 pounds.
4. Solvent naphtha, 2.4 pounds.
5. Naphthaline, 6.3 pounds; naphthol, 4.75 pounds; naphtha yellow, 9.5 pounds.
6. Creosote, 17 pounds.
7. Heavy oils, 14 pounds.
8. Anthracine, 0.46 pounds; alazarin, 2.25 pounds.
9. Pitch, 69.6 pounds.

These colors derived from the distillation of coal are extensively used in the arts and have almost extinguished the industries heretofore existing in madder, and seriously injured that in cochineal and logwood. The force of this remark will be better appreciated when it is stated that the colors derived from one ton of coal as indicated above will dye to a full shade,

1. Magusta, 500 yards of flannel, 27 inches wide.
2. Naphthol (yellow), 3,800 yards, 27 inches wide.
3. Aurine (orange), 120 yards, 27 inches wide.
4. Alazarin (Turkey red), 225 yards of calico, 27 inches wide.

As in view of these uses, anthracine and alazarin are very valuable, being worth in the market, respectively, 16 and 25 cents per ounce at wholesale, the temptation to obtain these products is very great; but to reach them by distillation, the heavy oils, which give the pitch its value for paving and roofing, must be driven off. If these oils are absent the pitch is practically worthless, and hence the greatest care should be used in testing it for anthracine. This can only be done in the laboratory.

On the other hand a paving cement made from a good quality of natural asphalt, properly refined, mixed with a certain proportion of plastic slate or a heavy non-evaporative oil and carefully heated to 300° F. would quite as perfectly permeate the voids between the pebbles in the joints; would, owing to the non-volatile quality of its elements, long preserve its elasticity and flexibility in spite of the destructive influences of excessive heat and frost, and would last at least five times as long as any coal tar product which could be manufactured.

As the responsibility for the manifest error in judgment committed in selecting the coal tar pitch rests with the Department of Public Works, nothing was left for the engineer to do but to make the best use he could of the inferior material with which he had to deal.

G. T. B.

ASSESSMENT COMMISSION.

No. 280 BROADWAY,
TUESDAY, September 14, 1886—2 o'clock P. M. }

On a call of the roll, Commissioner Joseph Garry answered to his name.

A quorum of the Commissioners not being present, the Clerk declared the meeting adjourned until Tuesday, September 21, 1886, at 2 o'clock P. M.

JAMES J. MARTIN, Clerk.

No. 280 BROADWAY,
TUESDAY, September 21, 1886—2 o'clock P. M. }

The Commission created by chapter 550 of the Laws of 1880, to revise, vacate, or modify assessments for local improvements in the City of New York, met pursuant to adjournment.

Present—All the members, viz.: Commissioners Daniel Lord, Jr. (Chairman), Allan Campbell, Joseph Garry, and John W. Marshall.

The Clerk presented copies of the CITY RECORD and "Daily Register," of September 20 and 21, 1886, showing the publication of notices of the meeting.

The minutes of the meeting held on July 8, 1886, were read and approved.

The Clerk reported that he had filed in the Finance Department, on July 10, 1886, certificates reducing assessments in cases specified in resolution adopted on July 8, 1886.

Calendar.

No. 4201. Matter of New York Life Insurance Company—Assessment for Eighth avenue regulating, grading, etc., from Fifty-ninth to One Hundred and Twenty-second street; confirmed June 16, 1876.

Commissioner Lord called up the motion made by John C. Shaw, Esq., attorney for the petitioner, at the meeting on July 8, 1886, that the decision made by the Commissioners on December 4, 1883, reducing this assessment, be made applicable to this case.

After hearing the Counsel representing the City in opposition, the motion was granted.

No. 5547. Matter of Nicholas F. Palmer, trustee, etc.—Assessment for Tenth avenue regulating, grading, etc., from One Hundred and Tenth street to Manhattan street; confirmed July 20, 1885.

On motion of T. H. Baldwin, Esq., attorney for the petitioner, the Counsel representing the City consenting, the decision made by the Commissioners on December 29, 1885, reducing this assessment, was made applicable to this case.

Decisions.

Commissioner Garry presented the following resolution, viz.:

Resolved, That the decisions made by the Commissioners on December 4, 1883, November 19, 1884, March 9 and May 25, 1886, reducing certain assessments for local improvements in the City of New York, be made the decisions of the Commissioners in the following similar cases, proof of title having been furnished, viz.:

Assessment for Eighth Avenue Regulating, Grading, etc., from Fifty-ninth to One Hundred and Twenty-second Street; confirmed June 16, 1876.

No. 4201. The New York Life Insurance Co.....reduced from \$5,453.87 to \$4,472.26

Assessment for Avenue A (E. B.), Regulating, Grading, etc., from Fifty-seventh to Eighty-sixth Street; confirmed July 12, 1878.

No. 372. Stephen Bayard Fish.....reduced from \$3,162.31 to \$2,751.20

Assessment for Underground Drains, between Fordham and Pelham Avenues and the Kingsbridge Road, in Twenty-fourth Ward; confirmed May 19, 1885.

No. 5494. W. J. Barnes.....assessment amounting to \$36 vacated.

Assessment for Tenth Avenue, Regulating, Grading, etc., from Manhattan Street to One Hundred and Fifty-fifth Street; confirmed November, 12, 1885.

No. 5688. John Simpkins.....reduced from \$162 50 to \$113 75

No. 5689. Eliza S. Bacon....." 89 50 " 628 25

No. 5690. Ruth Simpkins....." 1,265 00 " 885 50

" 5691. Charles R. Simpkins....." 1,265 00 " 885 50

" 5692. Mabel Simpkins....." 1,265 00 " 885 50

" 5693. N. S. Simpkins....." 697 50 " 488 25

" 5694. Willard Simpkins....." 162 50 " 113 75

" 5695. James M. Horton....." 97 50 " 68 26

" 5697. Edward J. King et al. ex'rs., etc....." 1,300 00 " 910 00

" 5700. Emma A. Ramsay....." 1,000 00 " 700 00

" 5708. Frederick T. Locke and another....." 2,600 00 " 1,820 00

Which was adopted by the following vote, viz.:

Affirmative—Commissioners Lord, Campbell, Garry, and Marshall—4.

Motion.

On motion of Commissioner Marshall, the Commission adjourned.

JAMES J. MARTIN, Clerk.

BOARD OF ASSESSORS.

OFFICE BOARD OF ASSESSORS,
No. 11½ CITY HALL,
NEW YORK, August 31, 1886.

To the Commissioners of the Department of Taxes and Assessments:

GENTLEMEN—We herewith respectfully submit the accompanying statement, showing in detail the official action of the Board of Assessors upon the various assessment lists described therein, for the quarter ending July 31, 1886. A summary of this statement is as follows:

Number of Assessment Lists received	14	\$961,849 33
" " apportioned and advertised	29	525,400 73
" " transmitted to the Board of Revision and Correction of Assessments for confirmation	30	349,921 18

Very respectfully,
EDWARD GILON, Chairman.

Report of the Board of Assessors for the Quarter ending July 31, 1886.

RECEIVED FROM.	No.	LOCATION OF WORK.	DESCRIPTION OF WORK.	RECEIVED.	PRESENTED TO COMPTROLLER FOR INTEREST CERTIFICATE.	RETURNED BY COMPTROLLER.	DATE OF COMPTROLLER'S CERTIFICATE.	ADVERTISED.	TRANSMITTED TO BOARD OF REVISION, ETC., FOR CONFIRMATION.	DATE OF CONFIRMATION.	COST OF WORK AS CERTIFIED BY THE DEPARTMENT.	AMOUNT OF INTEREST CERTIFICATE.	TOTAL ASSESSMENT.	NUMBER OF PIECES OF PROPERTY.
D. P. W.	1344	Lexington avenue, from One Hundred and Second street to Harlem river	Regulating, etc.	Dec. 1, 1877	July 30, 1880	Aug. 26, 1880	Aug. 20, 1880	July 31, 1886	.....	.....	\$62,718 47	\$11,163 33	\$73,88 0	1,116
D. P. W.	1596	Madison avenue, from Ninety-ninth to One Hundred and Fifth street	Regulating, grading, curb, gutter and flagging	Sept. 13, 1880	Sept. 24, "	Oct. 9, "	Oct. 9, "	" 31, "	.....	.....	51,226 46	2,537 05	53,763 51	216
D. P. P.	1766	Third avenue, from the Southern Boulevard to One Hundred and Thirty-fifth street, and in One Hundred and Thirty-fifth street and One Hundred and Thirty-fourth street, from Third avenue to the summit east of Willis avenue, with branches in Lincoln, Alexander and Willis avenues.	Sewers	May 18, 1882	June 9, 1882	June 24, 1882	June 23, 1882	May 27, "	July 13, 1886	.....	20,875 01	3,080 25	23,955 26	618
D. P. P.	1767	Third avenue, in the Twenty-third Ward, and grading approaches to the same at intersecting streets between Harlem river and One Hundred and Forty-seventh st.	Regulating, grading, curb and flagging ..	" 18, "	" 9, "	" 24, "	" 23, "	July 9, "	.....	{ Awards for damages..	17,729 18	1,537 10	34,154 28	496
D. P. W.	1877	Ninth avenue, from Eighty-first to One Hundred and Tenth street ..	Regulating, grading, curb and flagging ..	Oct. 25, "	Oct. 30, "	Dec. 30, "	Dec. 28, "	Aug. 25, 1885	July 15, 1886	July 15, 1886	24,394 96	655 63	25,050 59	1,592
D. P. W.	1899	Lexington avenue, from One Hundred and Fourth to One Hundred and Thirty-first street	Paving	Dec. 2, "	Jan. 10, 1883	Mar. 21, 1883	Mar. 17, 1883	July 31, 1886	.....	.....	64,301 29	1,886 97	66,188 26	1,179
D. P. P.	2060	One Hundred and Thirty-fifth street, between College and Third avenues	Sewer	" 9, 1883	Dec. 10, "	Dec. 20, "	Dec. 20, "	April 6, "	May 27, 1886	July 15, 1886	2,477 39	173 40	2,650 79	289
D. P. P.	2110	One Hundred and Forty-eighth street, between Brook avenue and Mill brook and between Mill brook and Courtland avenue, with branches in North Third avenue, between One Hundred and Forty-seventh and One Hundred and Forty-ninth streets, and in Willis avenue, between One Hundred and Forty-eighth and One Hundred and Forty-ninth streets	Sewers	May 2, 1884	May 22, 1884	June 19, 1884	June 18, 1884	" 27, "	June 8, "	" 15, "	11,429 91	683 76	12,113 67	75
D. P. P.	2115	One Hundred and Thirty-fifth street, from Third to Alexander avenue	Regulating, grading, curb, gutter and flagging	" 2, "	" 22, "	" 19, "	" 18, "	June 25, "	July 30, "	{ Awards for damages..	3,853 91	356 43	5,905 34	54
D. P. P.	2120	One Hundred and Forty-ninth street, between Brook avenue and Mill brook and between Mill brook and Courtland avenues, with a branch in Bergen avenue, between One Hundred and Forty-eighth and One Hundred and Forty-ninth streets	Sewer	June 10, "	Oct. 27, "	Dec. 2, "	Nov. 28, "	Apr. 17, "	May 21, "	July 15, 1886	9,192 55	656 08	9,848 63	61
D. P. W.	2125	One Hundred and Thirty-eighth street, from Sixth to Eighth avenue	Regulating, grading, curb and flagging ..	" 24, "	" 27, "	" 2, "	" 28, "	" 9, "	" 13, "	" 15, "	16,652 29	786 43	17,438 72	129
D. P. W.	2126	Sixty-seventh street, from Third avenue to Avenue A	Regulating, grading, curb and flagging ..	" 24, "	" 27, "	" 2, "	" 28, "	May 27, Apr. 6, "	.....	.....	21,591 79	1,139 68	22,731 47	112
D. P. W.	2131	One Hundred and Fifty-sixth street, from Avenue St. Nicholas to Eleventh avenue	Regulating, grading, curb and flagging ..	" 24, "	" 27, "	" 2, "	" 28, "	June 25, "	.....	{ Awards for damages..	6,414 45	226 94	9,491 39	45
D. P. W.	2136	One Hundred and Thirty-seventh street, between Fifth and Seventh avenues	Regulating, grading, curb and flagging ..	Aug. 1, "	" 27, "	" 2, "	" 28, "	May 29, "	July 15, 1886	.....	14,559 22	756 27	15,315 49	137
D. P. W.	2146	West End Avenue, formerly Eleventh avenue, between Ninety-sixth and One Hundred and Fifth streets ..	Sewer	Sept. 5, "	" 27, "	" 2, "	" 28, "	Mar. 23, "	May 5, "	July 15, 1886	38,441 58	2,188 39	40,629 97	203
D. P. W.	2170	Sixty-ninth street at Ninth avenue, Boulevard and Eleventh avenue ..	Crosswalks	Oct. 27, "	Jan. 12, 1885	Feb. 13, 1885	Feb. 10, 1885	Apr. 17, "	" 21, "	" 15, "	492 76	8 58	501 34	84
D. P. W.	2173	Fifty-third street, from Tenth to Eleventh avenue	Regulating, grading, curb, gutter and flagging	Oct. 30, "	" 12, "	" 13, "	" 10, "	" 17, "	" 21, "	" 15, "	15,193 66	686 94	15,880 60	66
D. P. W.	2180	Ninety-fifth street, from Ninth to Tenth avenue	Regulating, grading, curb and flagging ..	Nov. 11, "	" 12, "	" 13, "	" 10, "	May 21, "	July 3, "	" 15, "	8,063 62	200 81	8,264 43	62
D. P. W.	2193	One Hundred and Fifty-first street, from St. Nicholas avenue to Boulevard	Regulating, grading, curb and curbing	Dec. 17, "	" 12, "	" 13, "	" 10, "	July 30, "	.....	{ Awards for damages..	7,040 55	251 26	9,891 81	113
D. P. W.	2194	One Hundredth street, from Fourth to Fifth avenue	Regulating, grading, curb and flagging ..	" 17, "	" 12, "	" 13, "	" 10, "	May 21, "	July 3, 1886	July 15, 1886	11,596 37	195 59	11,791 96	67
D. P. W.	2195	One Hundred and Eighth street, from Second to Third avenue	Paving	" 17, "	" 12, "	" 13, "	" 10, "	" 21, "	" 3, "	" 15, "	5,637 94	90 28	5,728 22	65
D. P. W.	2196	Eighty-first street, from Boulevard to Riverside Drive	Paving	" 17, "	" 12, "	" 13, "	" 10, "	" 21, "	" 3, "	" 15, "	6,735 53	89 11	6,824 64	46
D. P. W.	2199	Eighty-first street, from First avenue to Avenue A	Paving	" 31, "	" 12, "	" 13, "	" 10, "	" 21, "	" 3, "	" 15, "	5,498 49	68 97	5,567 46	53
D. P. W.	2212	One Hundred and Thirty-first street, from Sixth to Seventh avenue ..	Sewer	Jan. 24, 1885	" 27, "	" 13, "	" 10, "	" 21, "	" 3, "	" 15, "	2,344 34	19 38	2,363 72	52
D. P. W.	2214	Sixty-sixth street, from Eighth avenue to the Boulevard	Regulating, grading, curb, gutter and flagging	" 24, "	Dec. 21, "	Dec. 24, "	" 10, "	Apr. 27, "	" 3, "	.....	22,878 55	4,530 56	27,409 11	73
D. P. W.	2215	Eighty-sixth street, between Tenth and Riverside avenues	Sewers	" 24, "	Jan. 27, "	Feb. 13, "	" 10, "	June 25, "	" 30, "	.....	13,186 97	213 45	13,400 42	67
D. P. W.	2216	Fourth avenue, east and west sides, between Twenty-seventh and Thirtieth streets	Sewer	" 24, "	" 27, "	" 13, "	" 10, "	July 9, "	.....	.....	9,241 12	126 17	9,367 29	50
D. P. P.	2219	One Hundred and Forty-eighth street, between North Third and Alexander avenues, with a branch in Alexander avenue, between One Hundred and Fortieth and One Hundred and Forty-first streets ..	Sewer	" 30, "	Feb. 10, "	" 24, "	" 10, "	" 9, "	.....	.....	2,434 45	185 66	2,620 11	24
D. P. P.	2220	One Hundred and Forty-sixth street, between Third and Brook avenues, with branches in Willis avenue, between One Hundred and Forty-sixth and One Hundred and Forty-seventh streets, and Courtland avenue, between Third avenue and One Hundred and Fifty-first street	Sewers	" 30, "	" 10, "	" 24, "	" 19, "	" 30, "	.....	.....	6,670 61	828 57	7,499 18	139
D. P. P.	2222	One Hundred and Thirty-ninth street, from North Third avenue to the summit between Alexander and Willis avenues, with branches in Alexander avenue, between One Hundred and Thirty-ninth and One Hundred and Fortieth streets ..	Sewers	" 30, "	" 10, "	" 24, "	" 19, "	" 9, "	.....	.....	16,838 62	2,071 36	18,909 98	70
D. P. P.	2229	One Hundred and Thirty-eighth street, between Willis and Brook avenues, with a branch in Brown place, between One Hundred and Thirty-eighth and One Hundred and Thirty-seventh streets	Sewer	" 30, "	" 10, "	" 24, "	" 19, "	" 9, "	.....	.....	7,799 74	654 18	8,453 92	103
D. P. P.	2231	Railroad avenue, opposite Tremont Depot of the N. Y. and H. R. R. and at the southerly intersection of East One Hundred and Seventy-sixth street	Crosswalks	" 30, "	" 10, "	" 24, "	" 19, "	Apr. 29, "	June 8, 1886	July 15, 1886	206 28	13 50	219 78	8
D. P. W.	2238	Ninety-seventh street, from Third to Fourth avenue	Sewer	Feb. 4, "	" 10, "	" 24, "	" 19, "	" 29, "	" 8, "	" 15, "	5,236 38	.....	5,236 38	66
D. P. P.	2242	Alexander avenue, from Southern Boulevard to North Third avenue	Regulating, grading, curb, flagging and crosswalks	Mar. 9, "	Mar. 13, "	Mar. 18, "	Mar. 17, "	June 25, "	July 30, "	{ Awards for damages..	38,870 74	3,373 54	43,894 28	488

RECEIVED FROM.	No.	LOCATION OF WORK.	DESCRIPTION OF WORK.	RECEIVED.	PRESENTED TO COMPTROLLER FOR INTEREST CERTIFICATE.	RETURNED BY COMPTROLLER.	DATE OF COMPTROLLER'S CERTIFICATE.	ADVERTISED.	TRANSMITTED TO BOARD OF REVISION, ETC., FOR CONFIRMATION.	DATE OF CONFIRMATION.	COST OF WORK AS CERTIFIED BY THE DEPARTMENT.	AMOUNT OF INTEREST CERTIFICATE.	TOTAL ASSESSMENT.	NUMBER OF PIECES OF PROPERTY.
D. P. P.	2243	Lincoln avenue, from Southern Boulevard to North Third avenue.....	Regulating, grading, curb and flagging...	Mar. 9, 1885	Mar. 13, 1885	Mar. 18, 1885	Mar. 17, 1885	Apr. 27, 1886	June 8, 1886	.....	\$3,439 21	\$207 11	\$3,646 32	161
D. P. P.	2251	One Hundred and Forty-fifth street, between Brook and St. Ann's avenues.....	Sewer.....	" 20, "	" 21, "	Apr. 10, "	Apr. 8, "	" 29, 1885	" 8, "	July 15, 1886	3,301 65	121 40	3,423 05	30
D. P. P.	2270	One Hundred and Thirty-ninth street, from North Third to Willis avenue.....	Regulating, grading, curb, gutter, flagging and crosswalks....	May 5, "	May 23, "	June 30, "	June 27, "	" 27, 1886	" 8, "	" 15, "	2,683 83	62 35	2,746 18	73
D. P. W.	2286	Eighty-eighth street, from Second to Third avenue.....	Paving.....	June 17, "	June 30, "	Aug. 10, "	Aug. 7, "	June 25, "	July 30, "	.....	5,333 52	85 13	5,418 65	49
D. P. W.	2293	One Hundred and Thirty-fourth street, from Madison to Fifth avenue.....	Paving.....	July 11, "	July 22, "	" 27, "	" 26, "	" 25, "	" 30, "	.....	3,722 61	52 32	3,774 93	35
D. P. W.	2295	Eighty-second street, from Eighth to Ninth avenue.....	Paving.....	" 11, "	" 22, "	" 27, "	" 26, "	" 25, "	" 30, "	.....	6,769 53	108 13	6,877 66	68
D. P. W.	2300	One Hundred and Fifteenth street, from Fifth to Sixth avenue.....	Paving.....	Aug. 1, "	Aug. 10, "	" 27, "	" 26, "	" 25, "	" 30, "	.....	8,084 12	99 48	8,183 60	73
D. P. W.	2309	Eighty-fifth street, from Ninth to Tenth avenue.....	Regulating, grading, curb, gutter and flagging.....	" 19, "	Sept. 1, "	Oct. 5, "	Oct. 5, "	July 30, "	.....	.....	2,318 13	25 55	2,343 68	54
D. P. W.	2321	Seventy-fourth street, from Eighth avenue to Riverside Drive.....	Regulating, grading, curb and flagging.....	Oct. 3, "	Oct. 7, "	" 17, "	" 17, "	May 29, "	July 13, 1886	{ Awards for damages..	30,633 70	954 29	38,837 99	220
D. P. W.	2332	Eleventh avenue, from Kingsbridge road to Dyckman street.....	Regulating, grading, curb and flagging.....	May 13, 1886	May 14, 1886	June 5, 1886	May 19, 1886	.....	.....	.....	126,607 28	6,076 26	132,683 54	246
D. P. W.	2333	One Hundred and Fifty-third street, from a line 60 feet east of and parallel with east line of Seventh avenue to the east line of the first new avenue west of Eighth avenue.....	Regulating, grading, curb and flagging ..	June 2, "	June 4, "	" 8, "	June 8, "	.....	.....	.....	28,216 94	2,483 38	30,700 32	74
D. P. W.	2334	One Hundred and Eighty-fifth street, from Tenth avenue to Kingsbridge road.....	Regulating, grading, curb and flagging ..	" 8, "	" 14, "	July 6, "	July 6, "	.....	.....	.....	26,819 66	780 57	27,600 23	179
D. P. W.	2335	Morning-side avenue, from north line of One Hundred and Tenth street to east line of Tenth avenue.....	Regulating, grading, curb and flagging, and retaining walls.	" 8, "	" 14, "	" 26, "	" 26, "	.....	.....	.....	323,906 60	63,039 29	386,945 89	186
D. P. P.	2336	Brook avenue, from tide water to a point in One Hundred and Sixty-fifth street.....	Sewers.....	" 17, "	.....	.....	.....	.....	.....	.....	306,574 40	.....	.....	8,616
D. P. W.	2337	Attorney street, between Stanton and Rivington streets.....	Sewer.....	" 18, "	.....	.....	.....	.....	.....	.....	2,374 07	.....	.....	24
D. P. W.	2338	Fourth avenue, east side, between Fifty-fourth and Fifty-fifth streets.....	Sewer.....	" 18, "	.....	.....	.....	.....	.....	.....	1,399 09	.....	.....	4
D. P. W.	2339	Ninety-first street, between Second and Fourth avenues.....	Paving.....	" 18, "	.....	.....	.....	.....	.....	.....	9,526 89	.....	.....	134
D. P. W.	2340	One Hundred and Thirty-second street, from Seventh to Eighth avenue.....	Paving.....	" 18, "	.....	.....	.....	.....	.....	.....	4,886 60	.....	.....	86
D. P. P.	2341	St. Ann's avenue, west side of, between Westchester avenue and One Hundred and Fifty-sixth street, known as the Benson Cemetery.....	Fencing.....	" 30, "	.....	.....	.....	.....	.....	.....	668 83	.....	.....	2
D. P. W.	2342	Eighty-second street, from Avenue A to B.....	Paving.....	" 30, "	.....	.....	.....	.....	.....	.....	4,824 82	.....	.....	63
D. P. W.	2343	Lexington avenue, between Ninety-fifth and Ninety-seventh streets, and in Ninety-fifth and Ninety-sixth streets, between Lexington and Fourth avenues, with alterations, etc., to existing sewers in Third avenue, between Ninety-seventh and Ninety-eighth streets.....	Sewers.....	July 10, "	.....	.....	.....	.....	.....	.....	14,131 73	.....	.....	337
D. P. W.	2344	One Hundred and Thirty-third street, from Seventh to Eighth avenue.....	Paving.....	" 23, "	.....	.....	.....	.....	.....	.....	5,819 02	.....	.....	69
D. P. W.	2345	Kingsbridge road, from One Hundred and Fifty-fifth to One Hundred and Ninetieth street.....	Regulating, grading, curb and flagging ..	" 23, "	.....	.....	.....	.....	.....	.....	106,093 40	.....	.....	870

LEGISLATIVE DEPARTMENT.

OFFICE OF THE BOARD OF ALDERMEN,
No. 8 CITY HALL,
NEW YORK, May 29, 1886.

PUBLIC NOTICE.

A resolution, of which the following is a copy, was adopted by the Common Council, May 26, 1886, and was approved by the Mayor, May 28, 1886, viz.:

"Resolved, That in consideration of the fact that little, if any, business is transacted in the public offices of the Corporation after 12 o'clock, M., on Saturdays during the summer season, the various offices of the City, except those specially required by law to be kept open, be closed at noon every Saturday during the months of June, July, August and September, and the heads of the several departments of the City government be and are hereby requested to give their employees a half-holiday on Saturdays during the months above named."

FRANCIS J. TWOMEY, Clerk Common Council.

BOARD OF ESTIMATE AND APPORTIONMENT

BOARD OF ESTIMATE AND APPORTIONMENT—CITY OF NEW YORK,
MAYOR'S OFFICE—CITY HALL,
MONDAY, September 27, 1886—2 o'clock P. M.

The Board met in pursuance of the following call:

OFFICE OF THE MAYORALTY,
EXECUTIVE DEPARTMENT—CITY HALL,
NEW YORK, September 21, 1886.

In pursuance of the authority contained in the 189th section of the New York City Consolidation Act of 1882, a meeting is hereby called of the Mayor, Comptroller, President of the Board of Aldermen, and the President of the Department of Taxes and Assessments, constituting a Board of Estimate and Apportionment, to be held at the office of the Mayor, on Monday, September 27, 1886, at 2 o'clock P. M., for the purpose of transacting such business as may be brought before the Board.

ROBERT B. NOONEY, Acting Mayor.

INDORSED:

Admission of a copy of the within as served upon us this 21st day of September, 1886.

Mayor;
EDWARD V. LOEW,
Comptroller;
ROBERT B. NOONEY,
President of the Board of Aldermen;
M. COLEMAN,
President of the Department of Taxes and Assessments.

Present—All the members, viz.:

Wm. R. Grace, the Mayor; Edward V. Loew, the Comptroller; Robt. B. Nooney, the President of the Board of Aldermen; Michael Coleman, the President of the Department of Taxes and Assessments.

The minutes of the meetings held July 30 and August 16, 1886, were read and approved.

The Comptroller offered the following resolution:

Resolved, That the amounts following be and hereby are appropriated from the "Excise Fund" under the provisions of section 210, chapter 410, Laws of 1882 (New York City Consolidation Act of 1882), for the support of children in the month of May, 1886, committed by magistrates to the institutions named, pursuant to law:

NAME.	NUMBER OF CHILDREN.	NUMBER OF DAYS.	RATE.	AMOUNT.
Institution of Mercy.....	889	26,620	\$2 per week.	\$7,605 71
St. Joseph's Asylum.....	459	13,550	"	3,871 43
St. Stephen's Home for Children.....	513	15,145	"	4,285 14
Mission of the Immaculate Virgin.....	1,020	30,966	"	8,847 43
Missionary Sisters, Third Order of St. Francis.....	531	16,071	"	4,591 71
Dominican Convent of Our Lady of the Rosary.....	414	12,325	"	3,521 09
Association for the Benefit of Colored Orphans.....	125	3,717	"	1,053 00
St. James' Home.....	141	4,309	"	1,231 14
Association for Befriending Children and Young Girls.....	28	831	"	237 43
St. Ann's Home.....	29	874	"	249 71
American Female Guardian Society and Home for the Friendless.....	127	3,089	"	882 57
Asylum of St. Vincent de Paul.....	57	1,714	"	489 71
St. Agatha Home for Children.....	148	4,476	"	1,278 86
St. Michael's Home.....	54	1,674	"	460 57
Hebrew Sheltering Guardian Society.....	358	10,533	"	3,009 43
Ladies' Deborah Nursery and Child's Protectory.....	407	12,356	"	3,530 29
Total.....				\$45,145 22

Which was adopted by the following vote:

Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller offered the following resolution:

Resolved, That the amounts following be and hereby are appropriated from the "Excise Fund" under the provisions of section 210, chapter 410, Laws of 1882 (New York City Consolidation Act of 1882), for the support of children in the month of June, 1886, committed by magistrates to the institutions named, pursuant to law:

NAME.	NUMBER OF CHILDREN.	NUMBER OF DAYS.	RATE.	AMOUNT.
Asylum Sisters of St. Dominic.....	395	11,830	\$2 per week.	\$3,380 00
Dominican Convent of Our Lady of the Rosary.....	429	12,448	"	3,431 04
Total.....				\$6,811 04

Which was adopted by the following vote:

Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller offered the following resolution :
 Resolved, That the sum of one hundred and fifty-seven dollars and forty cents (\$157.40) be and hereby is appropriated from the "Excise Fund" to the "Home for Fallen and Friendless Girls," for the support of twenty-two inmates in the month of May, 1886, aggregating three hundred and eighty-three days, at the rate of \$150 per annum, pursuant to section 208, chapter 410, Laws of 1882 (New York City Consolidation Act of 1882).
 Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller presented the following :

MAYOR'S OFFICE, NEW YORK, September 24, 1886.

The Honorable the Board of Estimate and Apportionment :

I hereby consent to a transfer of \$2,200 to the Bureau of the First Marshal, the appropriation to which for the present year (1886) will be insufficient to meet the expenses of the same, from the appropriation for the present year (1886) to the Bureau of Permits, which is in excess of the needs of the same, said bureau having been abolished by resolution of the Board of Aldermen, and its functions vested in the Bureau of the First Marshal.

W. R. GRACE, Mayor.

And offered the following resolution :
 Resolved, That the sum of twenty-two hundred dollars be and the same is hereby transferred from the appropriation made for the year 1886, entitled "Bureau of Permits—For Salaries," which is in excess of the amount required for the purposes and objects thereof, to an appropriation for 1886, entitled "Bureau of Licenses, as constituted by an ordinance of the Common Council, passed February 3, 1886—For Salaries," the amount of said appropriation being required.

Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller presented the following :

LAW DEPARTMENT,
 OFFICE OF THE COUNSEL TO THE CORPORATION,
 NEW YORK, September 16, 1886.

To the Honorable Board of Estimate and Apportionment :

GENTLEMEN—I respectfully apply for a transfer to the appropriation for this Department entitled "General Contingencies," 1886, of the sum of \$1,500, such appropriation being insufficient for its purposes and objects. This transfer may, I am informed, be made, \$1,000 from the appropriation "For Salaries—Mayor's Office," 1886, and \$500 from the appropriation "Contingencies—Comptroller's Office," 1886. Such sums being respectively in excess of the amounts required or deemed to be necessary for the purposes and objects of said last-named appropriations.

Yours, very respectfully,

E. HENRY LACOMBE, Counsel to the Corporation.

MAYOR'S OFFICE, NEW YORK, September 24, 1886.

The Honorable the Board of Estimate and Apportionment :

I hereby consent to a transfer to the appropriation made for the present year (1886) to the General Contingencies of the Law Department, which has been certified to me by the Counsel to the Corporation as insufficient for the needs thereof, of \$1,000, from the appropriation made to the Bureau of Permits for the present year (1886), which is in excess of the needs of the same, said bureau having been abolished by resolution of the Board of Aldermen, and its functions vested in the Bureau of the First Marshal.

W. R. GRACE, Mayor.

And offered the following resolution :
 Resolved, That the sum of fifteen hundred dollars (\$1,500) be and the same is hereby transferred from the following appropriations made for the year 1886, which are in excess of the amounts required for the purposes and objects thereof, viz.:

"Salaries—Mayor's Office—Salaries of Clerks and Subordinates".....	\$1,000 00
"Contingencies—Comptroller's Office".....	500 00
	<u>\$1,500 00</u>

—to the appropriation entitled "Contingencies—Law Department—General Contingencies," 1886, which is insufficient for the purposes and objects thereof.

Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller presented the following :

LAW DEPARTMENT,
 OFFICE OF THE COUNSEL TO THE CORPORATION,
 NEW YORK, September 22, 1886.

To the Honorable the Board of Estimate and Apportionment :

GENTLEMEN—I respectfully apply for a transfer from the appropriation of this Department for the year 1886, entitled "Salaries of Assistants, Clerks and Messengers," of \$500, which is in excess of the amount required for the purpose thereof, to the appropriation for 1886, for "Procuring and Presenting Evidence as to the Value of Lands to be taken for New Parks," which is insufficient for the object and purpose thereof.

I am, gentlemen, respectfully yours,

E. HENRY LACOMBE, Counsel to the Corporation.

And offered the following resolution :
 Resolved, That the sum of five hundred dollars (\$500) be and is hereby transferred from the appropriation to the Law Department for 1886, entitled "Salaries—Law Department—For Salaries of Assistants, Clerks, and Messengers," which is in excess of the amount required for the purpose thereof, to the appropriation for 1886, for "Procuring and Presenting Evidence as to the Value of Lands to be taken for New Parks," which is insufficient for the object and purpose thereof.

Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller presented the following :

OFFICE OF THE COMMISSIONERS OF ACCOUNTS,
 ROOMS 114 AND 115, STEWART BUILDING,
 NEW YORK, September 6, 1886.

The Board of Estimate and Apportionment :

GENTLEMEN—The undersigned, Commissioners of Accounts, request a transfer of five thousand dollars to the credit of the appropriation "Commissioners of Accounts—Salaries of Assistants and Contingencies," from sundry unexpended balances of appropriation, as per consent of the Mayor herewith.

The expenditures of the current month will exhaust the balance now remaining to our credit, and the transfer above requested will be needed to carry us through the year.

Very respectfully,

W. P. SHEARMAN,
 J. B. ADAMSON,
 Commissioners of Accounts.

And offered the following resolution :
 Resolved, That the sum of five thousand dollars (\$5,000) be and the same is hereby transferred from the following appropriations made for the year 1886, which are in excess of the amounts required for the purposes and objects thereof, viz.:

"Salaries—Mayor's Office—Salaries of Clerks and Subordinates".....	\$2,500 00
"Bureau of Permits—For Salaries".....	2,500 00
	<u>\$5,000 00</u>

—to the appropriation made for the year 1886, entitled "Salaries—Commissioners of Accounts—Salaries of Assistants and Contingencies," which is insufficient.

Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller offered the following resolution :
 Resolved, That pursuant to the authority conferred upon the Board of Estimate and Apportionment by chapter 207 of the Laws of 1884, and in accordance with an opinion of the Corporation Counsel under date of September 9, 1886, additional fees of the Sheriff of the City and County of New York, not provided for by resolution of the Board of Estimate and Apportionment adopted December 30, 1885, are fixed at the following rates of payment :
 For board of prisoners under sentence of death, per day..... \$1 00
 Publication of certificates of execution, each..... 4 50
 Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller presented the following :

HEALTH DEPARTMENT, No. 301 MOTT STREET,
 NEW YORK, August 19, 1886.

EDWARD V. LOEW, Esq., Comptroller :

SIR—At a meeting of this Board, held on the 17th inst., it was
 "Resolved, That the Board of Estimate and Apportionment be and is hereby respectfully requested to transfer the sum of \$225 from the appropriation made to the Health Department, entitled "Hospital Fund—For Completion of Hospital Buildings and Grounds on North Brother's Island, Artesian Well," 1886, for which object and purpose it will not be required, to the appropriation entitled "Hospital Fund—For Completion of Hospital Buildings and Grounds on North Brother's Island—Two Additional Pavilions," 1886, to pay the architects' fees for plans and specifications and the supervision of the same."
 A true copy.

EMMONS CLARK, Secretary.

And offered the following resolution :
 Resolved, That the sum of two hundred and twenty-five dollars (\$225) be and is hereby transferred from the appropriation made to the Board of Health for the year 1886, entitled "Hospital Fund—For Completion of Hospital Buildings and Grounds on North Brother Island—Artesian Well," which is in excess of the amount required for the purpose thereof, to the appropriation entitled "Hospital Fund—For Completion of Hospital Buildings and Grounds on North Brother Island—Two Additional Pavilions," which is insufficient for the purpose thereof.

Which was adopted by the following vote :
 Affirmative—The Mayor, Comptroller and President of the Board of Aldermen—3.
 Negative—The President of the Department of Taxes and Assessments—1.

The Chairman presented the following :

DEPARTMENT OF PUBLIC WORKS—COMMISSIONER'S OFFICE,
 No. 31 CHAMBERS STREET,
 NEW YORK, September 20, 1886.

Hon. WILLIAM R. GRACE, Mayor and Chairman Board of Estimate and Apportionment :

SIR—At the present rate of expenditure there will be a deficiency of \$2,500 in the appropriation for "Laying Water-pipes—Salaries," for 1886, for the following reasons :

Toward the close of last year several contracts were made for water-pipes and charged against the appropriation of that year, the work for which was not begun or executed until this year, amounting to about \$120,000. The expense of supervision and inspection of this work must be paid out of this year's appropriation for salaries.

The work of laying pipes under this year's appropriation has been more scattered through various parts of the city than in previous years, and, therefore, divided into a larger number of small contracts, requiring more labor for supervision and inspection. The demands for additional water-pipes, as authorized by the Common Council, are so urgent that the work must be continued vigorously to the end of the year. I therefore respectfully request that the Board of Estimate and Apportionment make a transfer of \$2,500 to the appropriation for "Laying Water-pipes—Salaries" for 1886, from the following appropriations of 1886, viz.:

From "Repairs and Renewal of Pipes, Stop-cocks, etc.—Salaries".....	\$400 00
From "Repairs and Renewal of Pavements—Salaries".....	700 00
From "Repaving Streets and Avenues—Salaries".....	1,400 00
Total.....	<u>\$2,500 00</u>

—the said amounts not being required for the purposes of said appropriations.

Very respectfully,
 D. LOWBER SMITH,
 Deputy and Acting Commissioner of Public Works.

NEW YORK, July 22, 1886.

To the Honorable the Board of Estimate and Apportionment of the City of New York :

GENTLEMEN—I would respectfully petition your Honorable Body, under the provisions of chapter 169, Laws of 1886—a certified copy of which is hereto annexed—to examine my claim arising from services rendered as instructor of Political Science in the New York Evening High School.

Following the terms of the act cited, I would respectfully refer to the records of the Board of Education and of the Auditing Bureau of the Finance Department, for the proofs on the points involved. They show :

1. That the services were rendered under a regular appointment made and accepted in good faith ; and,
 2. That the claim is honest and just, and that the only obstacle to payment was the technicality which the act of the Legislature here cited was framed to remove.

I append a bill, setting forth the claim in detail under the terms and limitations imposed by the act, and pray your Honorable Body to audit and confirm this bill, as embodying the findings in equity of the Legislature after a thorough hearing in the Committees on Cities, both of the Assembly and the Senate.

And your petitioner will ever pray.

Very respectfully,
 GRAHAM McADAM.

The Mayor, Aldermen and Commonalty of the City of New York, or The Board of Education of the City of New York,

To Graham McAdam, Dr.

Claim in equity arising from services rendered as Instructor in Political Science in the New York Evening High School, under chapter 169, Laws 1886.

Amounts Credited on Pay-rolls of the Evening High School.	Interest on the several sums to May 1, 1886.
March and April, 1884.....	2 years.....
October, ".....	1 year 6 months.....
November, ".....	1 " 5 ".....
December, ".....	1 " 4 ".....
January, 1885.....	1 " 3 ".....
February, ".....	1 " 2 ".....
March and April, 1885.....	1 " 1 ".....
Principal.....	
Interest.....	
Counsel fees.....	
Printing.....	
Traveling and sundries.....	
Deduction made necessary by the terms of the act.....	
Net claim.....	

CHAPTER 169.

AN ACT to authorize the board of estimate and apportionment of the City of New York to examine the claim of Graham McAdam and to audit and pay the amount that may be justly due.

Passed April 21, 1886 ; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows :

Section 1. The board of estimate and apportionment of the city of New York is hereby authorized to examine, upon notice to the board of education, the claim of Graham McAdam, arising from services rendered as instructor in political science in the New York evening high school during the school term of eighteen hundred and eighty-four and eighteen hundred and eighty-five. If it shall satisfactorily appear to the said board that such services were rendered under an appointment of the

board of education of said city, made and accepted in good faith, and if the said board shall be satisfied that the said claim is honest and just and ought in equity to be paid, then the said board is hereby authorized to audit and allow the same for such an amount as may appear equitable and just, not exceeding five hundred dollars.

§ 2. The comptroller of the city of New York is hereby authorized to pay said claim as so audited out of moneys appropriated for the board of education.

§ 3. This act shall take effect immediately.

STATE OF NEW YORK, } ss.:
Office of the Secretary of State, }

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and the seal of office of the Secretary of State, at the City of Albany, this fourth day of May, in the year one thousand eight hundred and eighty-six.

[SEAL.]

DIEDRICH WILLERS, Deputy Secretary of State.

To the Honorable the Board of Estimate and Apportionment:

GENTLEMEN—Owing to the necessity of having to increase our building at Seventieth street by way of erecting a new wing, whereby we will be enabled to accommodate several more than we have already under our care, two hundred and sixty-four (264) in number, old men and women, ranging from sixty to one hundred years of age.

This will incur an expense which will affect us for some period, as we already labor under a large indebtedness. Having to provide for those under our protection, and having no source of benefits from any State or county charity, but entirely depending on the public generosity by way of subscription, are compelled at this moment to appeal to your Honorable Body to seek for aid, knowing full well that the statute directs who shall be favored with the charities, but feel that you, gentlemen, can discover, in justice to duty as public men, a way to help an already burdened charitable home.

Yours, very respectfully,

HOME FOR THE AGED OF THE LITTLE SISTERS OF THE POOR
OF THE CITY OF NEW YORK.

CITY OF NEW YORK—DEPARTMENT OF PUBLIC PARKS, }
Nos. 27 AND 29 READE STREET,
September 27, 1886. }

To the Board of Estimate and Apportionment:

GENTLEMEN—At a meeting of the Board of Parks held on 25th instant, it was
“Resolved, That the Board of Estimate and Apportionment be and hereby is respectfully requested to transfer the sum of eight thousand dollars from the unexpended balance of the appropriation entitled ‘Sewers and Drains—Twenty-third and Twenty-fourth Wards,’ 1886, for which it will not be required, to the appropriation entitled ‘Maintenance—Twenty-third and Twenty-fourth Wards,’ which is insufficient.”

Yours, very respectfully,

CHARLES DE F. BURNS, Secretary D. P. P.

CITY OF NEW YORK—DEPARTMENT OF PUBLIC PARKS, }
Nos. 27 AND 29 READE STREET,
September 27, 1886. }

To the Board of Estimate and Apportionment:

GENTLEMEN—At a meeting of the Board of Parks, held on 25th instant, it was
“Resolved, That the Board of Estimate and Apportionment be respectfully requested to give its consent to the expenditure, by this Department, of the balance to the credit of the appropriation made for the improvement, etc., of Riverside Park and Avenue for the year 1886, for construction work other than a retaining wall.”

Yours, very respectfully,

CHARLES DE F. BURNS, Secretary D. P. P.

CITY OF NEW YORK—DEPARTMENT OF PUBLIC PARKS, }
Nos. 27 AND 29 READE STREET,
September 27, 1886. }

To the Board of Estimate and Apportionment:

GENTLEMEN—At a meeting of the Board of Parks, held on 25th instant, it was
“Resolved, That the Board of Estimate and Apportionment be and hereby is respectfully requested to transfer from the unexpended balance of the appropriation entitled ‘Cromwell’s Creek Bridges,’ etc., 1886, for which it will not be required, the sum of two thousand five hundred dollars to the appropriation entitled ‘Harlem River Bridges,’ which is insufficient.”

Yours, very respectfully,

CHARLES DE F. BURNS, Secretary D. P. P.

Which were received and referred to the Comptroller.

The Comptroller offered the following resolution:

Resolved, That the Department of Public Parks be and is hereby authorized to apply and expend the sum of thirteen hundred and seventy-three dollars and sixty-eight cents (\$1,373.68) for the furnishing of its new offices in Chambers street, from the appropriation entitled “Rents and Repairs—Department of Public Parks—To pay rents and make repairs of offices, stables, and yards for the use of the Department, under agreements entered into by the Comptroller, by order of the Commissioners of the Sinking Fund,” which is in excess of the amount required for the purpose.

Which was adopted by the following vote:

Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

The Comptroller offered the following resolution:

Resolved, That the request contained in the communication of the Department of Public Parks, under date of July 15, 1886, to use the appropriation made to the Zoological Department for 1886, for the purchase of animals other than a rhinoceros, be and is hereby granted.

Which was adopted by the following vote:

Affirmative—The Mayor, Comptroller, President of the Board of Aldermen and President of the Department of Taxes and Assessments—4.

On motion, the Board adjourned.

M. COLEMAN, Secretary.

POLICE DEPARTMENT.

The Board of Police met on the 24th day of September, 1886.
Present—Commissioners French, Porter, McClave, and Voorhis.

Leaves of Absence Granted.

Captain Charles McDonnell, Eighth Precinct, five days, half-pay.

Patrolman Louis Degan, Third Precinct, thirty days, half-pay.

“ Henry B. Schryver, Seventh Precinct, two days, half-pay.

“ Robert F. Dempsey, Tenth Precinct, thirty days, half-pay.

Report of the Chief Clerk on proposals for building the new Twenty-eighth Precinct Station-house, was referred to Commissioners Voorhis and McClave.

Report of Surgeon Fluhrer on condition of Patrolman Joseph Hode, Thirteenth Precinct, was referred to the Chief Clerk to prefer charges.

Report of Surgeon Dexter on condition of Patrolman Charles B. Jenny, Sixth Precinct, was referred to the Board of Surgeons for report.

Death Reported.

Doorman Bradley Hall, Seventh Precinct, on 23d instant.

Applications Ordered on File.

Roundsman John Clark, Eleventh Precinct, for Civil Service examination for promotion.

Patrick H. Lynch, for appointment papers.

The following applications for permission to take vacation after October 15, were granted, provided they be not absent on registration and election days:

Sergeant Chas. F. Williams, Second Court.

“ Andrew Doyle, Eleventh Precinct.

Patrolman Abram Quick, Ninth Precinct.

Application of Coroner M. J. B. Messemmer for appointment of Jacob A. Lehman as Special Patrolman was referred to the Superintendent for report.

Application of Herman Sulzer for permit for masked ball at Sulzer’s Casino on 27th instant, was referred to the Counsel to the Corporation for opinion, calling attention to resolution of July 13, 1886.

Communication from Joseph Schwartz relative to complaint against Patrolman George L. Arfken, Tenth Precinct, was referred to the Chief Clerk to answer.

Communications Referred to the Superintendent.

Commissioner Street Cleaning—Complaining that fruit dealers on Hester, Ludlow, Orchard and Essex streets, dump decayed fruit and vegetables into the gutters.

Henry & Christ—Inclosing circular of C. & H. Marsh, recipes for manufacturing liquors.

Transfers.

Patrolman Israel W. Miller, from Sanitary Company to — by Superintendent.

“ James Nealis, from Tenth Precinct to Sanitary Company.

“ Eugene Moran, from Eighteenth Precinct to Twenty-ninth Precinct.

“ Patrick Glynn, from Seventh Precinct to Twenty-third Precinct.

“ Edward Sweeney, from Seventeenth Precinct to Twelfth Precinct.

“ George Grace, from Seventeenth Precinct to Second Precinct.

“ Isaac V. Partington, from Twentieth Precinct to Thirtieth Precinct.

“ John Shannon, Twenty-ninth Precinct to Twenty-third Precinct.

“ George Issing, Tenth Precinct to Seventeenth Precinct.

“ Patrick Hart, from Eighth Precinct to Thirtieth Precinct.

Employed on Probation.

John Kennelly.

Edward W. Lammis.

Appointed Patrolmen.

Precinct.		Precinct.	
John H. Thompson.....	1	John E. Miller.....	29
Patrick F. Gilmartin.....	6	George E. Cummings.....	31
John M. DeLay.....	8	Frederick D. Robbins.....	33

Advanced to Second Grade.

Patrolmen, Charles Reiser, Eighth Precinct, from September, 15, 1886.

“ Richard J. Cogan, Fifteenth Precinct, from September 24, 1886.

“ James J. Perkins, Twenty-ninth Precinct, from September 24, 1886.

Resolved, That full pay while sick be and is hereby granted to Patrolman, Lawrence Connolly, Thirty-fifth Precinct, eight days, from May 31, 1886.

Resolved, That William J. Wheaton, William Bloss, Frank Flynn, Moses Yeager, and Thomas F. Whalen, be granted a re-examination by the surgeons.

Resolved, That the style of winter hat heretofore adopted, and worn last year, be continued; and that E. M. Knox have permission to furnish them to members of the force, of the same style and quality, and at the same price (\$2.35), through the Bureau of Clothing and Equipment.

Bureau of Elections.

Resolved, That the persons named in list “C” be selected and appointed as Inspectors of Election in the several districts named, in the place and stead of those previously selected, approved and appointed who have resigned, and to fill vacancies; that said list be ordered on file in the Bureau of Elections, and the Chief of the Bureau to issue the necessary notices, and qualify them according to law.

ELECTION DISTRICT.	ASSEMBLY DISTRICT.	NAMES.	IN PLACE OF.	POLITICS.	CAUSE.
26	8	Chas. W. Hovey.....	.....	Republican....	Vacancy.
26	8	Louis Escude.....	.....	“	“
1	18	W. H. Richards.....	.....	“	“
3	21	Jas. Matthews.....	.....	“	“
14	21	Henry T. Smith.....	.....	“	“
49	22	Wm. Johnstone.....	.....	“	“
5	9	Robert H. Gregory.....	Jacob H. Forshay.....	“	Resigned
7	19	A. A. Manchester.....	George Marx.....	“	“
5	21	S. Derickson.....	Chas. Hartman.....	“	“
2	21	Theo. S. Connell.....	.....	“	Vacancy.
28	6	Geo. Rogers.....	Jas. McTurnay.....	“	Resigned.
28	6	Peter T. Gilligan.....	John Gilligan.....	“	“
13	24	Edw. H. Healy.....	Wm. Martin.....	“	“
30	24	Wm. Martin.....	Ed. H. Healy.....	“	“
1	5	Jos. Murphy.....	H. von Gerichten.....	“	“

WM. H. KIPP, Chief Clerk.

DEPARTMENT OF PUBLIC CHARITIES AND CORRECTION.

MEETINGS, SEPTEMBER 13 TO 18, 1886.

Communications Received.

From Penitentiary—List of prisoners received during week ending September 11, 1886: Males, 21; females, 6. On file.

List of 38 prisoners to be discharged from September 19 to 25, 1886. Transmitted to Prison Association.

From Lunatic Asylum, Blackwell’s Island—History of 19 patients received during week ending September 11, 1886. On file.

From N. Y. City Asylum for Insane, Ward’s Island—History of 9 patients received during week ending September 11, 1886. On file.

From City Prison—Amount of fines received during week ending September 11, 1886, \$396. On file.

From Acting Supervising Engineer—Recommending that the steamer “Bellevue” be sold at public auction, and that notices of the sale be mailed to engine and steamboat builders. Approved.

From General Storekeeper—Transmitting \$165.50, received for bones and coal-tar during August, 1886. To be deposited.

From Acting Supervising Engineer—Recommending acceptance of proposal of Woodward Pump Co. to repair Pump No. 6 for \$268.25. Approved.

From Penitentiary—List of twelve State convicts to be discharged during October, 1886, who are entitled to money, clothing and mileage. To Purchasing Agent.

Appointed.

September 13. Nellie Hart, Attendant, Branch Lunatic Asylum. Salary, \$192 per annum.

“ 13. Kate Mulligan, Attendant, Lunatic Asylum. Salary, \$192 per annum.

“ 13. William Twigg, Attendant, N. Y. City Asylum for Insane. Salary, \$150 per annum.

“ 15. Charles Bernard, Attendant, Randall’s Island Hospital. Salary, \$240 per annum.

“ 15. Jacob Pisback, Attendant, Bellevue Hospital. Salary, \$96 per annum.

“ 16. Richard Fitzhenry, Nurse, Homoeopathic Hospital. Salary, \$168 per annum.

“ 16. Anna M. Moran, Nurse, Hart’s Island Hospital. Salary, \$180 per annum.

“ 17. David Harris, Cook, Infants’ Hospital. Salary, \$360 per annum.

“ 17. Emma Twigg, Assistant to Nurse, Randall’s Island Hospital. Salary, \$120 per annum.

“ 18. Patrick Ward, Foreman, Bakery. Salary, \$168 per annum.

“ 18. Susan Beyer, Nurse, Charity Hospital. Salary, \$120 per annum.

Reappointed.

September 16. Kate Langdon, Nurse, Almshouse. Salary, \$144 per annum.

Resigned.

- September 13. J. H. Girdner, Assistant Physician, N. Y. City Asylum for Insane.
 " 14. Kate Mulligan, Attendant, Lunatic Asylum.
 " 14. Michael Leaden, Attendant, N. Y. City Asylum for Insane.
 " 14. James Finnell, Nurse, Homoeopathic Hospital.
 " 14. Thomas L. Fenn, Assistant Physician, Hart's Island Hospital.
 " 15. William Hanley, Cook, Randall's Island Hospital.
 " 16. William Twigg, Attendant, N. Y. City Asylum for Insane.
 " 16. Theodore Wiggins, Orderly, Charity Hospital.

Place Declared Vacant.

- September 13. James McCormack, Attendant, N. Y. City Asylum for Insane.
 " 17. John Ritchie, Attendant, N. Y. City Asylum for Insane.

Relieved from Duty.

- September 14. Catherine Egan, Attendant to Nurse, Randalls' Island Hospital.
 " 17. Kate McElgun, Nurse, Gouverneur Hospital.

Dismissed.

- September 15. Ellen Fitzgerald, Attendant, Lunatic Asylum.
 " 17. John Burns, Orderly, Bellevue Hospital.
 " 18. William McDonald, Foreman, Bakery.

Salary Increased.

- September 14. Joseph F. Kelly, Assistant Physician, Hart's Island Hospital, from \$400 to \$600 per annum.
 " 14. George A. Smith, Assistant Physician, Branch Lunatic Asylum, from \$600 to \$800 per annum.
 " 14. Frank A. E. Disney, Assistant Physician, Branch Lunatic Assylum, from \$400 to \$600 per annum.

Transferred.

- September 16. Ellen Hayden, Nurse, Bellevue Hospital to Almshouse. Salary reduced from \$180 to \$144 per annum.

G. F. BRITTON, Secretary.

APPROVED PAPERS.

Resolved, That the following-named persons be and they are hereby respectively reappointed to the office of Commissioner of Deeds in and for the City and County of New York, to date from the expiration of their present terms of office, viz.:

Benjamin W. Buchanan. Henry Lang.
 Russell A. Bigelow. Graham McAdam.
 Simson Wolf.

Resolved, That the following-named persons be and they are hereby appointed Commissioners of Deeds in and for the City and County of New York, in the places respectively of those whose names appear opposite, and whose terms of office have expired, viz.:

James A. Smith, in place of.....Stephen S. Blake.
 Julius Levy, ".....J. S. Conroy.
 David E. Babcock, ".....Richard M. Fleming.
 Ray C. Kayser, ".....Alexander Finelite.
 Austin E. Pressinger, ".....John J. Hopkins.
 John W. Nammack, ".....Julius Jackson.
 Charles Goldzier, ".....Louis J. Kaufman.
 Abraham Levy, ".....John Looman.
 William H. Sanford, ".....Almet R. Latson.
 Isidor Lazard, ".....James W. McLaughlin.
 Frederick Kropp, ".....Henry E. Nugent.
 Eben Grant Marsh, ".....Jacob Rutz.
 Charles E. Mathews, ".....H. Rosenthal.
 Siegmund Rothschild, ".....Patrick J. Roon.
 B. P. Benjamin, ".....William Wetterer.
 Charles I. White, ".....William H. Schooley.
 Julius M. Mayer, ".....Alexander V. Campbell.
 Henry E. Vaughan, ".....George B. Stone.

Resolved, That the following-named persons be and they are hereby appointed Commissioners of Deeds in and for the City and County of New York, in the places respectively of those whose names appear opposite, who were recently appointed, but failed to qualify, viz.:

William Groesser, in place of.....Samuel Wolf.
 Alfred J. Dickerson, ".....Thomas F. Kearney.
 John Kerr, ".....Frank Mead.
 John S. Bacon, ".....D. Ulan.
 John H. Waterman, ".....Joseph Weill.
 E. L. Reynolds, ".....Simon Weinberg.

Resolved, That William Randall be and he is hereby appointed a Commissioner of Deeds in and for the City and County of New York, in place of George E. Lynch, deceased.

Adopted by the Board of Aldermen, September 22, 1886.

Resolved, That permission be and the same is hereby given to George H. Huber to erect two ornamental lamp-posts and lamps, the same to be enclosed by wooden frames three feet long by two feet wide, to be used as bill-boards, in front of the entrance to Nos. 106 and 108 East Fourteenth street, the work be done and gas supplied at his own expense, under the direction of the Commissioner of Public Works; such permission to continue only during the pleasure of the Common Council.

Adopted by the Board of Aldermen, August 31, 1886.

Received from his Honor the Mayor, September 8, 1886, with his objections thereto.

In Board of Aldermen, September 22, 1886, taken up, reconsidered, as provided in section 75, chapter 410, Laws of 1882, and adopted, notwithstanding the objections of his Honor the Mayor, three-fourths of all the members elected voting in favor thereof.

Resolved, That permission be and the same is hereby given to William Pilger to place and keep a stand for the sale of fruit on the sidewalk, near the curb, in front of No. 263 East Houston street, provided such stand shall not be an obstruction to the free use of the street by the public, nor exceed six feet long by four feet wide; such permission to continue only during the pleasure of the Common Council.

Adopted by the Board of Aldermen, August 31, 1886.

Received from his Honor the Mayor, September 8, 1886, with his objections thereto.

In Board of Aldermen, September 22, 1886, taken up, reconsidered, as provided in section 75, chapter 410, Laws of 1882, and adopted, notwithstanding the objections of his Honor the Mayor, three-fourths of all the members elected voting in favor thereof.

Resolved, That permission be and the same is hereby given to Owen Martin to place and keep a stand for the sale of fruit on the sidewalk, near the curb, in front of northwest corner of First avenue and Eleventh street, provided such stand shall not be an obstruction to the free use of the street by the public, nor exceed six feet long by four feet wide; such permission to continue only during the pleasure of the Common Council.

Adopted by the Board of Aldermen, August 31, 1886.

Received from his Honor the Mayor, September 8, 1886, with his objections thereto.

In Board of Aldermen, September 22, 1886, taken up, reconsidered, as provided in section 75, chapter 410, Laws of 1882, and adopted, notwithstanding the objections of his Honor the Mayor, three-fourths of all the members elected voting in favor thereof.

Resolved, That a crosswalk be laid across Washington street, of two courses of blue stone, on a line parallel with the sidewalk on the northerly side of Cedar street, under the direction of the Commissioner of Public Works.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That One Hundred and Thirty-fifth street, from Willis avenue to Brown place, be regulated and graded, the curb-stones set and sidewalks flagged a space four feet wide through the centre thereof, under the direction of the Commissioners of the Department of Public Parks; and that the accompanying ordinance therefor be adopted.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That the vacant lots on the west side of Willis avenue, between One Hundred and Thirty-fourth and One Hundred and Thirty-fifth streets, be fenced in, under the direction of the Commissioners of the Department of Public Parks; and that the accompanying ordinance therefor be adopted.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That Eighty-seventh street, from Madison avenue to Park avenue, be paved with granite-block pavement, under the direction of the Commissioner of Public Works; and that the accompanying ordinance therefor be adopted.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That a crosswalk of two courses of blue stone be laid across Pleasant avenue at or near the northerly and southerly intersections of One Hundred and Fifteenth street, parallel and within the lines of the sidewalks on both sides of said street, under the direction of the Commissioner of Public Works; and that the accompanying ordinance therefor be adopted.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That a crosswalk of three courses of blue-stone be laid across West street, on a line parallel with the northerly crosswalk of Jay street, opposite the entrance to the depot of the West Shore Railroad Company, under the direction of the Commissioner of Public Works.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That permission be and the same is hereby given to the Lyceum Theatre, Fourth avenue and Twenty-third street, to place two iron rods, not more than six feet in height and three inches in diameter, each surmounted by a small lamp, on the sidewalk near the curb, the work done at his own expense, under the direction of the Commissioner of Public Works; such permission to continue only until the 18th of October, 1886.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That the curb and gutter stones be set and the sidewalks flagged a space four feet wide through the centre thereof of Ninetieth street, from Eighth to Ninth avenue, under the direction of the Commissioner of Public Works; and that the accompanying ordinance therefor be adopted.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That Croton-mains be laid in One Hundred and First street, from Third to Fourth avenue, as provided in section 356 of the New York City Consolidation Act.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That Croton-mains be laid in Ninety-ninth street, from First avenue east to the bulk-head-line, as provided in section 356 of the New York City Consolidation Act.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That Croton water-pipes be laid in One Hundredth street, from Second to Third avenue, as provided in section 356 of the New York City Consolidation Act.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

Resolved, That Croton water-pipes be laid in Sixty-eighth street, between Ninth avenue and the Boulevard, as provided in section 356 of the New York City Consolidation Act.

Adopted by the Board of Aldermen, September 8, 1886.

Approved by the Mayor, September 25, 1886.

EXECUTIVE DEPARTMENT.

MAYOR'S OFFICE,
 NEW YORK, January 7, 1886.

Pursuant to section 9 of chapter 339, Laws of 1883, I hereby designate
 "New York Times" and the "Daily News"
 two of the daily newspapers printed in the City of New York, in which notice of each sale of unredeemed pawns or pledges by public auction in said city, by pawnbrokers, shall be published for at least six days previous thereto, until otherwise ordered.

W. R. GRACE, Mayor.

MAYOR'S OFFICE,
 NEW YORK, December 31, 1885.

In pursuance of the ordinance, approved April 30, 1877, and amended June 1, 1877, entitled, "An ordinance to prevent the danger of hydrophobia to any of the inhabitants of the City of New York," notice is hereby given that all Dogs found at large in the City of New York on and after January 1, contrary to such ordinance, will be seized and disposed of as provided therein.

The Dog Pound at the foot of Sixteenth street, East river, is hereby designated as the place where dogs so captured must be delivered to the Keeper thereof. The Pound will be open from eight o'clock A. M. until five o'clock P. M. daily, Sundays excepted, on and after the first day of January, 1886.

WM. R. GRACE,
 Mayor.

OFFICIAL DIRECTORY.

STATEMENT OF THE HOURS DURING WHICH all the Public Offices in the City are open for business, and at which each Court regularly opens and adjourns, as well as of the places where such offices are kept and such Courts are held; together with the heads of Departments and Courts.

EXECUTIVE DEPARTMENT.

Mayor's Office.
 No. 6 City Hall, 10 A. M. to 3 P. M.
 WILLIAM R. GRACE, Mayor; WILLIAM L. TURNER, Secretary and Chief Clerk.

Mayor's Marshal's Office
 No. 1 City Hall, 9 A. M. to 4 P. M.
 THOMAS W. BYRNES, First Marshal.
 GEORGE W. BROWN, Jr., Second Marshal.

COMMISSIONERS OF ACCOUNTS.
 Rooms 114 and 115, Stewart Building, 9 A. M. to 4 P. M.
 WM. PITT SHEARMAN, J. B. ADAMSON.

AQUEDUCT COMMISSIONERS
 Room 209, Stewart Building, 5th floor, 9 A. M. to 5 P. M.
 JAMES C. SPENCER, President; JOHN C. SHEEHAN, Secretary; BENJAMIN S. CHURCH, Chief Engineer; J. C. LULLEY, Auditor.

BOARD OF ARMORY COMMISSIONERS.
 THE MAYOR, Chairman; PRESIDENT OF DEPARTMENT OF TAXES AND ASSESSMENTS, Secretary.
 Address M. COLEMAN, Staats Zeitung Building, Tryon Row. Office hours, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.

LEGISLATIVE DEPARTMENT.
 Office of Clerk of Common Council
 No. 8 City Hall, 10 A. M. to 4 P. M.
 ROBERT B. NOONEY, President Board of Aldermen.
 FRANCIS J. TWOMEY, Clerk Common Council.

City Library.
 No. 12 City Hall, 10 A. M. to 4 P. M.
 BERNARD JACOBS, City Librarian.

DEPARTMENT OF PUBLIC WORKS.
 Commissioner's Office.
 No. 31 Chambers street, 9 A. M. to 4 P. M.
 JOHN NEWTON, Commissioner; D. LOWBER SMITH, Deputy Commissioner.

Bureau of Chief Engineer.

No. 31 Chambers street, 9 A. M. to 4 P. M.
GEORGE W. BIRDSALL, Chief Engineer.

Bureau of Water Register.

No. 31 Chambers street, 9 A. M. to 4 P. M.
JOHN H. CHAMBERS, Register.

Bureau of Street Improvements.

No. 31 Chambers street, 9 A. M. to 4 P. M.
WM. M. DEAN, Superintendent.

Engineer-in-Charge of Sewers.

No. 31 Chambers street, 9 A. M. to 4 P. M.
HORACE LOOMIS, Engineer-in-Charge.

Bureau of Repairs and Supplies.

No. 31 Chambers street, 9 A. M. to 4 P. M.
THOMAS H. MCAVOY, Superintendent.

Bureau of Water Purveyor.

No. 31 Chambers street, 9 A. M. to 4 P. M.
ALSTON CULVER, Water Purveyor.

Bureau of Lamps and Gas.

No. 31 Chambers street, 9 A. M. to 4 P. M.
STEPHEN MCCORMICK, Superintendent.

Bureau of Streets.

No. 31 Chambers street, 9 A. M. to 4 P. M.
GEO. E. BABCOCK, Superintendent.

Bureau of Incumbrances.

No. 31 Chambers street, 9 A. M. to 4 P. M.
GEO. A. McDERMOTT, Superintendent.

Keeper of Buildings in City Hall Park.

MARTIN J. KESSE, City Hall.

FINANCE DEPARTMENT.**Comptroller's Office.**

No. 15 Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
EDWARD V. LOEW, Comptroller; RICHARD A. STORRS, Deputy Comptroller.

Auditing Bureau.

Nos. 10, 21, 23 Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
WM. J. LYON, Auditor of Accounts; DAVID E. AUSTEN, Deputy Auditor.

Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents.

Nos. 31, 33, 35, 37, 39 Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
ARTEMAS S. CADY, Collector of Assessments and Clerk of Arrears.

Bureau for the Collection of City Revenue and of Markets.

Nos. 1 and 3 Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
JAMES J. KELSO, Collector of the City Revenue and Superintendent of Markets.

Bureau for the Collection of Taxes.

First floor, Crown-stone Building, City Hall Park.
GEORGE W. McLEAN, Receiver of Taxes; ALFRED VREDENBURG, Deputy Receiver of Taxes.

Bureau of the City Chamberlain.

Nos. 25, 27 Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
WM. M. IVINS, City Chamberlain.

Office of the City Paymaster.

No. 33 Reade street, Stewart Building.
City Paymaster.

LAW DEPARTMENT.**Office of the Counsel to the Corporation.**

Staats Zeitung Building, third floor, 9 A. M. to 5 P. M. Saturdays, 9 A. M. to 4 P. M.
E. HENRY LACOMBE, Counsel to the Corporation; ANDREW T. CAMPBELL, Chief Clerk.

Office of the Public Administrator.

No. 49 Beekman street, 9 A. M. to 4 P. M.
RICHARD J. MORRISON, Public Administrator.

Office of the Corporation Attorney.

No. 49 Beekman street, 9 A. M. to 4 P. M.
WILLIAM A. BOYD, Corporation Attorney.

POLICE DEPARTMENT.**Central Office.**

No. 300 Mulberry street, 9 A. M. to 4 P. M.
STEPHEN B. FRENCH, President; WILLIAM H. KIPP, Chief Clerk; JOHN J. O'BRIEN, Chief Bureau of Elections.

DEPARTMENT OF CHARITIES AND CORRECTION.**Central Office.**

No. 66 Third avenue, corner Eleventh street, 8.30 A. M. to 5.30 P. M.
HENRY H. PORTER, President; GEORGE F. BRITTON, Secretary.

FIRE DEPARTMENT.

Office hours for all except where otherwise noted from 9 A. M. to 4 P. M. Saturdays, to 3 P. M.

Headquarters.

Nos. 155 and 157 Mercer street.
HENRY D. PURROY, President; CARL JUSSEN, Secretary.

Bureau of Chief of Department.

CHARLES O. SHAY, Chief of Department.

Bureau of Inspector of Combustibles.

PETER SEERY, Inspector of Combustibles.

Bureau of Fire Marshal.

GEORGE H. SHELTON, Fire Marshal.

Bureau of Inspection of Buildings.

ALBERT F. D'OECH, Superintendent of Buildings.

Attorney to Department.

WM. L. FINDLEY, Nos. 155 and 157 Mercer street.

Fire Alarm Telegraph.

J. ELLIOT SMITH, Superintendent of Telegraph, Nos. 155 and 157 Mercer street.
Central Office Fire Alarm Telegraph open at all hours.

Repair Shops.

Nos. 128 and 130 West Third street.
JOHN CASTLES, Foreman-in-Charge, 8 A. M. to 5 P. M.

Hospital Stables.

Ninety-ninth street, between Ninth and Tenth avenues.
JOSEPH SHEA, Foreman-in-Charge.
Open at all hours.

HEALTH DEPARTMENT.

No. 301 Mott street, 9 A. M. to 4 P. M.
ALEXANDER SHALER, President; EMMONS CLARK, Secretary.

DEPARTMENT OF PUBLIC PARKS.

Emigrant Industrial Savings Bank Building, Nos. 27 and 29 Reade street, 9 A. M. to 4 P. M.
HENRY R. BEEKMAN, President; CHARLES DE F. BURNS, Secretary.

Civil and Topographical Office.

Arsenal, Sixty-fourth street and Fifth avenue, 9 A. M. to 5 P. M.

Office of Superintendent of 23rd and 24th Wards.
One Hundred and Forty-sixth street and Third avenue, 9 A. M. to 5 P. M.

DEPARTMENT OF DOCKS.

Battery, Pier A, North River, 9 A. M. to 4 P. M.
L. J. N. STARK, President; B. W. ELLISON, Secretary.
Office hours from 9 A. M. to 4 P. M. daily, except Saturdays; on Saturdays as follows: from October 1 to June 1, from 9 A. M. to 3 P. M.; from June 1 to September 30, from 9 A. M. to 12 M.

DEPARTMENT OF TAXES AND ASSESSMENTS.

Staats Zeitung Building, Tryon Row, 9 A. M. to 4 P. M. Saturdays, 3 P. M.
MICHAEL COLEMAN, President; FLOYD T. SMITH, Secretary.

Office Bureau Collection of Arrears of Personal Taxes.
Brown-stone Building, City Hall Park, 9 A. M. to 4 P. M.
CHARLES S. BEARDSLEY, Attorney; WILLIAM COMBERFORD, Clerk.

DEPARTMENT OF STREET CLEANING.

Nos. 31 and 32 Park Row, "World" Building, Rooms 8 and 9, 9 A. M. to 4 P. M.
JAMES S. COLEMAN, Commissioner; JACOB SEABOLD, Deputy Commissioner; R. W. HORNER, Chief Clerk.

CIVIL SERVICE SUPERVISORY AND EXAMINING BOARDS.

Room No. 11, City Hall.
EVERETT P. WHEELER, Chairman of the Supervisory Board; LEE PHILLIPS, Secretary and Executive Officer.

BOARD OF ESTIMATE AND APPORTIONMENT.

Office of Clerk, Staats Zeitung Building, Room 5.
The MAYOR, Chairman; CHARLES V. ADEE, Clerk.

BOARD OF ASSESSORS.

Office, City Hall, Room No. 11½, 9 A. M. to 4 P. M.
EDWARD GILON, Chairman; WM. H. JASPER, Secretary.

BOARD OF EXCISE.

No. 24 Bon street, 9 A. M. to 4 P. M.
CHARLES H. WOODMAN, President; DAVID S. WHITE, Secretary and Chief Clerk.

SHERIFF'S OFFICE.

Nos. 3 and 4 New County Court-house, 9 A. M. to 4 P. M.
HUGH J. GRANT, Sheriff; JOHN B. SEXTON, Under Sheriff; BERNARD F. MARTIN, Order Arrest Clerk.

REGISTER'S OFFICE.

East side City Hall Park, 9 A. M. to 4 P. M.
JOHN REILLY, Register; JAMES A. HANLEY, Deputy Register.

COMMISSIONER OF JURORS.

Room 127, Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
CHARLES REILLY, Commissioner; JAMES E. CONNER, Deputy Commissioner.

COUNTY CLERK'S OFFICE.

Nos. 7 and 8 New County Court-house, 9 A. M. to 4 P. M.
JAMES A. FLACK, County Clerk; THOMAS F. GILROY, Deputy County Clerk.

DISTRICT ATTORNEY'S OFFICE.

Second floor, Brown-stone Building, City Hall Park, 9 A. M. to 4 P. M.
RANDOLPH B. MARTINE, District Attorney.

THE CITY RECORD OFFICE.

And Bureau of Printing, Stationery, and Blank Books.
No. 2 City Hall, 8 A. M. to 5 P. M., except Saturdays, on which days 8 A. M. to 3 P. M.
THOMAS COSTIGAN, Supervisor; R. P. H. ABELL, Book-keeper.

CORONERS' OFFICE.

Nos. 13 and 15 Chatham street, 8 A. M. to 5 P. M. Sundays and holidays, 8 A. M. to 12.30 P. M.
MICHAEL J. B. MESSMER, FERDINAND LEVY, FERDINAND EIDMAN, JOHN R. NUGENT, Coroners; JOHN T. TOAL, Clerk of the Board of Coroners.

SUPREME COURT.

Second floor, New County Court-house, opens at 10.30 A. M.
NOAH DAVIS, Presiding Justice; JAMES A. FLACK, Clerk; THOMAS F. GILROY, Deputy County Clerk.
General Term, Room No. 9, WILLIAM LAMB, Jr., Clerk.
Special Term, Part I., Room No. 10, HUGH DONNELLY, Clerk.
Special Term, Part II., Room No. 18, JOSEPH P. McDONOUGH, Clerk.
Chambers, Room No. 11, WALTER BRADY, Clerk.
Circuit, Part I., Room No. 12, SAMUEL BARRY, Clerk.
Circuit, Part II., Room No. 14, RICHARD J. SULLIVAN, Clerk.
Circuit, Part III., Room No. 13, GEORGE F. LYON, Clerk.
Circuit, Part IV., Room No. 15, J. LEWIS LYON, Clerk.
Judges' Private Chambers, Rooms Nos. 19 and 20, EDWARD J. KNIGHT, Librarian.

SUPERIOR COURT.

Third floor, New County Court-house, 11 A. M.
General Term, Room No. 35.
Special Term, Room No. 33.
Chambers, Room No. 33, 10 A. M.
Part I., Room No. 34.
Part II., Room No. 35.
Part III., Room No. 36.
Judges' Private Chambers, Room No. 30.
Naturalization Bureau, Room No. 32.
Clerk's Office, Room No. 31, 9 A. M. to 4 P. M.
JOHN SEDGWICK, Chief Judge; THOMAS BOESE, Chief Clerk.

COURT OF COMMON PLEAS.

Third floor, New County Court-house, 11 A. M.
Assignment Bureau, Room No. 23, 9 A. M. to 4 P. M.
Clerk's Office, Room No. 22, 9 A. M. to 4 P. M.
General Term, Room No. 24, 11 o'clock A. M. to adjournment.
Special Term, Room No. 21, 11 o'clock A. M. to adjournment.
Chambers, Room No. 21, 10.30 o'clock A. M. to adjournment.
Part I., Room No. 25, 11 o'clock A. M. to adjournment.
Part II., Room No. 26, 11 o'clock A. M. to adjournment.
Part III., Room No. 27, 11 o'clock A. M. to adjournment.
Naturalization Bureau, Room No. 23, 9 A. M. to 4 P. M.
RICHARD L. LARREMORE, Chief Justice; NATHANIEL JARVIS, Jr., Chief Clerk.

COURT OF GENERAL SESSIONS.

No. 32 Chambers street. Parts I. and II. Court opens at 11 o'clock A. M.
FREDERICK SMYTH, Recorder; HENRY A. GILDER-SLEEVE and RUFUS B. COWING, Judges of the said Court.
Terms, first Monday each month.
JOHN SPARKS, Clerk. Office, Room No. 11, 10 A. M. till 4 P. M.

CITY COURT.**City Hall.**

General Term, Room No. 20.
Trial Term, Part I., Room No. 20.
Part II., Room No. 19.
Part III., Room No. 15.
Special Term, Chambers, Room No. 21, 10 A. M. to 4 P. M.
Clerk's Office, Room No. 10, City Hall, 9 A. M. to 4 P. M.
DAVID MCADAM, Chief Justice; JOHN REID, Clerk.

OVER AND TERMINER COURT.

New County Court-house, second floor, southeast corner, Room No. 12. Court opens at 10½ o'clock A. M.
Clerk's Office, Brown-stone Building, City Hall Park, second floor, northwest corner, Room No. 11, 10 A. M. till 4 P. M.

COURT OF SPECIAL SESSIONS.

At Tombs, corner Franklin and Centre streets, daily at 10.30 A. M., excepting Saturday.
Clerk's Office, Tombs.

DISTRICT CIVIL COURTS.

First District—First, Second, Third and Fifth Wards, southwest corner of Centre and Chambers streets.
MICHAEL NORTON, Justice.
Clerk's office open from 9 A. M. to 4 P. M.

Second District—Fourth, Sixth and Fourteenth Wards, corner of Pearl and Centre streets, 9 A. M. to 4 P. M.
CHARLES M. CLANCY, Justice.

Third District—Ninth and Fifteenth Wards, southwest corner Sixth avenue and West Tenth street. Court open daily (Sundays and legal holidays excepted) from 9 A. M. to 4 P. M.
GEORGE W. PARKER, Justice.

Fourth District—Tenth and Seventeenth Wards, No. 30 First street, corner Second avenue. Court opens 9 A. M. daily; continues to close of business.
ALFRED STECKLER, Justice.

Fifth District—Seventh, Eleventh and Thirteenth Wards, No. 154 Clinton street.
JOHN H. MCCARTHY, Justice.

Sixth District—Eighteenth and Twenty-first Wards, No. 67 Union place, Fourth avenue, southwest corner of Eighteenth street. Court opens 9 A. M. daily; continues to close of business.
WILLIAM H. KELLY, Justice.

Seventh District—Nineteenth and Twenty-second Wards, No. 151 East Fifty-seventh street. Court opens every morning at 9 o'clock (except Sundays and legal holidays) and continues to the close of business.
AMBROSE MONELL, Justice.

Eighth District—Sixteenth and Twentieth Wards, southwest corner of Twenty-second street and Seventh avenue. Court opens at 9 A. M. and continues to close of business. Clerk's office open from 9 A. M. to 4 P. M. each court day.
FREDERICK G. GEDNEY, Justice.

Ninth District—Twelfth Ward, No. 225 East One Hundred and Twenty-fifth street.
HENRY P. MCGOWN, Justice.
Clerk's office open daily from 9 A. M. to 4 P. M. Trial days Tuesdays and Fridays. Court opens at 9½ A. M.

Tenth District—Twenty-third and Twenty-fourth Wards, corner of Third avenue and One Hundred and Fifty-eighth street.
Office hours, from 9 A. M. to 4 P. M. Court opens at 9 A. M.
ANDREW J. ROGERS, Justice.

Eleventh District—No. 919 Eighth avenue; Twenty-second Ward, and all that part of the Twelfth Ward lying south of One Hundred and Tenth street and west of Sixth avenue. Court open daily (Sundays and legal holidays excepted) from 9 A. M. to 4 P. M.
LEO C. DESSAR, Justice.

POLICE COURTS.

Judges—MAURICE J. POWER, J. HENRY FORD, JACOB PATTERSON, JR., JAMES T. KILBRETH, JOHN J. GORMAN, HENRY MURRAY, SOLON B. SMITH, ANDREW J. WHITE, CHARLES WELDE, DANIEL O'REILLY, PATRICK G. DUFFY.

GEORGE W. CREGIER, Secretary.

Office of Secretary, Fifth District Police Court, One Hundred and Twenty-fifth street, near Fourth avenue.

First District—Tombs, Centre street.

Second District—Jefferson Market.

Third District—No. 69 Essex street.

Fourth District—Fifty-seventh street, near Lexington avenue.

Fifth District—One Hundred and Twenty-fifth street, near Fourth avenue.

Sixth District—One Hundred and Fifty-eighth street and Third avenue.

FIRE DEPARTMENT.

HEADQUARTERS
FIRE DEPARTMENT, CITY OF NEW YORK,
155 & 157 MERCER STREET.
NEW YORK, May 12, 1885.

NOTICE IS HEREBY GIVEN THAT THE Board of Commissioners of this Department will meet daily, at 10 o'clock A. M., for the transaction of business.

By order of
HENRY D. PURROY, President.
RICHARD CROKER,
ELWARD SMITH,
Commissioners.

CARL JUSSEN,
Secretary.

ASSESSMENT COMMISSION.

NOTICE IS HEREBY GIVEN, THAT A MEETING of the Commissioners under the act, chapter 550 of the Laws of 1880, entitled "An act relating to certain assessments for local improvements in the City of New York," passed June 9, 1880, will be held at their office, No. 280 Broadway (Stewart Building), on Tuesday, September 28, 1886, at 2 o'clock, P. M.

DANIEL LORD, JR.,
ALLAN CAMPBELL,
JOSEPH GARRY,
JOHN W. MARSHALL,
Commissioners under the Act.

JAMES J. MARTIN, Clerk.

POLICE DEPARTMENT.

POLICE DEPARTMENT—CITY OF NEW YORK,
OFFICE OF THE PROPERTY CLERK (Room No. 9),
No. 300 MULBERRY STREET,
NEW YORK, 1885.
OWNERS WANTED BY THE PROPERTY
Clerk of the Police Department of the City of New York, No. 300 Mulberry street, Room No. 9, for the following property, now in his custody, without claimants: Boats, rope, iron, lead, male and female clothing, boots, shoes, wine, blankets, diamonds, canned goods, liquors, etc., also small amount money taken from prisoners and found by patrolmen of this Department.
JOHN F. HARRIOT,
Property Clerk.

DEPARTMENT OF PUBLIC CHARITIES AND CORRECTION.

DEPARTMENT OF PUBLIC CHARITIES AND CORRECTION,
No. 66 THIRD AVENUE.

TO CONTRACTORS.

PROPOSALS FOR GROCERIES, CROCKERY, DRY GOODS, WOODENWARE, HARDWARE, LEATHER, PAINTS AND OILS AND LUMBER.

SEALED BIDS OR ESTIMATES FOR FURNISHING

GROCERIES.
6,500 pounds Dairy Butter, sample on exhibition Thursday, October 7, 1886.
1,000 pounds Cheese.
1,000 pounds Dried Apples.
3,000 pounds Rio Coffee, roasted.
2,000 pounds Wheaten Grits, price to include packages.
2,000 pounds Hominy, price to include packages.
3,600 pounds Oatmeal, price to include packages.
4,000 pounds Rice.
12,000 pounds Brown Sugar.
1,000 pounds Cut-loaf Sugar.
1,500 pounds Granulated Sugar.
2,000 pounds Oolong Tea.
100 bushels Beans.
100 bushels Rye.
300 bushels Oats, 32 pounds net per bushel.
50 bags Coarse Meal, 120 pounds net each.
30 bags Fine Meal, 100 pounds net each.
100 bales prime quality Long Bright Rye Straw, tare not to exceed three pounds, weight charged as received at Blackwell's Island.
30 pieces prime quality City cured Bacon, to average about 6 pounds each.
50 prime City cured Smoked Hams, to average about 14 pounds each.
20 prime City cured Smoked Tongues, to average about 6 pounds each.
600 barrels good, sound Irish Potatoes, to weigh 168 pounds net per barrel.
20 dozen Canned String Beans.
10 dozen Chow Chow, pints, "C. & B."
3 dozen Olive Oil.
24 dozen Sea Foam.
2,451 dozen Fresh Eggs, all to be candled.
25 barrels Vinegar.
2,000 gallons Syrup.
12,000 pounds Brown Soap.

CROCKERY.
1 gross Chambers.
1 gross Bed Pans.
5 gross Tumblers.
1 gross Soup plates.

DRY GOODS.
25,000 yards Brown Muslin.
500 yards Crash Toweling.
1,000 yards Huck Toweling.
10,000 yards Ticking.
400 Women's Shawls.
50 White Spreads.

PAINTS AND OILS.
10,000 pounds pure white lead, ground in oil, free from all adulteration and any added impurities, and subject to analysis, if necessary, 75 100s, 40 50s, 20 25s.

500 pounds best quality Red Lead, 20 25s.
100 pounds best quality Prussian Blue, 25 25s, 50 1s.
100 pounds best quality Chrome Yellow, 25 25s, 50 1s.
200 pounds best quality Emerald Green, 8 25s.
10 barrels standard White Kerosene Oil, 150¢ test.

HARDWARE, WOODENWARE, ETC.
10 kegs best quality Cut Nails, 4d.
6 dozen Stove Brushes.
5 dozen Wash Boards.
10 gross Shoe Blacking.
108 pounds Sail Twine.
10 bundles best quality Galvanized Iron, No. 24, 24 x 84.

LEATHER.
126 sides Good Damaged Sole Leather, to average about 22 to 25 pounds.
105 sides prime quality Waxed Kip Leather, to average about 11 feet.
100 sides prime quality Waxed Upper Leather, to average about 17 feet.
1,000 pounds Offal Leather.
200 bunches Leather Laces.

LUMBER.
2,500 square feet first quality cone or vertical grained, thoroughly seasoned Georgia Yellow Pine Flooring, 1½ x 3½ inches, tongued and grooved, dressed one side.
2,500 square feet first quality cone or vertical grained, thoroughly seasoned Georgia Yellow Pine Flooring, 1½ x 4½ inches, tongued and grooved, dressed one side.
2,000 square feet first quality thoroughly seasoned White Pine Ceiling Boards, ¾ x 4½ x 16 feet, tongued, grooved and beaded, dressed one side.
1,000 square feet first quality Clear White Pine, ¾ x 12 to 16 inch wide x 12 to 16 feet long, dressed both sides.
750 lineal feet first quality thoroughly seasoned Clear White Pine Ceiling, ¾ x 3½" tongued and grooved. Beaded and dressed one side.
1,000 square feet first quality Clear White Pine, ¾ x 14", dressed both sides.

All lumber to be delivered at Blackwell's Island.
—will be received at the Department of Public Charities and Correction, in the City of New York, until 9.30 o'clock A. M. of Friday, October 8, 1886. The person or persons making any bid or estimate shall furnish the same in a sealed envelope, indorsed "Bid or Estimate for Groceries, Dry Goods, Woodenware, Crockery, Paints and Oils, Hardware, Leather and Lumber," with his or their name or names, and the date of presentation, to the head of said Department, at the said office, on or before the day and hour above named, at which time and place the bids or estimates received will be publicly opened by the President of said Department and read.

THE BOARD OF PUBLIC CHARITIES AND CORRECTION RESERVES THE RIGHT TO REJECT ALL BIDS OR ESTIMATES IF DEEMED TO BE FOR THE PUBLIC INTEREST, AS PROVIDED IN SECTION 64, CHAPTER 410, LAWS OF 1882.
No bid or estimate will

person or persons to whom the contract may be awarded will be required to give security for the performance of the contract by his or their bond, with two sufficient sureties, in the penal amount of fifty (50) per cent. of the estimated amount of the contract.

Each bid or estimate shall contain and state the name and place of residence of each of the persons making the same; the names of all persons interested with him or them therein; and if no other person be so interested, it shall distinctly state that fact; also that it is made without any connection with any other person making an estimate for the same purpose, and is in all respects fair and without collusion or fraud; and that no member of the Common Council, Head of a Department, Chief of a Bureau, Deputy thereof, or Clerk therein, or other officer of the Corporation, is directly or indirectly interested therein or in the supplies or work to which it relates, or in any portion of the profits thereof. The bid or estimate must be verified by the oath, in writing, of the party or parties making the estimate, that the several matters stated therein are in all respects true. Where more than one person is interested, it is requisite that the verification be made and subscribed by all the parties interested.

Each bid or estimate shall be accompanied by the consent, in writing, of two householders or freeholders in the City of New York, with their respective places of business or residence, to the effect that if the contract be awarded to the person making the estimate, they will, on its being so awarded, become bound as his sureties for its faithful performance; and that if he shall omit or refuse to execute the same, they shall pay to the Corporation any difference between the sum to which he would be entitled on its completion and that which the Corporation may be obliged to pay to the person or persons to whom the contract may be awarded at any subsequent letting. The consent above mentioned shall be accompanied by the oath or affirmation, in writing, of each of the persons signing the same that he is a householder or freeholder in the City of New York, and is worth the amount of the security required for the completion of this contract, over and above all his debts of every nature, and over and above his liabilities, as bail, surety, or otherwise; and that he has offered himself as surety in good faith and with the intention to execute the bond required by section 12 of chapter 7 of the Revised Ordinances of the City of New York, if the contract shall be awarded to the person or persons for whom he consents to become surety. The adequacy and sufficiency of the security offered to be approved by the Comptroller of the City of New York.

No bid or estimate will be considered unless accompanied by either a certified check upon one of the National Banks of the City of New York, drawn to the order of the Comptroller, or money, to the amount of five per centum of the amount of the security required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the estimate, but must be handed to the officer or clerk of the Department who has charge of the Estimate-box, and no estimate can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that of the successful bidder, will be returned to the persons making the same, within three days after the contract is awarded. If the successful bidder shall refuse or neglect, within five days after notice that the contract has been awarded to him, to execute the same, the amount of the deposit made by him shall be forfeited to and retained by the City of New York, as liquidated damages for such neglect or refusal; but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

Should the person or persons to whom the contract may be awarded neglect or refuse to accept the contract within five days after written notice that the same has been awarded to his or their bid or proposal, or if he or they accept but do not execute the contract and give the proper security, he or they shall be considered as having abandoned it and as in default to the Corporation, and the contract will be readvertised and relet as provided by law.

The quality of the articles, supplies, goods, wares, and merchandise must conform in every respect to the samples of the same, on exhibition, at the office of the said Department. Bidders are cautioned to examine the specifications for particulars of the articles, etc., required, before making their estimates.

Bidders will state the price for each article, by which the bids will be tested.

Bidders will write out the amount of their estimate in addition to inserting the same in figures.

Payment will be made by a requisition on the Comptroller, in accordance with the terms of the contract, from time to time, as the Commissioners may determine.

Bidders are informed that no deviation from the specifications will be allowed, unless under the written instruction of the Commissioners of Public Charities and Correction.

No bid or estimate will be accepted from, or a contract awarded to, any person who is in arrears to the Corporation upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to the Corporation.

The form of the agreement, including specifications, and showing the manner of payment, can be obtained at the office of the Department.

Dated New York, September 27, 1886.

HENRY H. PORTER, President,
THOMAS S. BRENNAN, Commissioner,
CHARLES E. SIMMONS, Commissioner,
Public Charities and Correction.

DEPARTMENT OF PUBLIC CHARITIES AND CORRECTION,
No. 66 THIRD AVENUE.

TO CONTRACTORS.

PROPOSALS FOR FLOUR.

SEALED BIDS OR ESTIMATES FOR FURNISHING and delivering, free of all expense, at the Bakehouse dock, Blackwell's Island (east side), 4,000 barrels extra Wheat Flour, in lots of 500 to 1,000 barrels, one-half of each quality, as follows:

2,000 barrels of sample marked No. 1.
2,000 barrels of sample marked No. 2.

—will be received at the office of the Department of Public Charities and Correction, No. 66 Third Avenue, in the City of New York, until 9 o'clock A.M., Tuesday, October 8, 1886. The person or persons making any bid or estimate shall furnish the same in a sealed envelope, indorsed "Bid or Estimate for Flour," and with his or their name or names, and the date of presentation, to the head of said Department, at the said office, on or before the day and hour above named, at which time and place the bids or estimates received will be publicly opened by the President of said Department, and read.

The contractor shall furnish a certificate of inspection by the Flour Inspector of the New York Produce Exchange, also an award from the Committee on Flour of the Exchange, that the flour offered is equal to the standards of the Department, and which certificate shall accompany each delivery of flour, the expense of such inspection and award to be borne by the contractor, also certificate of weight and tare to be furnished with each delivery.

THE BOARD OF PUBLIC CHARITIES AND CORRECTION RESERVES THE RIGHT TO REJECT ALL BIDS OR ESTIMATES IF DEEMED TO BE FOR THE PUBLIC INTEREST, AS PROVIDED IN SECTION 64, CHAPTER 410, LAWS OF 1882.

No bid or estimate will be accepted from, or contract awarded to, any person who is in arrears to the Corporation upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to the Corporation.

The award of the contract will be made as soon as practicable after the opening of the bids.

Delivery will be required to be made from time to time, and in such quantities as may be directed by the said Commissioners.

Any bidder for this contract must be known to be engaged in and well prepared for the business, and must have satisfactory testimonials to that effect; and the person or persons to whom the contract may be awarded will be required to give security for the performance of the contract by his or their bond, with two sufficient sureties, each in the penal amount of fifty (50) per cent. of the ESTIMATED amount of the contract.

Each bid or estimate shall contain and state the name and place of residence of each of the persons making the same; the names of all persons interested with him or them therein; and if no other person be so interested, it shall distinctly state that fact; also that it is made without any connection with any other person making an estimate for the same purpose, and is in all respects fair and without collusion or fraud; and that no member of the Common Council, Head of a Department, Chief of a Bureau, Deputy thereof, or Clerk therein, or other officer of the Corporation, is directly or indirectly interested therein, or in the supplies or work to which it relates, or in any portion of the profits thereof. The bid or estimate must be verified by the oath, in writing, of the party or parties making the estimate, that the several matters stated therein are in all respects true. Where more than one person is interested, it is requisite that the verification be made and subscribed by all the parties interested.

Each bid or estimate shall be accompanied by the consent, in writing, of two householders or freeholders in the City of New York, with their respective places of business or residence, to the effect that if the contract be awarded to the person making the estimate, they will, on its being so awarded, become bound as his sureties for its faithful performance; and that if he shall omit or refuse to execute the same, they shall pay to the Corporation any difference between the sum to which he would be entitled on its completion and that which the Corporation may be obliged to pay to the person or persons to whom the contract may be awarded at any subsequent letting; the amount in each case to be calculated upon the estimated amount of the work by which the bids are tested. The consent above mentioned shall be accompanied by the oath or affirmation, in writing, of each of the persons signing the same, that he is a householder or freeholder in the City of New York, and is worth the amount of the security required for the completion of this contract, over and above all his debts of every nature, and over and above his liabilities as bail, surety or otherwise; and that he has offered himself as a surety in good faith and with the intention to execute the bond required by section 12 of chapter 7 of the Revised Ordinances of the City of New York, if the contract shall be awarded to the person or persons for whom he consents to become surety. The adequacy and sufficiency of the security offered to be approved by the Comptroller of the City of New York.

No bid or estimate will be considered unless accompanied by either a certified check upon one of the National Banks of the City of New York, drawn to the order of the Comptroller, or money, to the amount of five per centum of the amount of the security required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the estimate, but must be handed to the officer or clerk of the Department who has charge of the Estimate-box, and no estimate can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that of the successful bidder, will be returned to the persons making the same within three days after the contract is awarded. If the successful bidder shall refuse or neglect, within five days after notice that the contract has been awarded to him, to execute the same, the amount of the deposit made by him shall be forfeited to and retained by the City of New York, as liquidated damages for such neglect or refusal; but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

Should the person or persons to whom the contract may be awarded neglect or refuse to accept the contract within five days after written notice that the same has been awarded to his or their bid or proposal, or if he or they accept but do not execute the contract and give the proper security, he or they shall be considered as having abandoned it, and as in default to the Corporation; and the contract will be readvertised and relet as provided by law.

The quality of the articles, supplies, goods, wares, and merchandise must conform in every respect to the samples of the same on exhibition at the office of the said Department. Bidders are cautioned to examine the specifications for particulars of the articles, etc., required, before making their estimates.

Bidders will state the prices for each article, by which the bids will be tested.

Bidders will write out the amount of their estimate in addition to inserting the same in figures.

Payment will be made by a requisition on the Comptroller, issued on the completion of the contract, or from time to time, as the Commissioners may determine.

Bidders are informed that no deviation from the specifications will be allowed, unless under the written instruction of the Commissioners of Public Charities and Correction.

The form of the agreement, including specifications, and showing the manner of payment, can be obtained at the office of the Department.

Dated New York, September 27, 1886.

HENRY H. PORTER,
THOMAS S. BRENNAN,
CHARLES E. SIMMONS,
Commissioners of the Department of
Public Charities and Correction.

DEPARTMENT OF PUBLIC CHARITIES AND CORRECTION,
No. 66 THIRD AVENUE,
NEW YORK, September 27, 1886.

IN ACCORDANCE WITH AN ORDINANCE OF the Common Council, "In relation to the burial of strangers or unknown persons who may die in any of the public institutions of the City of New York," the Commissioners of Public Charities and Correction report as follows:

At Morgue, Bellevue Hospital—From foot of Duane street; unknown man; aged about 30 years; 5 feet 8 inches high; dark brown hair; red beard. Had on blue check gingham shirt, gray knit undershirt, brown check pants, striped socks, laced shoes; badge No. 26, Public Porter, found on his person.

Unknown man from foot of Thirty-second street, East river; aged about 30 years; 5 feet 6 inches high; brown hair; sandy moustache. Had on brown check suit, white shirt, red flannel drawers and undershirt, white cotton socks, gaiters; \$6.24, pin, six keys found on his person.

Unknown man from One Hundred and Fifteenth street and Fourth avenue; aged about 35 years; 5 feet 10 inches high; dark brown hair; sandy moustache; brown eyes. Had on dark gray coat, brown check vest, dark striped pants, white shirt, balbriggan undershirt, boots. Run over by train of Harlem Railroad.

Unknown man from foot of Twenty-third street, East river; aged about 35 years; 5 feet 9 inches high; brown hair; sandy moustache. Had on dark check coat and vest, dark mixed pants, check calico shirt, white knit undershirt, gray woolen socks, gaiters.

Unknown man from Bellevue Hospital; aged about 35 years; 5 feet 7 inches high; dark brown hair; gray moustache. Had on blue flannel pants, brown striped shirt, blue check jumper, one laced shoe, one brogan shoe.

At Lunatic Asylum, Blackwell's Island—Rosanna Hughes; aged 63 years; 5 feet 2 inches high; gray hair and eyes.

At Homeopathic Hospital, Ward's Island—John Harvey; aged 55 years; 5 feet 5 inches high; black eyes and hair. Had on when admitted black coat and vest, dark mixed pants, laced shoes, black derby hat.

Louisa Schull; aged 37 years; 5 feet 1 inch high; brown eyes; gray hair.

At Idiot Asylum, Randall's Island—Oliver C. Hunter; aged 26 years; 6 feet 1 inch high; dark hair; hazel eyes.

Nothing known of their friends or relatives.

By order,

G. F. BRITTON,
Secretary.

DEPARTMENT OF PUBLIC AND CHARITIES CORRECTION,
No. 66 THIRD AVENUE,
NEW YORK, September 13, 1886.

IN ACCORDANCE WITH AN ORDINANCE OF the Common Council, "In relation to the burial of strangers or unknown persons who may die in any of the public institutions of the City of New York," the Commissioners of Public Charities and Correction report as follows:

At Morgue, Bellevue Hospital, from 727 Tenth avenue—unknown man; aged about 30 years; 5 feet 8 inches high; brown hair; gray eyes; sandy moustache and beard, about one week's growth. Had on black diagonal coat and pants, blue flannel shirt, buckled brogan shoes, brogan shoes.

Unknown man, from 356 Bowery; aged about 55 years; 5 feet 8 inches high; gray hair. Had on black diagonal coat, pants and vest, white shirt, white knit undershirt, white muslin drawers, white cotton socks, brogan shoes.

Unknown man, from Pier 47, East river; aged about 50 years; 5 feet 2 inches high; dark hair and moustache; dark eyes; pocked marked. Had on blue coat, pants and vest, blue flannel shirt, gray flannel drawers, brown woolen socks; figure of male and female tattooed on left arm, and name J. L. Miller, on right arm.

Unknown man, from One Hundred and Seventeenth street, North river; aged about 35 years; 5 feet 5 inches high; dark brown hair. Had on black coat, dark ribbed pants and vest, white shirt, white knit undershirt and drawers, white cotton socks, gaiters, gold ring with initials W. P. to F. C. November, 1876.

At Workhouse, Blackwell's Island—Otto Lang; aged 45 years. Committed July 27, 1886.

Luke Buisom; aged 34 years. Committed August 29, 1886.

At Lunatic Asylum, Blackwell's Island—Charlotte Walters; aged 56 years; 5 feet 2 inches high; gray hair; blue eyes.

At Homeopathic Hospital, Ward's Island—Mary Donnelly; aged 60 years; 5 feet 3 inches high; blue eyes; gray hair. Had on when admitted black alpaca skirt and sacque, black shawl, cloth gaiters, black silk bonnet.

James Cannon; aged 18 years; 5 feet 5½ inches high; brown hair and eyes. Had on when admitted black diagonal coat, pants and vest, laced shoes, white straw hat.

Nothing known of their friends or relatives.

By order

G. F. BRITTON,
Secretary.

JURORS.

NOTICE IN RELATION TO JURORS FOR STATE COURTS.

OFFICE OF THE COMMISSIONER OF JURORS,
ROOM 127, STEWART BUILDING,
CHAMBERS STREET AND BROADWAY,
NEW YORK, June 1, 1886.

APPLICATIONS FOR EXEMPTIONS WILL BE heard here, from 10 to 3 daily, from all persons hitherto liable or recently serving who have become exempt, and all needed information will be given.

Those who have not answered as to their liability, or proved permanent exemption, will receive a "jury enrollment notice," requiring them to appear before me this year. Whether liable or not, such notices must be answered (in person, if possible, and at this office only) under severe penalties. If exempt, the party must bring proof of exemption; if liable, he must also answer in person, giving full and correct name, residence, etc., etc. No attention paid to letters.

Persons "enrolled" as liable must serve when called or pay their fines. No mere excuse will be allowed or interference permitted. The fines if unpaid will be entered as judgments upon the property of the delinquents.

All good citizens will aid the course of justice, and secure reliable and respectable juries, and equalize their duty by serving promptly when summoned, allowing their clerks or subordinates to serve, reporting to me any attempt at bribery or evasion, and suggesting names for enrollment. Persons between sixty and seventy years of age, summer absentees, persons temporarily ill, and United States and District Court jurors are not exempt.

Every man must attend to his own notice. It is a misdemeanor to give any jury paper to another to answer. It is also punishable by fine or imprisonment to give or receive any present or bribe, directly or indirectly, in relation to a jury service, or to withhold any paper or make any false statement, and every case will be fully prosecuted.

CHARLES REILLY,
Commissioner of Jurors.

BOARD OF EDUCATION.

SEALED PROPOSALS WILL BE RECEIVED BY the Committee on Normal College, etc., at the Hall of the Board of Education, corner of Grand and Elm streets, until Monday, the 11th day of October, 1886, and until four o'clock P. M. on said day, for the materials and work for Altering Iron Railing, Granite Coping, etc., and for covering with Artificial Stone Pavement the surface (after the altering of railing, etc.) of the sidewalk on Lexington avenue, from the curb-line on Sixty-eighth street to the curb-line on Sixty-ninth street.

Plans and specifications may be seen at the office of the Superintendent of Schools Buildings, No. 146 Grand street, third floor.

Proposals will be received for the entire work on one contract.

The names of two responsible sureties to accompany each proposal; proposals will not be considered unless sureties are named, and are entirely satisfactory to the Committee.

The Committee reserves the right to reject any or all the proposals offered.

WILLIAM WOOD,
ISAAC BELL,
MILES M. O'BRIEN,
GUSTAV SCHWAB,
DE WITT J. SELIGMAN,
Committee on Normal College, etc.

Dated New York, September 21, 1886.

SEALED PROPOSALS WILL BE RECEIVED BY the School Trustees of the Ninth Ward, at the Hall of the Board of Education, No. 146 Grand street, until Monday, October 4, 1886, and until 4 o'clock P. M. on said day, for a new Steam Boiler, Repairs, etc., to Heating Apparatus for Grammar School Building No. 3, corner of Hudson and Grove streets.

Plans and specifications may be seen, and blanks for proposals and all necessary information may be obtained at the office of the Engineer, No. 146 Grand, corner of Elm street, third floor.

The party submitting a proposal, and the parties proposing to become sureties, must each write his name, place of residence, and place of business on said proposal. Two responsible and approved sureties, residents of this city, are required in all cases.

No proposal will be considered from persons whose character or antecedent dealings with the Board of Education render their responsibility doubtful.

The Committee reserve the right to reject any or all of the proposals submitted.

CHARLES S. WRIGHT,
GEORGE E. HORNE,
JAMES A. SEAMAN,
E. M. L. EHLENS,
E. J. TINSDALE,
Board of School Trustees, Ninth Ward.

Dated New York, September 21, 1886.

DEPARTMENT OF PUBLIC PARKS

DEPARTMENT OF PUBLIC PARKS,
Nos. 27 AND 29 READE ST.,
NEW YORK, September 16, 1886.

TO CONTRACTORS.

SEALED BIDS OR ESTIMATES FOR EACH OF the following-mentioned works, with the title of the work and the name of the bidder indorsed thereon, also the number of the work as in the advertisement, will be received by the Department of Public Parks, at its offices, Nos. 27 and 29 Reade street, until 11 o'clock A. M., on Wednesday, September 29, 1886:

No. 1. For Flagging the Sidewalks a space four feet wide, and Setting Curbstones and Laying Gutterstones in Forest (formerly Concord) avenue, between Westchester avenue and Home street.

No. 2. For Paving with Granite-block Pavement the Roadway of East One Hundred and Fiftieth street, from Mott avenue to Walton avenue, and Laying Crosswalks at the terminating avenues.

Special notice is given that the works must be bid for separately, that is, both works must not be included in the same estimate or envelope.

The nature and extent of each of the works, as near as it is possible to state them, in advance, is as follows:

NUMBER 1, ABOVE MENTIONED.

7,860 linear feet of new curbstone finished and set.
7,930 linear feet of new gutter-stone furnished and laid.
30,000 square feet of new flagging furnished and laid.
Also, the time required for the completion of the whole work, which will be tested at the rate of \$3 per day.

NUMBER 2, ABOVE MENTIONED.

885 square yards of new granite-block pavement.
200 square feet of new bridge-stones for crosswalks.

Also, the time required for the completion of the whole work, which will be tested at the rate of \$3.50 per day.

As the above-mentioned quantities, though stated with as much accuracy as is possible in advance, are approximate only, bidders are required to submit their estimates upon the following express conditions, which shall apply to and become part of every estimate received.

1. Bidders must satisfy themselves by personal examination of the location of the proposed work, and by such other means as they may prefer, as to the accuracy of the foregoing statement, and shall not at any time after the submission of an estimate dispute or complain of such statement nor assert that there was any misunderstanding in regard to the depth of the excavation to be made or the nature or amount of the work to be done.

2. Bidders will be required to complete the entire work to the satisfaction of the Department of Public Parks, and in substantial accordance with the specifications for the work and the plans therein referred to. No extra compensation beyond the amount payable for the several classes of work before enumerated, which shall be actually performed at the prices therefor, to be specified by the lowest bidder, shall be due or payable for the entire work.

The person making any bid or estimate must furnish the same inclosed in a sealed envelope, to the head of said Department, at his office, on or before the day and hour above mentioned.

The envelope must be indorsed with the name or names of the person presenting the same, the date of its presentation, and a statement of the work to which it relates.

The estimates received will be publicly opened by the head of the said Department at the place and hour last above mentioned and read.

Each bid or estimate shall contain and state the name and place of residence of each of the persons making the same; the names of all persons interested with him or them therein, and if no other person be so interested, it shall distinctly state that fact; that it is made without any connection with any other person making an estimate for the same purpose, and is in all respects fair and without collusion or fraud, and that no member of the Common Council, Head of a Department, Chief of a Bureau, Deputy thereof or Clerk therein, or other officer of the Corporation is directly or indirectly interested therein, or in the supplies or work to which it relates, or in any portion of the profits thereof. The bid or estimate must be verified by the oath, in writing, of the party or parties making the estimate, that the several matters stated therein are in all respects true. Where more than one person is interested, it is requisite that the verification be made and subscribed by all the parties interested.

Each bid or estimate shall be accompanied by the consent in writing of two householders or freeholders in the City of New York, with their respective places of business or residence, to the effect that if the contract be awarded to the person making the estimate, they will, on its being so awarded, become bound as his sureties for its faithful performance; and that if he shall omit or refuse to execute the same, they shall pay to the Corporation any difference between the sum to which he would be entitled on its completion, and that which the Corporation may be obliged to pay to the person or persons to whom the contract may be awarded at any subsequent letting; the amount in each case to be calculated upon the estimated amount of the work by which the bids are tested. The consent above mentioned shall be accompanied by the oath or affirmation, in writing, of each of the persons signing the same that he is a householder or freeholder in the City of New York, and is worth the amount of the security required for the completion of this contract, over and above all his debts of every nature, and over and above his liabilities as bail, surety or otherwise; and that he has offered himself as surety in good faith and with the intention to execute the bond required by section 27 of chapter 8 of the Revised Ordinances of the City of New York, if the contract shall be awarded to the person or persons for whom he consents to become surety. The adequacy and sufficiency of the security offered to be approved by the Comptroller of the City of New York.

No bid or estimate will be considered unless accompanied by either a certified check upon one of the National or State banks of the City of New York, drawn to the order of the Comptroller, or money, to the amount of five per centum of the amount of the security required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the estimate, but must be handed to the officer or clerk of the Department who has charge of the Estimate-box, and no estimate can be deposited in said box until such check or money has been examined by said officer or clerk, and found to be correct. All such deposits, except that of the successful bidder, will be returned to the persons making the same within three days after the contract is awarded. If the successful bidder shall neglect or refuse, within five days after notice that the contract has been awarded to him, to execute the same, the amount of the deposit made by him shall be forfeited to and retained by the City of New York, as liquidated damages for such neglect or refusal; but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

N. B.—The prices must be written in the estimate, and also stated in figures, and all estimates will be considered as informal which do not contain bids for all items for which bids are herein called or which contain bids for items for which bids are not herewith called for. Permission will not be given for the withdrawal of any bid or estimate. No bid will be accepted from, or contract awarded to, any person who is in arrears to the Corporation upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to the Corporation.

The amount in which security will be required for the performance of the several contracts is as follows:

For No. 1, above mentioned..... \$9,000 00

" 2, " "..... 1,500 00

The Department of Public Parks reserves the right to reject any or all the bids received in response to this advertisement if it should deem it for the interest of the city so to do, and to readvertise until satisfactory bids or proposals shall be received. But the contracts when awarded shall in each case be awarded to the lowest bidder.

Blank forms for proposals and forms of the several contracts which the successful bidders will be required to execute, can be had at the office of the Secretary, and the plans can be seen and information relative to them can be had at the office of the Department, Nos. 27 and 29 Reade street.

HENRY R. BEEKMAN,
JOHN D. CRIMMINS,
JESSE W. POWERS,
M. C. D. BORDEN,
Commissioners of the Department of Public Parks.

DEPARTMENT OF PUBLIC WORKS.

DEPARTMENT OF PUBLIC WORKS,
COMMISSIONER'S OFFICE, No. 31 CHAMBERS ST.,
NEW YORK, September 17, 1886.

NOTICE OF SALE AT PUBLIC AUCTION.

ON WEDNESDAY, SEPTEMBER 29, 1886, AT 11 o'clock A. M., the Department of Public Works will sell at public auction, at the Corporation Yard, foot of Twenty-fourth street, East river, by Van Tassel & Kearney, auctioneers, the following, viz.:

About 40 tons scrap Cast Iron.
" 1 ton " Wrought Iron.
1 lot old Wire Rope.

TERMS OF SALE.

The purchaser must remove the material purchased from the yard within ten days from date of sale, otherwise he will forfeit the same, together with all moneys paid therefor.

Purchase-money to be paid in bankable funds at the time and place of sale.

JOHN NEWTON,
Commissioner of Public Works.

DEPARTMENT OF PUBLIC WORKS,
COMMISSIONER'S OFFICE,
ROOM 6, No. 31 CHAMBERS STREET,
NEW YORK, September 13, 1886.

TO CONTRACTORS.

BIDS OR ESTIMATES, INCLOSED IN A SEALED envelope with the title of the work and the name of the bidder endorsed thereon, also the number of the work as in the advertisement, will be received at this office until Tuesday, September 28, 1886, at 12 o'clock M., at which place and hour they will be publicly opened by the head of the Department and read, for the following:

No. 1. SEWER IN AVENUE ST. NICHOLAS, east side, between One Hundred and Forty-first and One Hundred and Forty-fifth streets.

No. 2. SEWER IN ONE HUNDRED AND EIGHTEENTH STREET, between Fifth and Sixth avenues.

No. 3. SEWER IN ONE HUNDRED AND NINETEENTH STREET, between Seventh avenue and Avenue St. Nicholas.

No. 4. SEWER IN ONE HUNDRED AND THIRTY-FIRST STREET, between Broadway and Tenth avenue.

No. 5. SEWER IN ONE HUNDRED AND THIRTY-THIRD STREET, between Eighth avenue and Avenue St. Nicholas.

No. 6. REGULATING AND GRADING EDGE-COMB AVENUE (the first avenue east of and generally parallel with Ninth avenue or St. Nicholas Place), from One Hundred and Forty-fifth street to St. Nicholas Place, SETTING CURBSTONES, FLAGGING SIDEWALKS, AND CONSTRUCTING RETAINING WALLS AND DRAIN-PIPES THEREIN.

No. 7. REGULATING AND GRADING THE FIRST NEW AVENUE WEST OF EIGHTH AVENUE, from One Hundred and Forty-fifth street to One Hundred and Fifty-fifth street, and SETTING CURBSTONES AND FLAGGING SIDEWALKS THEREIN.

No. 8. REGULATING AND GRADING, BUILDING RETAINING WALL AND PAVING WITH GRANITE-BLOCK PAVEMENT, WITH A FOUNDATION OF BROKEN STONE THOROUGHLY ROLLED, THE ROADWAY OF ONE HUNDRED AND FIFTY-FIFTH STREET, from Avenue St. Nicholas to the easterly line of St. Nicholas Place, extended, and LAYING CROSSWALKS AT THE INTERSECTING STREETS WHERE REQUIRED.

Each estimate must contain the name and place of residence of the person making the same, the names of all persons interested with him therein, and if no other person be so interested, it shall distinctly state that fact. That it is made without any connection with any other person making an estimate for the same work, and is in all respects fair and without collusion or fraud. That no member of the Common Council, head of a department, chief of a bureau, deputy thereof, or clerk therein, or other officer of the Corporation, is directly or indirectly interested in the estimate or in the work to which it relates or in the profits thereof.

Each estimate must be verified by the oath, in writing, of the party making the same, that the several matters therein stated are true, and must be accompanied by the consent, in writing, of two householders or freeholders in the City of New York, to the effect that if the contract is awarded to the person making the estimate, they will, upon its being so awarded, become bound as his sureties for its faithful performance; and that if he shall refuse or neglect to execute the same, they will pay to the Corporation any difference between the sum to which he would be entitled upon its completion and that which the Corporation may be obliged to pay to the person to whom the contract shall be awarded at any subsequent letting; the amount to be calculated upon the estimated amount of the work by which the bids are tested.

The consent last above mentioned must be accompanied by the oath or affirmation, in writing, of each of the persons signing the same, that he is a householder or freeholder in the City of New York, and is worth the amount of the security required for the completion of the contract, over and above all his debts of every nature, and over and above his liabilities as bail, surety, or otherwise, and that he has offered himself as surety in good faith, with the intention to execute the bond required by law.

No estimate will be considered unless accompanied by either a certified check upon one of the State or National banks of the City of New York, drawn to the order of the Comptroller, or money, to the amount of five per centum of the amount of the security required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the estimate, but must be handed to the officer or clerk of the Department who has charge of the estimate-box, and no estimate can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that of the successful bidder, will be returned to the persons making the same within three days after the contract is awarded. If the successful bidder shall neglect or refuse, within five

days after notice that the contract has been awarded to him, to execute the same, the amount of the deposit made by him shall be forfeited to and be retained by the City of New York, as liquidated damages for such neglect or refusal; but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

THE COMMISSIONER OF PUBLIC WORKS RESERVES THE RIGHT TO REJECT ALL BIDS RECEIVED FOR ANY PARTICULAR WORK IF HE DEEMS IT FOR THE BEST INTERESTS OF THE CITY.

Blank forms of bid or estimate, the proper envelopes in which to inclose the same, the specifications and agreements, and any further information desired can be obtained for Sewers, at Room 8; for Regulating and Grading, at Room 5; and for Paving, at Room 1, No. 31 Chambers street.

JOHN NEWTON,
Commissioner of Public Works.

CORPORATION NOTICE.

PUBLIC NOTICE IS HEREBY GIVEN TO THE owner or owners, occupant or occupants of all houses and lots, improved or unimproved lands affected thereby, that the following assessments have been completed and are lodged in the office of the Board of Assessors, for examination by all persons interested, viz.:

List 2188, No. 1. Sewer in One Hundred and Forty-seventh street, between Eighth avenue and first new avenue west of Eighth avenue, with branches in said new avenue, between One Hundred and Forty-fifth and One Hundred and Fifty-first streets.

List 2247, No. 2. Constructing a sewer and appurtenances in Westchester avenue and One Hundred and Fiftieth street, between Brook and Courtland avenues, with branches in North Third avenue and Bergen avenue, between One Hundred and Forty-ninth street and Westchester avenue.

List 2253, No. 3. Paving with trap blocks, East One Hundred and Thirty-fourth street, from North Third avenue to Alexander avenue.

The limits embraced by such assessments include all the several houses and lots of ground, vacant lots, pieces and parcels of land situated on—

No. 1. Both sides of the first new avenue west of Eighth avenue, between One Hundred and Forty-fifth and One Hundred and Fifty-first streets, and both sides of One Hundred and Forty-seventh street, between Eighth avenue and said new avenue.

No. 2. Both sides of Westchester avenue and both sides of One Hundred and Fiftieth street, from Brook to Courtland avenue; both sides of Bergen avenue, from One Hundred and Forty-ninth street to Westchester avenue; both sides of North Third avenue, from One Hundred and Forty-ninth to One Hundred and Fiftieth street, and east side of Courtland avenue, between One Hundred and Fiftieth and One Hundred and Fifty-first streets.

No. 3. Both sides of One Hundred and Thirty-fourth street, from North Third avenue to Alexander avenue, and to the extent of half the block at the intersecting avenues.

All persons whose interests are affected by the above-named assessments, and who are opposed to the same, or either of them, are requested to present their objections in writing to the Chairman of the Board of Assessors, at their office, No. 11½ City Hall, within thirty days from the date of this notice.

The above-described lists will be transmitted, as provided by law, to the Board of Revision and Correction of Assessments for confirmation, on the 25th day of October, 1886.

EDWARD GILON, Chairman.
PATRICK M. HAVERTY,
CHAS. E. WENDT,
VAN BRUGH LIVINGSTON,
Board of Assessors.

OFFICE OF THE BOARD OF ASSESSORS,
No. 11½ CITY HALL,
NEW YORK, September 22, 1886.

PUBLIC NOTICE IS HEREBY GIVEN TO THE owner or owners, occupant or occupants of all houses and lots, improved or unimproved lands affected thereby, that the following assessments have been completed and are lodged in the office of the Board of Assessors, for examination by all persons interested, viz.:

List 2198, No. 1. Regulating, grading, curbing and flagging One Hundred and Forty-fourth street, from Seventh avenue to the east line of the first new avenue west of Eighth avenue.

List 2221, No. 2. Laying crosswalks across Denman place, at or near its intersections with Leggett and Tinton avenues, and across Leggett and Tinton avenues, at or near the intersections with Denman place.

List 2228, No. 3. Regulating and grading One Hundred and Fifty-fifth street, and also setting curb and gutter-stones and flagging the sidewalks four feet wide therein, from Elton to Courtland avenue.

List 2232, No. 4. Laying crosswalks in East One Hundred and Fifty-third street, at the intersection with each avenue and of each avenue with said street, between the westerly curb-line of North Third avenue and the easterly curb-line of Railroad avenue.

List 2234, No. 5. Constructing sewers and appurtenances in One Hundred and Forty-fifth and One Hundred and Forty-fourth streets, between Third and Brook avenues, and in One Hundred and Forty-third street, between Alexander and Brook avenues, with branches in Willis avenue, between One Hundred and Forty-sixth and One Hundred and Forty-second streets, and in Alexander avenue, between One Hundred and Forty-third and One Hundred and Forty-second streets.

List 2237, No. 6. Regulating, grading, curb and flagging One Hundred and Fifty-eighth street, from Kingsbridge road to Public Drive.

List 2248, No. 7. Flagging sidewalks a space four feet wide and setting curb and gutter-stones in Denman place, between Forest (Concord) and Union avenues.

The limits embraced by such assessments include all the several houses and lots of ground, vacant lots, pieces and parcels of land situated on—

No. 1. Both sides of One Hundred and Forty-fourth street, from Seventh avenue to the east line of the first new avenue west of Eighth avenue, and to the extent of half the block at the intersecting avenues.

No. 2. To the extent of one-half the block on all sides, from the intersection of Denman place and Tinton avenue.

No. 3. Both sides of One Hundred and Fifty-fifth street, from Elton to Courtland avenue, and to the extent of one-half the block at the intersecting avenues.

No. 4. Both sides of One Hundred and Fifty-third street, from Third to Railroad avenue, and to the extent of one-half the block at the intersecting avenues.

No. 5. Blocks bounded by One Hundred and Forty-second and One Hundred and Forty-sixth streets, Third and Brook avenues.

No. 6. Both sides of One Hundred and Fifty-eighth street, from Kingsbridge road to Public Drive, and to the extent of one-half the block at the intersecting avenues.

No. 7. Both sides of Denman place, between Forest (Concord) and Union avenues.

All persons whose interests are affected by the above-named assessments, and who are opposed to the same, or either of them, are requested to present their objections in writing to the Chairman of the Board of Assessors, at their office, No. 11½ City Hall, within thirty days from the date of this notice.

The above-described lists will be transmitted, as provided by law, to the Board of Revision and Correction of Assessments for confirmation, on the 9th day of October, 1886.

EDWARD GILON, Chairman.
PATRICK M. HAVERTY,
CHAS. E. WENDT,
VAN BRUGH LIVINGSTON,
Board of Assessors.

OFFICE OF THE BOARD OF ASSESSORS,
No. 11½ CITY HALL,
NEW YORK, September 8, 1886.

AQUEDUCT COMMISSION.

AQUEDUCT COMMISSIONERS' OFFICE,
STEWART BUILDING, No. 280 BROADWAY,
NEW YORK, September 20, 1886.

PUBLIC HEARING.

TO WHOM IT MAY CONCERN.

WHEREAS, IN THE PROGRESS OF THE work upon the New Croton Aqueduct, it has become apparent to the Aqueduct Commissioners that the best interests of the city requires that for the proper construction, future protection, and maintenance of the said Aqueduct the city should acquire the FEE SIMPLE in lieu of the easements heretofore acquired through the lands upon the line of the New Croton Aqueduct, between One Hundred and Forty-fifth street and Convent avenue, and between One Hundred and Fifty-second street and Tenth avenue; and that the fee simple of the adjacent parcel, composing the city lot through which said portion of the Aqueduct passes should also be acquired; now therefore, in accordance with the requirements of chapter 490 of the Laws of 1883, of the State of New York, public notice is hereby given to all persons interested that a full opportunity will be afforded them to be heard in relation to the plans now under consideration by the Aqueduct Commissioners for the acquisition of the fee simple in lieu of the easement heretofore acquired in the lands upon the line of the New Croton Aqueduct, between One Hundred and Forty-fifth street and Convent avenue, and between One Hundred and Fifty-second street and Tenth avenue; and also for acquiring the title to the parcel composing the city lot through which said portion of the Aqueduct passes; the said public hearing to be at the above-named office of the Aqueduct Commissioners on Friday, the 1st day of October, 1886, at 10 o'clock A. M., and upon such other days thereafter to which said hearing may be adjourned. By order of the Aqueduct Commissioners.

JOHN C. SHEEHAN,
Secretary.

THE CITY RECORD.

COPIES OF THE CITY RECORD CAN BE obtained at No. 2 City Hall (northwest corner basement). Price three cents each.

FINANCE DEPARTMENT.

INTEREST ON CITY STOCKS.

THE INTEREST ON THE BONDS AND STOCKS of the City of New York, due November 1, 1886, will be paid on that day by the Comptroller, at his office in the Stewart Building, corner of Broadway and Chambers street.

The Transfer Books will be closed from September 24, to November 1, 1886.

EDWARD V. LOEW,
Comptroller.

FINANCE DEPARTMENT—COMPTROLLER'S OFFICE,
NEW YORK, September 17, 1886.

CITY OF NEW YORK,
FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
August 18, 1886.

NOTICE TO PROPERTY-OWNERS.

IN PURSUANCE OF SECTION 916 OF THE "New York City Consolidation Act of 1882," the Comptroller of the City of New York hereby gives public notice to all persons, owners of property affected by the following assessment lists, viz.:

Ninth avenue regulating and grading, from One Hundred and Fifty-first to One Hundred and Fifty-fifth street.

Seventy-fourth street regulating, grading, setting curbstones and flagging, from Eighth avenue to Riverside Drive.

One Hundred and Thirty-seventh street regulating, grading, setting curbstones and flagging, from Fifth to Seventh avenue.

Alexander avenue regulating, grading, setting curbstones, flagging, laying crosswalks and paving roadway with trap blocks, from the Southern Boulevard to North Third avenue.

Eighty-second street paving, from Eighth to Ninth avenue, with granite-block pavement.

Eighty-eighth street paving, from Second to Third avenue, with granite-block pavement.

One Hundred and Fifteenth street paving, from Fifth to Sixth avenue, with granite-block pavement.

One Hundred and Thirty-fourth street paving, from Madison to Fifth avenue, with granite-block pavement.

Eighty-sixth street sewers, between Tenth and Riverside avenues.

—which were confirmed by the Board of Revision and Correction of Assessments August 12, 1886, and entered on the same date, in the Record of Titles of Assessments, kept in the "Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents," that unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of said entry of the assessments, interest will be collected thereon as provided in section 917 of said "New York City Consolidation Act of 1882."

Section 917 of the said act provides that, "If any such assessment shall remain unpaid for the period of sixty days after the date of entry thereof in the said Record of Titles of Assessments, it shall be the duty of the officer authorized to collect and receive the amount of such assessment, to charge, collect and receive interest thereon, at the rate of seven per centum per annum, to be calculated from the date of such entry to the date of payment."

The above assessments are payable to the Collector of Assessments and Clerk of Arrears at the "Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents," between the hours of 9 A. M. and 2 P. M., and all payments made thereon, on or before November 1, 1886, will be exempt from interest as above provided, and after that date will be subject to a charge of interest at the rate of seven per cent. per annum from the date of entry in the Record of Titles of Assessments in said Bureau to the date of payment.

EDWARD V. LOEW
Comptroller.

CITY OF NEW YORK—FINANCE DEPARTMENT,
BUREAU FOR THE COLLECTION OF ASSESSMENTS AND ARREARS OF TAXES AND ASSESSMENTS AND OF WATER RENTS,
OFFICE OF THE COLLECTOR OF ASSESSMENTS AND CLERK OF ARREARS,
STEWART BUILDING, ROOM 35, August 16, 1886.

NOTICE OF THE SALE OF LANDS AND TENEMENTS for unpaid taxes of 1880, 1881 and 1882, and Croton water rents of 1879, 1880 and 1881, under the direction of Edward V. Loew, Comptroller of the City of New York.

The undersigned hereby gives public notice, pursuant to the provisions of section 926 of the New York City Consolidation Act of 1882,—

That the respective owners of all lands and tenements situated in the Wards Nos. 1 to 24, inclusive, in the City of New York, on which taxes have been laid and confirmed for the years 1880, 1881 and 1882, and are now remaining due and unpaid; and also the respective owners of all lands and tenements in the City of New York, situated in the Wards aforesaid, on which the regular Croton water rents have been laid for the years 1879, 1880 and 1881, and are now remaining due and unpaid, are required to

pay the said taxes and Croton water rents so remaining due and unpaid, with the interest thereon at the rate of seven per cent. per annum, from the time when the same became due to the time of payment, together with the charges of this notice and advertisement, to the Collector of Assessments and Clerk of Arrears at his office in the Finance Department, in the Stewart Building, corner of Broadway and Chambers street, in said city.

And that if default shall be made in such payment, such lands and tenements will be sold at public auction, at the Court-house in the City Hall Park, in the City of New York, on Monday, December 6, 1886, at 12 o'clock, noon, for the lowest term of years at which any person shall offer to take the same in consideration of advancing the amount of tax or Croton water rent, as the case may be, so due and unpaid, and the interest thereon, as aforesaid, to the time of sale, together with the charges of this notice and advertisement, and all other costs and charges accrued thereon, and that such sale will be continued from time to time until all the lands and tenements so advertised for sale shall be sold.

Notice is hereby further given that a detailed statement of the taxes and the Croton water rents, the ownership of the property on which taxes and Croton water rents remain unpaid, is published in a pamphlet, and that copies of the said pamphlet are deposited in the office of the Collector of Assessments and Clerk of Arrears, and will be delivered to any person applying for the same.

A. S. CADY,
Collector of Assessments and Clerk of Arrears.

CITY OF NEW YORK,
FINANCE DEPARTMENT,
COMPTROLLER'S OFFICE,
July 26, 1886.

NOTICE TO PROPERTY-OWNERS.

IN PURSUANCE OF SECTION 916 OF THE "New York City Consolidation Act of 1882," the Comptroller of the City of New York hereby gives public notice to all persons, owners of property affected by the following assessment lists, viz.:

Beekman place sewers, between Forty-ninth and Fifty-first streets.

Madison avenue sewers, alteration and improvement to, between Fifty-seventh and Fifty-ninth streets, and in Fifty-seventh street, east and west of Madison avenue.

Fifth avenue sewer, east side, between Fifty-fifth and Fifty-ninth streets.

West End avenue (formerly Eleventh avenue) sewer, between Sixty-fifth and Sixty-sixth streets, and in Sixty-fifth street, between West End and Tenth avenues.

West End avenue (formerly Eleventh avenue) sewer, between Ninety-sixth and One Hundred and Fifth streets.

Boulevard sewer, between One Hundred and Fifty-fifth and One Hundred and Fifty-seventh streets, and in One Hundred and Fifty-fifth street, between the Boulevard and Tenth avenue.

Forty-seventh street sewer, extension at the East river. Ninety-seventh street sewer, between Third and Fourth avenues, from end of present sewer east of Lexington avenue.

One Hundred and Thirty-first street sewer, between Sixth and Seventh avenues.

One Hundred and Thirty-fifth street sewer and appurtenances, between College and Third avenues.

One Hundred and Forty-fifth street sewer, between Brook and St. Ann's avenues.

One Hundred and Forty-eighth street sewer, between Brook avenue and Mill brook, and between Mill brook and Courtland avenue, with branches in North Third avenue, between One Hundred and Forty-seventh and One Hundred and Forty-ninth streets, and in Willis avenue between One Hundred and Forty-eighth and One Hundred and Forty-ninth streets.

One Hundred and Forty-ninth street sewer, between Brook avenue and Mill brook, and between Mill brook and Courtland avenue, with branch in Bergen avenue, between One Hundred and Forty-eighth and One Hundred and Forty-ninth streets.

Eighty-first street paving, from First avenue to Avenue A, with granite-block pavement.

Eighty-first street paving, from the Boulevard to Riverside Drive, with trap-block pavement.

One Hundred and Eighth street paving, from Second to Third avenue, with granite-block pavement.

Ninth avenue regulating, grading, setting curb and flagging, from Eighty-first to One Hundred and Tenth street.

Fifty-third street regulating, grading, setting curb and gutter-stones and flagging, from Tenth to Eleventh avenue.

Ninety-fifth street regulating, grading, setting curb stones and flagging, from Ninth to Tenth avenue.

One Hundredth street regulating, grading, setting curb-stones and flagging, from Fourth to Fifth avenue.

One Hundred and Thirty-eighth street regulating, grading, setting curb-stones and flagging, from Sixth to Eighth avenue.

One Hundred and Thirty-ninth street regulating, grading, setting curb and gutter stones and flagging, from North Third to Willis avenue.

Sixty-ninth street, laying crosswalks at Ninth avenue, the Boulevard and Eleventh avenue.

Railroad avenue, laying crosswalks opposite Tremont Depot of the New York and Harlem Railroad, and at the southerly intersection of East One Hundred and Seventy-sixth street.

—which were confirmed by the Board of Revision and Correction of Assessments, July 15, 1886, and entered on the same date in the Record of Titles of Assessments, kept in the "Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents," that unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of said entry of the assessments, interest will be collected thereon as provided in section 917 of said "New York City Consolidation Act of 1882."

Section 917 of the said act provides that, "If any such assessment shall remain unpaid for the period of sixty days after the date of entry thereof in the said Record of Titles of Assessments, it shall be the duty of the officer authorized to collect and receive the amount of such assessment to charge, collect, and receive interest thereon at the rate of seven per centum per annum, to be calculated from the date of such entry to the date of payment."

The above assessments are payable to the Collector of Assessments and Clerk of Arrears, at the "Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents," between the hours of 9 A. M. and 2 P. M., and all payments made thereon, on or before October 4, 1886, will be exempt from interest as above provided, and after that date will be subject to a charge of interest at the rate of seven per cent. per annum from the date of entry in the Record of Titles of Assessments in said Bureau to the date of payment.

EDWARD V. LOEW,
Comptroller.

REAL ESTATE RECORDS.

THE ATTENTION OF LAWYERS, REAL Estate Owners, Monetary Institutions engaged in making loans upon real estate, and all who are interested in providing themselves with facilities for reducing the cost of examinations and searches, is invited to these Official Indices of Records, containing all recorded transfers of real estate in the City of New York from 1853 to 1887, prepared under the direction of the Commissioners of Records.

Grantors, grantees, suits in equity, insolvents' and Sheriff's sales, in 61 volumes, full bound, price \$100 00
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Complete sets, folded, ready for binding, 15 00
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Orders should be addressed to "Mr. Stephen Angell Room 23, Stewart Building."

EDWARD V. LOEW,
Comptroller.