DESIGN OF A SANITARY SEWER SYSTEM FOR BARRINGTON ILLINOIS

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A THESIS

PRESENTED BY

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DATE May 19th, 1915.

DESIGN, AND ESTIMATE OF APPROXIMATE COST

of a

SANITARY SEWER SYSTEM

for the

VILLAGE OF BARRINGTON,

COOK AND LAKE COUNTIES,

ILLINOIS.

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FOREWORD.

The authors desire to express their gratitude to Professor Alfred E. Phillips, and Mrs. Julia A. Beveridge for their invaluable advice and suggestions; to Mr. Miles T. Lamey, Mayor of Barrington, for the many courtesies shown them; and to Leonard E. Starkel, of the Class of 1917, for services rendered in making the profile survey of the Village of Barrington.

May 19, 1915.

J. J., Jr.

G. J. T.

INTRODUCTION.

The Village of Barrington, Illinois, is situated about thirty-two miles northwest of Chicago, in Cook and Lake Counties, on the Wisconsin Division of the Chicago and Northwestern Railroad. The population has increased but slowly in the past, and in all probability will not increase greatly during the next twenty or twenty-five years, as the village is given over mainly to residences and small business enterprises, rather than to manufacturing industries. The population, according to the census of 1910, was eleven hundred and fourty-four, composed largely of merchants, commuters, and to some extent of retired farmers.

The present sewerage system consists of three main lines of tile pipe, and a septic tank and four filter beds. One of the pipe lines empties into an open ditch at a point about two hundred feet south of Liberty street, and about seven hundred feet west of Walnut street; while the other two lines are combined into one, which flows to the septic tank, located at the northwest village limits, adjacent to the right of way of the Chicago and Northwestern Railroad. The septic tank in its present condition is of doubtful value as a sewage

disposal plant. When inspected by the authors early in March of the present year, it was found to be little more than a veritable cess-pool, the decomposing sewage having backed up in the pipe line until it was found to be standing in the first man-hole from the tank to a depth of about three feet. The authorities had found it necessary to have the tank cleaned out, and at the time of the inspection a man was engaged in removing the sludge from the tank.

Early in March of the present year the authors, accompanied by Mr. Leonard E. Starkel, of the Class of 1917, spent several days in Barrington making a profile survey of the streets. Levels were taken along every street in the village, at intervals of fifty feet, or less, and bench marks were established at various points.

In the accompanying design no attempt is made to design a septic tank or filter beds, as the present tank and beds could, doubtless, be overhauled and repaired at less expense than the erection of a new plant would require.

DESIGN.

Plats of the village were drawn up; profiles were plotted from the notes of the survey, with the plan of the streets shown below the profile; and a topographic map was drawn, from which to study the natural drainage of the village, and determine the location and direction of flow of the sewer lines. The natural slope of the land was utilized as much as possible, in order to decrease the amount of excavation, and thereby minimize the cost of construction.

After a careful study of the topographic features of the village, it was decided to run a main line from the septic tank along parallel to the Chicago and Northwestern Railroad's right of way to Garfield street. The village was then divided into three parts as follows:-

I. The Northern part, containing that portion which is north of Main street and east of the Chicago and Northwestern Railroad.

II. The Southeastern part, containing that portion which is east of Grove avenue and south of Main street.

III. The Southwestern part, containing that portion which is west of Grove avenue and the Chicago and Northwestern Railroad.

The Northern branch enters the main sewer line at Garfield street; the Southeastern branch flows into the Northern branch at Main and Spring streets, and thence into the main sewer; while the Southwestern branch enters the main sewer at two points, namely, at Garfield and at Harrison streets.

In all of the outlying and unimproved districts, excepting the extreme northern part of the village, additions and extensions may be made to the lines as shown in order to provide for the improvements to these districts. In the case of the extreme northern part of the village, the topography of the land demands that a separate sewer line be constructed to run around the north end of the village, and enter the main line at a point near the septic tank. In all probability, however, it will not be necessary to construct this line of pipe for several years to come, as the growth of the village does not seem to be in that direction.

It has been found by various experiments that the minimum velocity which will prevent deposits in sewers is about two feet per second; and in order to obtain this velocity it is necessary to adhere to the following minimum grades in constructing the sewer lines:-

Diameter of pipe in inches.	Minimum Grade in per cent.
6.	0.666
8.	0.400
10.	0.285
12.	0.222

Wherever it was possible in the accompanying design to do so, a grade of 0.500% was used in pipe lines of eight inch diameter. Wherever the above mentioned minimum grades could not be attained, provision has been made for flushing the pipe line, either by means of flush-holes or manholes. Flushing should be done at regular intervals, and may be best accomplished by two men and a fire hose, attached to a nearby hydrant. This method of flushing has been adopted in preference to automatic flushing, because of the decreased first cost, and the fact that it is probably more effective if done properly and at sufficiently frequent intervals. Flush-holes have been provided at all dead ends to prevent the accumulation of sewage therein.

Drop manholes have been provided at various points, in order to decrease the amount of excavation, and thereby diminish the cost of construction.

Manholes are placed at all street intersections; at all points where there is a change in direction of the pipe line; and at such other points as may be necessary to keep the distance between manholes not greater than four hundred feet.

The capacities and velocities of the various sizes of pipe were determined from the following formulae:-

The velocity is determined from the Chezy formula

$$V = C\sqrt{RS}$$

The quantity is determined from the formula

$$Q = AV$$

The coefficient "C" is determined from Kutter's formula.

$$C = \frac{41.66 + \frac{1.811}{n} + \frac{.00281}{S}}{1 + (41.66 + \frac{.00281}{S}) \cdot \frac{n}{\sqrt{R}}}$$

where V = Velocity of flow, in feet per second.
C = A constant, as shown above.
R = The mean hydraulic radius.
S = Sine of the slope of the hydraulic gradient.
Q = Discharge, in cubic feet per second.
A = Area of cross-section of the stream, in sq. ft.
n = Coefficient of roughness of the sewer pipe.

Note:- For vitrified sewer pipe--n = 0.013.
(Hughes and Safford: Hydraulics, p. 342)

Using the aforementioned formulae, and assuming the pipes to flow half full, the following results were obtained:-

Diameter	A	R	S	C	V	Q
8 inch	0.1746	0.1670	0.005	75.93	2.187	0.3818
10 "	0.2726	0.2082	0.002	81.68	1.666	0.4542
12 "	0.3927	0.2500	0.00083	84.53	1.217	0.4779

Note:- The value of "S" is given as the slope per one thousand feet.

The values of "C" were obtained from those used by the U. S. Reclamation Service, as shown in Table 14 of Volume I. of "American Sewerage Practice," by Metcalf and Eddy.

To obtain the quantity of discharge in gallons per twenty-four hours it is necessary to multiply the above values of "Q" by 646,963.2. By so doing, the following results were obtained:-

8 inch pipe:	247,000. gallons per day.
10 " "	293,500. " " "
12 " "	309,200. " " "

INFORMATION TO BIDDERS

for the

CONSTRUCTION OF A SANITARY SEWER SYSTEM

in the

VILLAGE OF BARRINGTON,

ILLINOIS.

INFORMATION TO BIDDERS.

1. The ..... of the Village of Barrington, Illinois, will receive sealed proposals for the furnishing of all materials and labor necessary for the construction of sewer lines in the said Village of Barrington, in accordance with the provisions of an ordinance passed .....19 , and with the plans and specifications, copies of which may be seen at the office of the Village Clerk,..... .....Street, Barrington, Illinois, or at the office of ....., Engineer, ...Street, Chicago.

2. Copies of the plans and specifications may be obtained by depositing ten dollars ($10.00) with the Village Clerk, which deposit will be refunded upon the return of the plans and specifications in good condition.

3. Proposals must be made on blanks furnished by the Village Clerk, of the aforesaid village, and must be addressed to The ..... Barrington, Illinois, endorsed "Proposal for Furnishing Materials and Labor for the Construction of Sewer Lines in the Village of Barrington, Illinois," and should be accompanied by a

certified check, payable to the .....of .....in his official capacity, drawn on some responsible, local or Chicago bank, for an amount equal to ten per cent. (10%) of the total amount of the Proposal. This check should be deposited with the Village Clerk, to be returned after the awarding of the contract. No proposal will be considered unless accompanied by a check for such amount.

4. Immediately upon the acceptance of a proposal, by the ....., the Village Clerk shall notify the successful bidder of the award of the contract, and instruct him to execute the contract and surety bond, as hereinafter provided.

5. The party, to whom the contract may be awarded, shall be required, within fifteen (15) days, to execute, to the satisfaction of the ....., the contract and a surety bond to the amount of fifty per cent. (50%) of the contract price, to assure faithful performance of the contract.

6. Failure to comply with the above may be considered as abandonment of the contract, on the part of Contractor, and may be considered to be sufficient cause for forfeiting the proposal check.

7. Proposals are to be based upon the following approximate quantities, which will be used as a basis for comparing proposals, but which may vary from the actual quantities to be encountered in the work:-

38,796 feet of 8-inch standard strength vitrified sewer pipe.
1,552 " 10-inch " " " " "
1,566 " 12-inch " " " " "

1,422 two-foot lengths of 8-inch standard "Y" branches.
53 " " " 10-inch " "Y" "

480 feet of 8-inch Cast Iron Pipe (Minimum Thickness 0.5 in.)
348 " 10-inch " " " (" " 0.56 in.)
540 " 12-inch " " " (" " 0.6 in.)

70 Plain Manholes (Approximate average depth
40 Drop Manholes (" " "
40 Flush-holes (" " "

Note:- Manholes and flush-holes are to be furnished with covers of the following minimum weights.
Manhole Covers 370 lbs.
Flush-hole Covers 250 lbs.

32,521.1 cubic yards of Trenching, including all necessary sheeting, bracing, etc., and all back-filling.

8. The .....reserves the right to increase or decrease the amount of any class or portion of the work up to an amount equal to twenty-five per cent. (25%) of the above mentioned quantities, if necessary to properly complete said work.

9. All bidders must satisfy themselves, by personal inspection, as to the conditions on and adjoining the site of said work before submitting proposals.

10. All numbers, prices or quantities should be written in words as well as in figures, and where any discrepancy occurs the words will be taken as giving the proper values.

11. No proposal shall be considered unless, in the opinion of The ....., the party submitting the proposal shall posses sufficient facilities, ability, experience, and financial resources to fulfill the contract.

12. Unbalanced bidding; changing forms on the proposal blank furnished; or submitting proposals on blanks other than those furnished by the aforementioned Village Clerk may render a proposal informal, and subject to rejection.

13. The place of residence of each bidder must be given after his signature, which should be written in full. In the case of firms or corporations submitting proposals, the names and addresses of the individuals, as well as those of the firm, should be given.

14. All bidders are requested to be present, if possible, at the opening of the proposals.

15. The matter of time being an essential element to this contract, other things being equal, that bid will be accepted from that bidder who will complete the work in the shortest possible time. For a basis of comparison of bids, each day shall have a value of twenty-five dollars ($25.00).

16. The ..... of the Village of Barrington, Illinois, reserves the right to reject any or all proposals, and to re-advertise for proposals for the aforementioned work.

(Signed.)

The ..... of the

Dated ..... 19 . Village of Barrington, Illinois.

FORM OF PROPOSAL

for the

CONSTRUCTION OF A SANITARY SEWER SYSTEM

in the

VILLAGE OF BARRINGTON,

ILLINOIS.

PROPOSAL.

To The ..... of the Village of Barrington, Illinois, for the construction of sewers in the said Village of Barrington, Illinois.

The Undersigned, as bidder, do declare that the only parties interested in this proposal as principals are named herein; that this proposal is made without collusion with any other person, firm, or corporation; that no officer of the Village of Barrington or any other person in the employ of the Village of Barrington is directly or indirectly interested in this proposal; that he ha carefully examined the location of the proposed work, the accompanying proposed form of contract, and the plans and specifications therein referred to, and he propose and agree that if this proposal is accepted by The ..... of the Village of Barrington, he will contract with the aforementioned ..... in the form of the copy of the contract, on file in the office of the Village Clerk, and attached hereto, to provide all necessary machinery, tools, apparatus, and other means of construction, and do all of the work, and furnish all of the materials specified

in this contract, in the manner and time therein prescribed, and according to the requirements of the Engineer as therein set forth, and that he will take in full payment therefor the following sums, to wit:-

ITEM 1. For furnishing standard strength vitrified tile sewer pipe of the various sizes required, and laying same, including all excavation and back-filling and "Y" connections complete per lineal foot.

12-inch standard strength vitrified sewer pipe .....

10-inch " " " " " .....

8-inch " " " " " .....

6-inch " " " " " .....

4-inch " " " " " .....

ITEM 2. For furnishing all cast iron pipe, of the various sizes required, and laying same including all excavation, back-filling, and all material, complete per lineal foot.

12-inch cast iron pipe .....

10-inch " " " .....

8-inch " " " .....

ITEM 3. For furnishing all drain tile of the various sizes required and laying same, including all excavation, back-filling and materials, complete per lineal foot.

12-inch drain tile .....

10-inch " " .....

8-inch " " .....

6-inch " " .....

4-inch " " .....

ITEM 4. For furnishing all materials, including all excavation and back-filling, and constructing each plain manhole complete .....

ITEM 5. For furnishing all materials, including all excavation and back-filling, and constructing each drop manhole complete .....

ITEM 6. For furnishing all materials, including all excavation and back-filling, and constructing each flush-hole complete .....

ITEM 7. For furnishing all material, including all excavation and putting in place, and all extra concrete, complete per cubic yard solid measure .....

ITEM 8. For furnishing all material, including all excavation and putting in place, and all extra brick work, per cubic yard actual solid measure .....

ITEM 9. For furnishing all material, including all excavation, back-filling, and constructing bulkheads and retaining walls, complete per cubic yard, actual solid measure .....

ITEM 10. For furnishing and putting in place, including all extra excavation and labor, each one thousand feet (1000 ft.), board measure, of lumber or timber left in the trenches by order of the Engineer .....
.....

ITEM 11. For furnishing earth embankment or fill, including materials and labor, complete per cubic yard, measured in place .....

ITEM 12. For all rock excavation, including all blasting, protection, materials and labor, per cubic yard, actual solid measure .....

The above prices are to be for the work complete, and are also to include the cost of doing all other work required by the plans and specifications or appertaining thereto.

If this proposal shall be accepted by The ..... of the Village of Barrington, and the undersigned shall fail to contract, as aforesaid, and to give bond in the sum of .....
..... dollars ($) with surety satisfactory to The ..... within fifteen (15) days from the date of the mailing of a notice from the Village Clerk to .... , according to the

address given below, that the contract has been awarded to ....., then The ..... may, at their option, consider that the contract has been abandoned by the bidder, and thereupon the proposal and acceptance shall become null and void, and the certified check for .....dollars ($) accompanying this proposal shall become the property of the Village of Barrington; otherwise the accompanying check shall be returned to the undersigned.

Dated ..... 19 .

(Signed.)

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ARTICLES OF AGREEMENT

for the

CONSTRUCTION OF A SANITARY SEWER SYSTEM

in the

VILLAGE OF BARRINGTON,

ILLINOIS.

C O N T R A C T.

THIS AGREEMENT, made and entered into this ..... day of ..... in the year One Thousand Nine Hundred and ..... by and between ....., duly constituted and elected, herein acting for the VILLAGE OF BARRINGTON, ILLINOIS, and without personal liability to themselves, PARTY OF THE FIRST PART, and ...., PARTY OF THE SECOND PART.

WITNESSETH: That the parties to these presents, each in consideration of the undertakings, promises and agreements on the part of the other herein contained, have undertaken, promised and agreed, and do hereby undertake, promise and agree, the PARTY OF THE FIRST PART for itself, its successors and assigns, and the PARTY OF THE SECOND PART for ..... and ..... heirs, executors, and administrators or successors, as follows:-

ART. I. Wherever the words defined in this article, or pronouns used in their stead, occur in this contract or the specifications herein, they shall have the meanings herein given.

The words PARTY OF THE FIRST PART, above designated, shall include any board, officer or agents properly

authorized to act for said party in the execution of the work called for in this contract.

The word ENGINEER shall mean ...., the Engineer to the Village of Barrington, or any engineer who may be appointed to succeed him.

Wherever in the specifications or upon the drawings "as directed," "as required," "as permitted," or words of like import are used, it shall be understood that the direction, requirement or permission of the Engineer is understood, and similarly the words "approved," "satisfactory," "acceptable," or words of like import shall mean approved by, or satisfactory and acceptable to the Engineer.

The word CONTRACTOR shall mean the PARTY OF THE SECOND PART, above designated, or the legal representative of said party or the agent appointed to act for said party in the performance of the work.

ART. II. To prevent disputes and litigations, the Engineer shall in all cases determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this contract; shall determine all questions in relation to said work and the construction thereof, and in all cases shall decide every question which may arise relative to the fulfillment of this contract. He shall undertake to arbitrate all questions in dispute, arising under this contract, and it shall be a condition precedent to bringing suit in any matter pertaining to this contract that the Engineer shall have passed judgment upon the claims of either of the parties to the contract.

ART. III. The Engineer shall make all necessary explanations as to the meaning and intention of the specifications; shall give all orders and directions contemplated therein or thereby, and in every case in which a difficult or unforeseen condition shall arise in the performance of the work required by this contract.

ART. IV. The Contractor shall do all of the work and furnish all materials, tools, and appliances

necessary or proper for performing and completing the work required in this contract, in the manner and within the time hereinafter specified. He shall complete the entire work to the satisfaction of the Engineer, and in accordance with the plans and specifications herein mentioned, at the prices herein agreed upon and fixed therefor. All the work, labor and materials to be done and furnished under this contract shall be done and furnished strictly pursuant to, and in conformity with, the attached specifications, and the directions of the Engineer as given from time to time during the progress of the work under the terms of this contract, and also in accordance with the contract drawings, which said specifications and drawings form part of this agreement. The "INFORMATION TO BIDDERS" hereto attached, and the "PROPOSAL" submitted by the Contractor are also made parts of this contract.

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. He shall, at his own expense, wherever necessary or required, maintain fences, provide watchmen, maintain red lights, and take such other precautions as may be necessary to protect life and property, and shall be liable for all damages occasioned in any way by his act or neglect, or that of his agents, employes or workmen.

ART. V. No night work requiring the presence of an engineer or inspector will be permitted, except in case of emergency, and then only to such an extent as is absolutely necessary, and with the written consent of the Engineer, provided that this clause shall not operate in the case of a gang organized for regular and continuous night work, and on work which can be, in the opinion of the Engineer, satisfactorily performed at night.

No Sunday work will be permitted, except in case of great emergency, and then only with the written consent of the Engineer, and to such an extent as he may judge to be necessary.

ART. VI. Whenever the Contractor is not present on any part of the work where it may be desired to give directions, orders may be given by the Engineer, and they shall be received and obeyed by the superintendent or foreman who may have charge of the particular work in

reference to which orders are given.

ART. VII. The plans and specifications are intended to be explanatory of each other, but should any discrepancy appear or any misunderstanding arise as to the import of anything contained in either, the explanation of the Engineer shall be final and binding upon the Contractor. Any correction of errors or omissions in drawings and specifications may be made by the Engineer when such correction is necessary for the proper fulfillment of their intention as construed by him.

ART. VIII. Necessary sanitary conveniences for the use of the laborers on the work, properly secluded from public observation, shall be constructed and maintained by the Contractor, at his own expense, in such manner and at such points as shall be approved, and their use shall be enforced.

ART. IX. The Contractor shall not permit nor suffer the introduction or use of intoxicating liquors upon or about the works embraced in this contract.

ART. X. The Contractor shall commence work within ..... days after the execution of this contract by The ..... at such points as the Engineer may approve, and shall thereafter continue it at such points and in such order of precedence as the Engineer may from time to time approve.

The rate of progress shall be such that the whole work shall be performed in accordance with the terms of this contract on or before ..... 19 .

In case the Contractor fails to satisfactorily complete the entire work contemplated and provided for in this contract, on or before ..... 19 , the party of the first part shall deduct from the payments due to the Contractor the sum of twenty-five dollars ($25.00) for each day or part of a day by which the time specified in the contract is exceeded; and for every day by which the completion of the work falls short

of the time specified in the contract, the Contractor shall be paid a bonus of twenty-five dollars ($25.00) per day. If the payments due the Contractor are less than the amount of such liquidated damages, then the balance shall be charged upon the bond.

ART. XI. The party of the first part and the Engineer, agents and employees of the party of the first part may, for purposes already specified and for any other purposes, enter upon the work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefor. Other contractors of the party of the first part may also, for all purposes which may be required by their contracts, enter upon the work and the premises used by the Contractor.

The Engineer shall be furnished with every reasonable facility for ascertaining that the work is in accordance with the requirements and intentions of this contract, even to the extent of uncovering or taking down portions of finished work.

ART. XII. The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill his contract as herein prescribed, notwithstanding that such work and materials have been previously overlooked by the Engineer and accepted or estimated for payment. If the work or any part thereof shall be found defective at any time before the final acceptance of the whole work, the Contractor shall forthwith make good such defect in a manner satisfactory to the Engineer, and if any material brought upon the ground for use in the work, or selected for the same, shall be condemned by the Engineer as unsuitable or not in conformity with the specifications, the Contractor shall forthwith remove such materials from the vicinity of the work. Nothing in this contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or the soil, but all such materials shall, upon being so attached or affixed, become the property of the party of the first part.

ART. XIII. The Contractor shall employ enough competent men to do the work. If, in the opinion of the Engineer, the Contractor is not employing sufficient labor to complete this contract within the time specified, said Engineer may, after giving written notice, require said Contractor to employ such additional labor as may be necessary to enable said work to properly progress.

ART. XIV. The Contractor shall employ only competent men to do the work, and whenever the Engineer shall notify the Contractor in writing that any man on the work is, in his opinion, incompetent, unfaithful, disorderly or otherwise unsatisfactory, or not employed in accordance with the provisions of ART. XV., such man shall be discharged from the work, and shall not again be employed on it, except with the consent of the Engineer. If in the opinion of the Engineer, the Contractor is not employing sufficient labor to complete this contract within the time specified, said Engineer may, after giving written notice, require said Contractor to employ such additional labor as may be necessary to enable said work to progress properly. The judgment of the Engineer as to whether said work is progressing at such a rate as to enable it to be completed at the time herein specified shall be final and binding. Any action of the Engineer under this Article shall not affect the right of the party of the first part to annul this contract as provided in ART. XIX.

ART. XV. The Contractor shall keep himself fully informed of all existing and future State and National laws and local ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same; and shall protect and indemnify the party of the first part and their officers and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees.

ART. XVI. The Contractor shall give his personal attention constantly to the faithful prosecution of the work, shall keep the same under his control and shall not assign by power of attorney or otherwise, nor sublet, the work or any part thereof, without the previous written consent of the party of the first part, and shall not, either legally or equitably, assign any moneys payable under this contract or his claim thereto, unless by and with the like consent of the party of the first part.

ART. XVII. The Engineer may make alterations in the line, grade, plan, form, dimensions or materials of the work, or any part thereof, either before or after the commencement of construction; if such alterations diminish the quantity of the work to be done, they shall not warrant any claim for damages or for anticipated profits on the work that may be dispensed with; if they increase the amount of work, such increase shall be paid for according to the quantity actually done and at the prices stipulated for such work under this contract.

ART. XVIII. The Contractor shall take all responsibility for the work and shall take all precautions for preventing injuries to persons and property in and about the work; shall bear all losses resulting to him on account of the amount or character of the work, or because the nature of the land in which or on which the work is done is different from what was estimated or expected, or on account of the weather, elements or other causes; and he shall assume the defense of, and indemnify and save harmless the party of the first part and their officers and agents from all claims relating to labor and materials furnished for the work; to inventions, patents, and patent rights used in doing the work; to injuries to any person or corporation received or sustained by or from the Contractor and his employees in doing the work, or in consequence of any improper materials, implements or labor used therein; and to any act, omission or neglect of the Contractor and his employees therein.

The Contractor shall carry liability insurance, or workmen's compensation insurance, and also public liability insurance, together covering bodily injuries to his employees and the public, received as a consequence of the performance of work under this contract.

ART. XIX. If the work to be done under this contract shall be abandoned, or if this contract or any part thereof shall be sublet without the previous written consent of the party of the first part, or if the contract or any claim thereunder shall be assigned by the Contractor otherwise than herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the party of the first part, that the conditions herein specified as to the rate of progress are not fulfilled, or that the work or any part thereof is unnecessarily or unreasonably delayed, or that the Contractor has violated any of the provisions of this contract, the party of the first part may notify the Contractor to discontinue all work or any part thereof; and thereupon the Contractor shall discontinue such work or such part thereof as the party of the first part may designate and the party of the first part may thereupon, by contract or otherwise as they may determine, complete the work or such part thereof, and charge the entire expense of so completing the work or part thereof to the Contractor; and for such completion the party of the first part for themselves or their contractors may take possession of and use or cause to be used in the completion of the work or part thereof any such materials, animals, machinery, implements, and tools of every description as may be found at the location of said work.

All expenses charged under this Article shall be deducted and paid by the party of the first part out of any moneys then due or to become due to the Contractor under this contract, or any part thereof; and in such accounting the party of the first part shall not be held to obtain the lowest figures for the work of completing the contract or any part thereof, or for insuring its proper completion, but all sums actually paid therefor shall be charged to the Contractor. In case the expenses so charged are less than the sum which would have been payable under this contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference; and in case the amount of such expenses shall exceed the said sum, the Contractor shall pay the amount of the excess to the party of the first part.

ART. XX. The Contractor shall pay to the party of the first part all expenses, losses and damages, as determined by the Engineer, incurred in consequence of any defect, omission or mistake of the Contractor or his employees, or the making good thereof.

ART. XXI. The Contractor shall do any work not herein otherwise provided for, when and as ordered in writing by the Engineer or his agents specially authorized thereto in writing, and shall, when requested by the Engineer so to do, furnish itemized statements of the cost of the work ordered and give the Engineer access to accounts, bills and vouchers relating thereto. If the Contractor claims compensation for extra work not ordered as aforesaid, or for any damages sustained, he shall, within one (1) week after the beginning of such work or the sustaining of such damage, make a written statement of the nature of the work done or damage sustained, to the Engineer, and shall, on or before the fifteenth (15th) day of the month succeeding that in which any such extra work shall have been done or any such damage shall have been sustained, file with the Engineer an itemized statement of the details and amount of any such work or damage; and unless such statements shall be made as so required, his claim for compensation shall be forfeited and invalid, and he shall not be entitled to payment on account of any such work or damage.

The decision of the Engineer shall be final upon all questions of the amount and value of extra work, and he shall include in such value the cost to the Contractor of all materials used, of all labor, common and skilled, of foremen and teams, and the fair rental of all machinery used upon the extra work, for the period of such use, which was upon the work before or which shall be required by or used upon the work after the extra work is done. If said extra work requires the use of machinery not upon the work or to be used upon the work, then the cost of transportation of such machinery to and from the work shall be added to the fair rental, but said transportation shall not cover a distance exceeding ..... miles. He shall include in the value of extra work the cost to the Contractor of employer's liability insurance or workmen's compensation insurance, and also public liability

insurance, together covering bodily injuries to his employees and the public resulting from the extra work. The Engineer shall not include in the value of extra work any cost or rental of small tools, buildings or any portion of the time of the Contractor or his Superintendent, or any allowance for the use of capital, these items being considered as being covered in the regular work.

ART. XXII. The party of the first part may keep any moneys which would otherwise be payable at any time hereunder, and apply the same or as much of the same as may be necessary therefor, to the payment of any expenses, losses or damages incurred by the party of the first part, and determined as herein provided, and may retain, until all claims are settled, so much of such moneys as the party of the first part shall be of the opinion will be required to settle all claims against the party of the first part and their officers and agents, and all claims for labor on the work, and also all claims for materials used in the work or the party of the first part may make such settlements and apply thereto any moneys retained under this contract. If the moneys retained under this contract are insufficient to pay the sums found by the party of the first part to be due under the claims for labor and materials, the party of the first part may, at their discretion, pay the same and the Contractor and surety shall repay to the party of the first part the sums so paid out. The party of the first part may also, with the written consent of the Contractor, use any moneys retained, due or to become due under this contract for the purpose of paying for both labor and materials for the work, for which claims have not been filed in the office of the party of the first part. While it is understood that the security required to be given by the Contractor is furnished by the Contractor by his giving the Bond accompanying this contract, the party of the first part may, nevertheless, if they shall deem it just and equitable so to do, cause any moneys retained, due or to become due, to be held and applied to the payment for labor and materials furnished or supplied by said Contractor for which he has not made payment in full. The Contractor shall at such times as moneys are payable hereunder, deliver to the Engineer a sworn statement, showing as of that date

the amount owing by him for materials and labor performed.

ART. XXIII. The Village of Barrington shall pay and the Contractor shall receive as full compensation for everything furnished and done by the Contractor under this contract, including all work required but not specifically mentioned in the following items, and also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of any description connected with the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work as herein specified, and for well and faithfully completing the work as herein provided, as follows:-

Item 1. For furnishing standard strength vitrified tile sewer pipe of the various sizes required, and laying same including all excavation and back-filling, and "Y" connections, complete per lineal foot.

12-inch standard strength vitrified sewer pipe .....
10-inch " " " " " .....
8-inch " " " " " .....
6-inch " " " " " .....
4-inch " " " " " .....

Item 2. For furnishing all cast iron pipe, of the various sizes required, and laying same including all excavation and back-filling and all materials, complete per lineal foot.

12-inch cast iron pipe .....
10-inch " " " .....
8-inch " " " .....

Item 3. For furnishing all drain tile of the various sizes required and laying same, including all excavation, back-filling and materials, complete per lineal foot.

12-inch drain tile .....
10-inch " " .....
8-inch " " .....
6-inch " " .....
4-inch " " .....

Item 4. For furnishing all materials, including all excavation and back-filling, and constructing each plain manhole complete .....

Item 5. For furnishing all materials, including all excavation and back-filling, and constructing each drop manhole complete .....

Item 6. For furnishing all materials, including all excavation and back-filling, and constructing each flush-hole complete .....

Item 7. For furnishing all materials, including all excavation and putting in place, all extra concrete, complete per cubic yard, solid measure .....

Item 8. For furnishing all material, including all excavation and putting in place, all extra brick work, complete per cubic yard, solid measure .....

Item 9. For furnishing all material, including all excavation and back-filling, and constructing bulk-heads and retaining walls, complete per cubic yard, solid measure .....

Item 10. For furnishing and putting in place, including all extra excavation and labor, each one thousand feet (1000 ft.) board measure, of lumber or timber left in the trenches by order of the Engineer .....

Item 11. For furnishing earth embankment, or fill, including materials and labor, complete per cubic yard, measured in place .....

Item 12. For all rock excavation, including all blasting, protection, materials, and labor, per cubic yard, actual solid measure .....

ART. XXIV. The Engineer shall, once in each month, make an estimate in writing of the total amount of the work done to the time of such estimate and the value thereof. The party of the first part shall retain fifteen per cent. (15%) of such estimated value as part security for the fulfillment of this contract by the Contractor, and shall pay monthly to the Contractor while carrying on the

work, the balance not retained as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of this contract. No such estimate or payment shall be required to be made when, in the judgment of the Engineer, the total value of the work done since the last estimate amounts to less than three hundred dollars ($300.00). Payment may at any time be withheld if the work is not proceeding in accordance with the contract. The party of the first part may, if they deem it expedient so to do, cause estimates to be made more frequently than once in each month, and they may cause payments to be made more frequently to the Contractor. The party of the first part may at their option retain temporarily or permanently a smaller amount than is aforesaid, and may cause the Contractor to be paid temporarily or permanently from time to time during the progress of the work, such portion of the reserve as they may deem prudent.

The Engineer shall, as soon as practicable after the completion of this contract, make a final estimate of the amount of the work done thereunder, and the value of such work, and the party of the first part shall, within sixty (60) days after such final estimate is so made and is approved by the party of the first part, pay the entire sum so found to be due hereunder after deducting therefrom all previous payments and all amounts to be kept and all amounts to be retained under the provisions of this contract, including the two per cent. (2%) of the amount of the contract to be retained as hereinafter provided for the making of repairs. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

The Contractor guarantees the work done under this contract, and that the materials used in the construction of the same are free from defects and flaws, and this guaranty is for a period of one year (1 year) from and after the date upon which the final estimate of the Engineer is formally approved by the party of the first part.

It is hereby, however, specially agreed and understood that this guaranty shall not include any repairs that are made necessary by any cause or causes other than defective work or materials in the construction of the sewers. The Contractor shall at all times within said period of one year (1 year) keep the surface of the ground

over this work, or adjacent thereto, in the position and condition required by this contract, and refill any settlement or erosion in the back-filling or any surface graded by him due to any cause whatsoever, when so directed by the Engineer. Should he fail to do so, the party of the first part may have the said work done as described below.

ART. XXV. The party of the first part may retain out of the moneys payable to the Contractor under this contract the sum of two per cent. (2%) of the amount thereof, and may expend the same in the manner hereinafter provided for in making such repairs of said work as the Engineer may deem expedient. If at any time within the said period of one year (1 year), any part of the work contemplated in this contract shall, in the opinion of the Engineer, require repairing, the Engineer may notify the Contractor in writing to make the required repairs. If the Contractor shall neglect to make such repairs to the satisfaction of the Engineer, within three (3) days from the date of giving or mailing such notice, then the Engineer may employ other persons to make the same. The party of the first part shall pay the expense of the same out of the sum retained for that purpose. Upon the expiration of the said period of one year (1 year), provided that the work at that time shall be in good order, the Contractor shall be entitled to receive the whole or such part of the sum last aforesaid as may remain after the expense of making said repairs, in the manner aforesaid, shall have been paid therefrom, but if said expense is in excess of the sum of two per cent. (2%) retained, the Contractor shall pay to the Village of Barrington the amount of the excess.

It is, however, agreed that the party of the first part may apply or keep the sum so retained to or for payment of other claims arising and made payable by the Contractor under the provisions of this contract but remaining unsatisfied.

ART. XXVI. Neither the inspection of the party of the first part, or Engineer, or any of their employees, nor any order, measurement or certificate by the Engineer, nor any order by the party of the first part for the pay-

ment of money, nor any payment for, nor accpetance of, the whole or any part of the work by the Engineer or the party of the first part, nor any extension of time, nor any possession taken by the party of the first part or their employees, shall operate as a waiver of any provision of this contract, or of any power herein reserved to the party of the first part, or any right to damages herein provided; nor shall any waiver of any breach of this contract be held to be a waiver of any other or subsequent breach. Any remedy provided in this contract shall be taken and construed as cumulative, that is, in addition to each and every other remedy herein provided, and the party of the first part shall also be entitled as of right to a writ of injunction against any breach of any of the provisions of this contract.

ART. XXVII. No person or corporation, other than the signer of this contract as Contractor, now has any interest hereunder, and no claim shall be made or be valid, and neither the party of the first part, nor any agent thereof, shall be liable for, or be held to pay any money, except as provided in ARTICLES XIX, XXI, XXII, XXIII, XXIV, and XXV. The acceptance by the Contractor of the last payment made as aforesaid under the provisions of ART. XXIV., shall operate as, and shall be a release to the party of the first part and every agent thereof, from all claims and liability to the Contractor for anything done or furnished for, or relating to, the work, or for any act or neglect of the party of the first part or of any person relating to or affecting the work, except the claim against the party of the first part for the remainder, if there be any, of the amounts kept or retained as provided for in ARTICLES XXII. and XXV.

ART. XXVIII. The address given in the bid or proposal upon which this contract is founded is hereby designated as the place where notices, letters and other communications to the Contractor shall be certified, mailed or delivered. The delivering at the above mentioned place or depositing in a postpaid wrapper directed

to the above place, in any post office box regularly maintained by the Post Office Department of any notice, letter or other communication to the Contractor, shall be deemed sufficient service thereof to the Contractor. Such address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the party of the first part. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

In witness whereof, the said .....

..... party of the first part have hereunto set their hands and seals and the Contractor has also hereunto set his hand and seal, and the party of the first part and Contractor have executed this agreement in duplicate, one part to remain with the party of the first part, and one part to be delivered to the Contractor this ..... day of ..... in the year One Thousand Nine Hundred and ..... .

Village of Barrington, Illinois, by

.....(Seal).

.....(Seal).

.....(Seal).

.....(Seal).

.....(Seal).

.....(Seal).

Contractor.

SURETY BOND

to be furnished by

THE CONTRACTOR

for the

CONSTRUCTION OF A SANITARY SEWER SYSTEM

in the

VILLAGE OF BARRINGTON,

ILLINOIS.

B O N D.

KNOW ALL MEN BY THESE PRESENTS,

That we ..... as principal, and we ..... as surety, are held and firmly bound unto the VILLAGE OF BARRINGTON, ILLINOIS, in the sum of .... dollars ($), lawful money of the United States of America, to be paid to the said VILLAGE OF BARRINGTON, ILLINOIS, or to its attorney, successors, or assigns, for which payment, well and truly made, we bind ourselves, our successors and our several and respective heirs, executors and administrators, jointly and severally, firmly by these presents.

WHEREAS, the above bounden .... ha made a contract with the VILLAGE OF BARRINGTON, ILLINOIS, bearing date the ... . day of ..... 19 , to furnish material and labor for, and in good sufficient and workmanlike manner, construct sewers in the VILLAGE OF BARRINGTON, ILLINOIS, together will all of the work incidental thereto:

NOW THEREFORE, the condition of this obligation is such that if the said principal shall well and

truly keep and perform all the agreements, terms and conditions of said contract on part to be kept and performed, and shall also pay for all labor performed or furnished, and for all materials used, in the carrying out of said contract, then this obligation shall be void; otherwise it shall remain in full force and virtue.

IN WITNESS WHEREOF, the said ..... of ..... has hereto set ..... hand and seal, and the said ..... of ..... has caused these presents to be executed by its duly authorized officers and its corporate seal to be hereto affixed this ..... day of ..... 19 .

.....(Seal)
Contractor.

.....(Seal)

.....(Seal)

Signed and sealed in the
presence of ..... .

S P E C I F I C A T I O N S

for the

MATERIALS AND CONSTRUCTION OF SEWERS

in the

VILLAGE OF BARRINGTON,

ILLINOIS.

SPECIFICATIONS.

ART. I. EXCAVATION.

1. The ground shall be excavated in open trenches, except where tunneling is considered necessary or proper by the Engineer, in such direction as is required, to the width and depth as may be necessary for the proper construction of the sewer according to plan.

2. The trenches must be of sufficient width to admit of ample room within the lines of the sheeting to permit of the work being constructed in the manner and size specified. Wherever the nature of the ground will admit of it, the bottom of the excavation shall have the shape and dimensions of the outside of the lower half of the sewer.

3. If the character of the ground met with in excavating be such that the external form of the sewer cannot be preserved, the excavation shall be made to conform as nearly as possible to the external shape and dimensions of the sewer, and the space between the external sewer lines and the bottom and the sides of the excavation as made, shall be filled by the Contractor with dry earth well compacted.

4. The sidewalks must in no case be obstructed, and the Contractor shall make provisions at all cross streets for the free passage of vehicles and foot passengers, either by bridging or otherwise.

5. On all streets the materials excavated and the materials used in construction of the sewer shall be so placed as not to endanger the work, and so that free access may be had at any time to all parts of the trench and to all fire hydrants and water valves in the vicinity.

6. The excavation of the trench shall not advance more than two hundred (200) feet ahead of the completed pipe work, except where, in the opinion of the Engineer, it is necessary to drain wet ground.

7. Where rock is encountered in excavating the trenches, it is to be removed by drilling and blasting, or otherwise, to the level, six inches (6") below the inside of the bottom of the sewer. Where blasts are made the trench shall be carefully covered with suitable brush or timber or matting to prevent danger to life and property, and the Contractor must secure a special permit from ..... for blasting. Before the sewer is built all irregularities of the rock are to be filled with earth, well rammed into its place, and the bottom of

the trench brought to the proper grade, without extra compensation.

8. The Contractor shall strip the rock in sections of not less than fifty(50) feet in length, and shall not blast the same until notified by the Engineer that the elevation of the rock has been taken.

9. For all rock excavation, in addition to the price per foot of sewer, the Contractor shall receive a compensation of ..... ($) per cubic yard. In estimating the number of cubic yards, an arbitrary width of the trench equal to one (1) foot more than the nominal diameter will be taken, which multiplied by the depth from the surface of the rock to the level six inches below the inside of the bottom of the sewer, will be the dimensions of the rectangular section upon which estimates of quantities will be based, no allowance being made for excavation beyond these boundaries and no deductions made for the portion which is not removed. Provided, that in no case shall less than one (1) foot in depth be allowed. Boulders, one-quarter cubic yard and over in size, will be measured as rock excavation.

10. No claim for an amount of money beyond the contract price of the work will be entertained or allowed on

account of the character of the ground in which the trench or other excavations are made, except for the rock cutting heretofore specified.

11. The Contractor must assume the risk of meeting quicksand, hardpan, boulder clay, rubbish, unforeseen obstacles, underground conduits, railroad tracks, pavements, etc.

12. All water, gas, or other pipes or conduits shall be protected from injury by the Contractor, either until the sewer is built, and the back-filling finished, or if necessary, until the proper person removes or changes them. Nothing in this contract shall be so construed as to relieve any person or corporation owning or using any pipes, conduits or tracks, from the obligation to maintain and protect such pipes, conduits or tracks, without any expense to the Village of Barrington or to the Contractor building said sewer.

13. The Contractor shall ascertain for himself the existence and location of all water service pipes which may be encountered during the construction of this improvement. Where water service pipes are removed, cut or damaged in any way on account of the construction of this sewer, the Contractor shall at his own expense at once cause the water service pipes to be replaced or repaired.

In no case shall the Contractor receive extra compensation, in any form, for the removal, maintenance, repairing or replacing of extra labor involved on account of water service pipes encountered.

14. All paving, gravelling, macadamizing, planking, sidewalks, culverts, and crosswalks, or any street paving or walk whatever, shall be carefully removed, before the excavation is made, and kept separate from the other excavated material, and carefully replaced after the sewer is completed.

15. No tunneling will be allowed except upon written permission from the ..... . The tunnels shall be of such width and height as the Engineer may direct and shall be excavated in conformity with the cross-section to be approved by him.

ART. II. SHEETING AND BRACING.

1. The Contractor shall furnish, put in place and maintain such sheeting, bracing, etc., as may be required to support the sides of the trench, and to protect and maintain the adjacent streets, buildings or other improvements free of danger.

2. The sheeting and bracing shall be removed as the work progresses, in such manner as to prevent the caving in of the sides of the trench, or damage to the sewer.

3. The Contractor may at his own expense, leave the sheeting in place to prevent injury to life or property, provided that such sheeting does not come within two (2) feet of the surface of the street.

4. The ..... may order the sheeting and bracing to be left in, when in its opinion it is necessary to the protection of the work, the public, or adjacent property. For all timber which shall be ordered in writing by the ..... to be left in place the Contractor shall be paid the sum ..... dollars ($) per thousand (1000) feet, board measure.

5. The Contractor shall at his own expense shore up and restore, and make good as may be necessary, all fences, buildings, walls, or other property which may be disturbed during the progress of the work, and the said Contractor will be held responsible for all damages which may happen to neighboring property, or in any other way from the neglect of this precaution.

6. The price paid per lineal foot of sewer shall include the cost of all temporary supports and braces that may be necessary to secure a safe prosecution of the work until the permanent structure is complete; such temporary supports must in all cases be removed by the Contractor at his own expense after or concurrently with the completion of the permanent structure.

ART. III. PUMPING, BAILING AND DRAINING.

1. The Contractor shall furnish all necessary machinery for the work, shall pump, bail, or otherwise remove any water which may be found or shall accumulate in the trenches, and shall perform all work necessary to keep them clear of water while the foundations and the masonry are being constructed or the sewer laid. No structures or pipe sewers shall be laid in water.

2. When existing sewers have to be taken up or removed the Contractor shall provide and maintain temporary outlets and connections for all private or public drains, sewers, or catch-basins, and he shall take care of all sewage and storm water which will be received from these drains and sewers; and for this purpose he shall maintain and provide at his own expense an efficient

pumping plant and temporary outlet, and be prepared at all times to dispose of the water and sewage received from these temporary connections until such time as the permanent connections with the new sewers are built and in service, which permanent connections shall be made by the Contractor in a careful and workmanlike manner.

3. Water from the trenches and excavations shall be disposed of in such a manner as will not cause injury to the public health nor to public or private property, nor to the work completed or in progress, nor to the surface of the streets, nor cause any interference with the use of the same by the public.

ART. IV. RAILWAY-CROSSINGS.

1. When any railway lines are to be crossed or interfered with, notification shall be given to the railroad company at least ten (10) days prior to the beginning of said work, and the railroad company may undertake the work of shoring, bracing or otherwise protecting their right of way. In case the railroad company does not choose to carry out the work of shoring, bracing and otherwise protecting their right of way, the Contractor

shall proceed to carry out the work involved, under the direction of the Engineer.

2. The Contractor shall be allowed for material furnished and made part of the permanent construction, so far as it may be additional to that indicated on the plan, but all other work shall be done at his own expense.

ART. V. INTERFERENCE WITH EXISTING STRUCTURES AND WATER COURSES.

1. In excavating and back-filling trenches and laying the sewer, care must be taken not to move or injure any gas-, water-, sewer-, or other pipes, conduits, poles or structures without the order of the Engineer. If necessary the Contractor shall, at his own expense, sling, shore up, and secure, and maintain a continuous flow in said structures, and shall repair any damage to them and keep them in repair until the final acceptance of the completed works, leaving them in as good condition as when uncovered.

2. Should it be necessary to move the position of a pipe or conduit this shall be done in accordance

with instructions from the Engineer, and the Contractor shall be allowed for material furnished and made part of the permanent construction, so far as it may be additional to that indicated upon the plans, and for the labor performed on such additional construction, but all other work shall be done at the expense of the Contractor.

3. In case of a gas-, water-, or other pipe becoming broken in the prosecution of the work, the Contractor shall immediately notify the proper authorities, and repair the damage at once. The Contractor shall be liable for any damage to persons or property caused by such breaks.

4. The trenches shall, at such street crossings and other points as the Engineer may direct, be bridged in a secure manner, so as to prevent any serious interruption of travel upon the roadway and sidewalks and to provide for necessary access to public and private premises. The cost of all such work shall be at the expense of the Contractor.

5. All fire-hydrants should be left uncovered and easily accessible at all times.

6. All water courses, gutters, and drains shall be

maintained by the Contractor, at his own expense, so as not to interfere with their operation.

ART. VI. BLASTING.

1. All blasting operations shall be conducted in strict accordance with existing ordinances and regulations relative to rock blasting and the storage and use of explosives.

2. No blasting shall be done within ten (10) feet of an uncovered gas-, or water-pipe, or within twenty (20) feet of the finished sewer, and the end of the finished sewer shall be covered or stopped with timber or earth during each blast.

3. The site of the blast shall be covered with heavy timbers, blasting mats, or other devices to prevent damage by flying rock; and warning shall be given to all persons in the vicinity of the work before blasting.

4. The blasting shall be done only by experienced men, and the number and size of charges, and the time of blasting shall be satisfactory to the Engineer.

ART. VII. FOUNDATIONS.

1. The masonry or pipes shall be laid directly upon the bottom of the excavation wherever the ground is sufficiently firm and unyielding; but when such is not the case a foundation, built according to plans to be furnished by the Engineer, shall be constructed, for which the Contractor will receive extra compensation, as called for in Items VII. and VIII.

ART. VIII. FILLING.

1. The sewers shall in all cases be covered with earth to a depth of not less than three (3) feet, and where the trenches do not furnish sufficient material the Contractor shall supply such deficiency at his own expense.

2. When additional filling is required to be placed over the sewer for its protection, the Contractor shall furnish and spread earth, cinders or clean ashes, free from animal or vegetable matter, in such a manner and in sufficient quantity so that after it is thoroughly compacted the embankment will be of uniform grade and

cross-section, and of the dimensions shown or specified on the plans or proposal sheet. The number of cubic yards stated in the proposal sheet is approximate only.

ART. IX. BACK-FILLING.

1. Unless otherwise directed, all trenches and excavations shall be back-filled as soon as the cement in the structures placed therein has acquired a suitable degree of hardness, and the work shall be prosecuted expeditiously after it has been commenced.

2. For a depth of at least two (2) feet above the top of the sewer, the material used for back-filling shall be clean earth or sand, free from stones. The space between the pipe and the bottom and sides of the trench shall be packed full by hand and thoroughly tamped with a shovel or light tamper, as fast as placed, up to the top of the pipe. The filling shall be carried up evenly on both sides. The pipe shall then be covered by hand to a depth of two (2) feet above its top, and thoroughly tamped in layers not exceeding six (6) inches in thickness, there being one man tamping in the trench to

every one shoveling filling into the trench. The material must be deposited carefully in the trench to avoid injury to the sewer.

3. The remainder of the trench, above an elevation two (2) feet higher than the crown of the sewer, shall be back-filled with material free from organic matter, and thoroughly tamped in layers not exceeding one (1) foot in thickness, there being one man ramming for each man shoveling. Unless otherwise shown on the drawings, all trenches shall be back-filled to the height of the surface of the ground as it existed before the beginning of the work. The Contractor shall furnish, at his own expense, such material as may be necessary, due to any deficiency of the proper quality of material.

4. No heavy rock shall be dropped into the trench until there is at least three (3) feet of fill over the top of the sewer, and in depositing rock in the trench care must be taken that the rock does not injure the structure. All spaces between the pieces of rock shall be filled with earth to insure of there being no voids.

5. When sheeting is withdrawn, all cavities remaining in or adjoining the trench shall be solidly filled. When sheeting is left in place, all cavities

behind such sheeting shall be solidly filled.

6. Back-filling within two (2) feet of manholes, flush-holes, and other special structures shall be of the same quality as that specified in CLAUSE 2 of this section. It shall be uniformly deposited on all sides and, unless otherwise permitted, solidly tamped in such a manner as to avoid injuring the structures or producing unequal pressures on them.

7. In all streets that are paved or macadamized, after the trench has been back-filled to the required height, the pavement shall be relaid carefully and thoroughly to the satisfaction of the Engineer.

8. After the work is completed, all surplus material earth, rubbish, etc. shall be removed and the surface of each street included in this contract shall be left in as good condition as it was before the commencement of the work, and it shall be maintained in such condition during a period of one (1) year after the acceptance of the work.

ART. X. VITRIFIED PIPE AND SPECIALS.

1. All pipes and specials shall be of first quality, salt-glazed vitrified clay or stoneware, of the dimensions stated in the accompanying Table of Minimum Dimensions of Vitrified Pipe.

Diameter of Pipe in inches.	Thickness of Pipe in inches.	Depth of Socket in inches.	Annular Space in inches.
4	1/2	1-5/8	3/8
6	5/8	1-7/8	3/8
8	3/4	2	3/8
10	7/8	2-1/8	3/8
12	1	2-1/4	1/2
15	1-1/8	2-1/2	1/2
18	1-1/4	2-3/4	1/2

They shall be of the hub-and-spigot pattern, and each hub shall be of sufficient diameter to receive, to its full depth, the spigot end of the next following pipe or special without any chipping whatever of either, and

leave a space for the cement-mortar joint as shown in the foregoing TABLE. The pipe shall be furnished in two (2) foot lengths.

2. All pipe and specials shall be sound and thoroughly burned, with a clear ring, well glazed throughout and smooth on the inside and free from blisters, lumps, or flakes which are thicker than 1/6 of the nominal thickness of the pipe and whose largest diameters are greater than 1/8 of the inner diameter of the pipe. Pipe and specials having broken blisters, lumps, and flakes of any size shall be rejected unless the pipe can be so laid as to bring all of these defects in the top half of the sewer. No pipe having unbroken blisters more than 1/4-inch high shall be used unless these blisters can be placed in the top half of the sewer. Pipes or specials having fire checks or cracks of any kind extending through the thickness, or which betray in any manner a want of thorough vitrification or fusion or the use of improper or insufficient materials or methods in their manufacture shall be rejected.

3.- Any diameter of the pipe shall not vary more than three (3) per cent. above or below the standard

diameter, and the excess of the greatest diameter over the least in the same pipe shall not be more than three (3) per cent. No pipe shall vary more than 1/4-inch from a straight line in its length, and the ends of the barrel shall be at right angles to its axis.

4. All pipe will be inspected upon delivery, and such as do not conform to the requirements of this contract will be rejected, and must be immediately removed by the Contractor, who shall furnish all labor necessary to assist the Inspector in inspecting the material.

5. No pipe shall be used which has a piece broken from the spigot end deeper than one and one-half (1-1/2) inches, or longer at any point than one-half (1/2) the diameter of the pipe; nor which has a piece broken from the bell end if the fracture extends into the body of the pipe, or if its greatest length is greater than one-half (1/2) the diameter of the pipe, or if such fracture cannot be placed at the top of the sewer.

ART. XI. IRON CASTINGS AND PIPE.

1. All iron castings shall be made from a superior quality of gray iron, remelted in the cupola or air-furnace,

tough and of even grain, and shall have a tensile strength of not less than eighteen thousand (18,000) pounds per square inch. Test bars of the metal three (3) inches by one-half (1/2) inch, when placed upon supports eighteen (18) inches apart and loaded in the center, shall have a transverse breaking load of not less than one thousand (1000) pounds, and shall have a total deflection of not less than three-eighths (3/8) inch before breaking. These test-bars shall be poured from the ladle at any time that the Engineer may direct before or after the castings have been, or while they are being poured.

2. All castings shall conform to the shape and dimensions shown upon the drawings, and shall be clean and perfect, without blow- or sand-holes, or defects of any kind. No plugging or other stopping of holes will be allowed.

3. The castings shall be thoroughly cleaned of all lumps and subjected to careful hammer tests, after which they are to be dipped in a bath of coal-tar pitch, heated to at least 200 degrees Fahrenheit.

4. Iron pipe shall comply with the above specifications, except that the Engineer may, at his option, receive a pipe having a limited number of small blow- or

sand-holes on its exterior surface.

5. In addition to the above, all cast-iron pipe shall be of standard thickness, of the hub-and-spigot pattern.

ART. XII. BRICKS.

1. None but the best quality, sound, thoroughly burned, straight, hard brick, uniform in structure with true, even faces, shall be used. Shale brick, if used, shall be tough, homogeneous, of a compact structure, and burned uniformly throughout. They shall be free from laminations, fire cracks, and from lime or other soluble matter.

2. They shall not, after being immersed in water for twenty-four (24) hours, absorb more than ten (10) per cent., by weight, of water. They shall also meet such requirements as to specific gravity, abrasion and crushing strength as the Engineer may deem necessary.

ART. XIII. DRAINPIPE.

1. Pipe for sub-drains shall be composed of the

best quality of circular farm drain tile, in two foot lengths, and shall be hard-burned, without cracks, or any considerable departure from their nominal size, shape or cross-section.

ART. XIV. SAND.

1. All sand shall be clean and sharp, free from dirt, loam, mica and organic matter, and shall contain not more than five (5) per cent. by volume of clay, and no clay shall be artificially added. All particles must be sufficiently small to pass through a sieve having four (4) meshes per lineal inch.

ART. XV. CEMENT.

1. Unless otherwise specified, all cement shall be of the best quality of Portland Cement, and shall meet the requirements of the American Society For Testing Materials, as stated in their Specifications for Portland Cement, adopted August 16th, 1909.

2. It shall be delivered cloth sacks containing ninety-four (94) pounds net, or in sound paper lined

barrels containing three hundred seventy-six (376) pounds net, and each package shall be plainly market with the brand and manufacturer's name.

3. The cement shall be stored in a weather-tight and moisture-proof building, and each shipment shall be stored separately and marked with an identification number and date of receipt.

4. The Contractor shall submit the cement and afford every facility for inspection and testing, at least twelve (12) days before desiring to use it, and the Engineer shall be notified at once of the receipt of each shipment at the work.

5. The cement may be inspected either at the place of manufacture or at the work, and the failure of any shipment to meet the requirements of the specifications shall justify the prohibition of further use of the same brand on that work.

ART. XVI. GRAVEL AND BROKEN STONE.

1. Gravel and broken stone as required for foundations in the trench or for concrete shall be clean material, of a hard, durable and acceptable character, free from loam,

mica, dirt, clay and organic matter.

2. When used for concrete, or so ordered by the Engineer, it shall be carefully screened to pass through a one and one-half (1-1/2) inch ring, and be retained on a one-quarter (1/4) inch ring, with the particles well graded in size between these limits.

ART. XVII. PACKING.

1. Packing shall consist of flax, jute, oakum, or hemp, clean and with long fibres loosely twisted into strands.

ART. XVIII. TIMBER.

1. All timber and planking used in cradles, platforms, and foundations shall be of pine, hemlock, or timber equally as good, straight, sound, free from sap, shakes, large, loose or decayed knots, worm-holes or other imperfections which may impair its strength and durability.

2. Piling shall be of sound, straight, live yellow pine, hemlock or other material equally as good, of the

proper length, as directed by the Engineer. They shall not be less than six (6) inches in diameter at the smaller end, and shall have the bark removed.

ART. XIX. MORTAR.

1. All mortar for use in brick work shall be composed of one (1) volume of Portland Cement and two (2) volumes of sand. Mortar for use in laying pipe sewers shall be of one (1) volume of Portland Cement and one (1) volume of sand. For purposes of measurement, a barrel of cement shall be considered to contain three and eight-tenths (3.80) cubic feet, and a bag of cement to contain ninety-five hundredths (0.95) cubic feet.

2. The water used in preparing mortar must be clean and free from sewage. Salt water shall be used as directed by the Engineer when it is necessary to construct masonry in freezing weather.

3. The ingredients shall first be thoroughly mixed dry in a suitable tight box, after which the proper quantities of clean water shall be gradually added, and then the materials shall be hoed or worked until a uniform mixture is secured. No greater quantity of mortar is to be prepared than is required for immediate use, and it shall be worked over constantly with hoe or shovel until used.

Any mortar that has set shall not be retempered or used in any way.

ART. XX. MASONRY.

1. All bricks shall be clean and thoroughly wetted immediately before being laid, either by immersion or in such other manner as is acceptable to the Engineer. Old brickwork shall be cleaned and wetted before laying new work on it.

2. When work is done during freezing weather, the Contractor shall provide the necessary means for heating, and shall heat the bricks, gravel, stone, sand and water, and shall comply with all of the requirements of the Engineer to protect thoroughly the masonry from damage during and after laying, at the expense of the Contractor.

3. Every brick is required to be laid in a full and close joint of Portland Cement mortar on its bed, end and side, at one operation. The joints on the inside face of the work shall not exceed one-quarter (1/4) inch in thickness, and in no case shall mortar be slushed in afterward.

4. In stone masonry, all stones must be of good

quality, hard, clean, of good bed and build, and not less than six (6) inches thick, unless for trimming or closing. Each stone must have a firm and solid bearing, and be laid on its broadest bed, in full bed of fresh Portland Cement mortar, with which all joints shall be thoroughly filled.

5. Stone masonry shall be laid true and by line, and built to the exact dimensions and character shown on the drawings. It shall be well bonded, and the courses shall be roughly leveled up. When the laying of rubble masonry in mortar is interrupted, the tops of the courses shall be left unplastered. No dressing or tooling shall be done on or upon any stone after it is in place. No rubble masonry laid in mortar shall be constructed in freezing weather.

6. When the faces of rubble masonry laid in mortar will be exposed to view in the finished work, the joints shall be raked out to a depth of not less than one (1) inch and neatly pointed with mortar. The tops of walls, where other finish is not required, shall be plastered and floated to a smooth finish.

7. No masonry shall be built on concrete before it is thoroughly set.

ART. XXI. CONCRETE.

1. Concrete, unless otherwise specified, shall consist of one (1) bag of Portland Cement to two (2) cubic feet of sand and four (4) cubic feet of gravel or broken stone. All material shall be actually measured for each batch, in specially prepared boxes.

2. Mixing of materials shall be done thoroughly by machine wherever practicable, and always in batches. If the materials are mixed by hand, the cement and sand shall be first thoroughly mixed dry until the color of the material is of uniform tint, and then made into a soft mortar by gradually adding clean water and hoeing or otherwise working until a homogeneous mixture is obtained. The stone shall be spread upon a suitable floor to a depth of six (6) inches and thoroughly wetted, and the mortar spread evenly over it. The whole mass shall then be worked until it shall become mixed to the satisfaction of the Engineer. The concrete shall be kept in motion until deposited in place, and should any be permitted to set before it is placed and tamped, it shall be removed and not used again. The concrete shall not be mixed in larger quantities than are required for im-

mediate use; and in the case of hand mixing, batches shall not be larger than one (1) cubic yard in volume.

3. No concrete shall be laid in water, nor shall water be permitted to rise on it within twenty-four (24) hours after it is placed, nor shall water be allowed to run over completed masonry before four (4) days. No wheeling, walking or working will be allowed on finished surfaces within twenty-four (24) hours after they have been completed. Immediately after the face froms have been removed, which shall be before the concrete has completely hardened, if practicable, the surface shall be freed from inequalities and projections. All voids shall be filled by floating with cement mortar, and the entire surface shall be brushed with a thin wash composed of equal parts of cement and fine sand. Unsatisfactory concrete shall be taken down and replaced if so ordered by the Engineer.

4. Except in cold weather, the Contractor shall keep all concrete masonry wet by sprinkling with water or covering with wet cloths, until it shall have become thoroughly set and hard enough to prevent its drying and cracking. Sufficient covering shall be provided to protect fresh work from the action of the elements.

5. The quantity of concrete masonry to be paid for under the various items covering such work shall be that deposited in place in accordance with the requirements of the drawings and the Engineer. The prices stated in ITEM 7. include the cost of all forms and placing and removing them; of furnishing all materials and labor; of mixing, placing and finishing the concrete, and all expenses incidental thereto.

ART. XXII. MANHOLES.

1. All manholes shall be of brick construction, circular in cross-section, and of the dimensions shown on the plans. They should be brought up to the proper grade, as given by the Engineer, and care should be taken to see that the channels conform to the grade of the sewer.

2. Iron steps, either galvanized or coated with coal tar pitch, shall be placed in the brickwork spaced fifteen (15) inches apart vertically.

3. Manholes are to be built with two rings of brick, giving a thickness of eight (8) inches. The inner ring shall be built of whole bricks, but a limited num-

ber of brickbats may be used in the outer ring. The top ring shall in all cases be constructed of whole bricks, to be laid as headers.

ART. XXIII. FLUSH-HOLES.

1. Flush-holes shall be built where the Engineer may direct, of the size and form as shown in the drawings. All flush-holes of a depth greater than six (6) feet shall be properly protected at the foot by brick masonry, as may be directed by the Engineer.

ART. XXIV. CAST IRON COVERS.

1. Unless otherwise indicated, every manhole and flush-hole shall be provided with a cast iron frame and cover of the dimensions shown on the drawings. The frames and covers shall be of the best grade of cast iron, free from imperfections, thoroughly cleaned and coated with a coal tar pitch of approved quality, and shall weigh not less than three hundred and seventy (370) pounds. The castings must conform to the requirements of ART. XI. All covers should fit into the frames as neatly as possible without jamming.

ART. XXV. LAYING VITRIFIED PIPE.

1. The pipe lines shall be constructed of pipes of such sizes and laid to such lines and grades as are shown on the drawings, or as directed by the Engineer. Unless otherwise directed, the joints shall be made as required in CLAUSE 6 of this ARTICLE.

2. When the sewer is to be laid without a cradle, the earth forming the bed shall be carefully freed from stones. The pipe shall then be evenly bedded in the earth over the lower third of its circumference, great care being taken to remove only enough of the earth to leave a uniform support for the entire length of the pipe, except the bell, under which a recess shall be excavated to a sufficient depth to relieve it of any load and to allow ample room for making the joint. In case the bed trimmed in the bottom of the trench is too low, earth must be thrown into the bottom and thoroughly rammed, and a new bed trimmed for the pipe. It is forbidden to raise the grade of the pipe by ramming earth under it. When the pipe has been bedded satisfactorily and the joint made, the recess under the bell shall be refilled with earth, and enough earth shall be refilled and tamped on

each side of the pipe to hold it securely in place, care being taken not to disturb the position of the pipe during this process.

3. The concrete cradle shall have a thickness of at least six (6) inches, unless otherwise directed. In rock excavation the amount of concrete shall be sufficient to fill the space about the pipe. The concrete for the full width of the cradle shall be deposited continuously to the height of the outside of the bottom of the pipe. Before this concrete has set the pipe shall be evenly bedded therein, so as to have a uniform support for its entire length, and the remainder of the concrete shall be immediately deposited, and carefully tamped so as to avoid changing the position of the pipe.

4. Where the sewer is to be laid in a gravel or broken stone cradle, the latter shall consist of gravel or broken stone passing through a one (1) inch mesh, and retained on a one-eighth (1/8) inch mesh. This shall be deposited and tamped for the full width of the trench to the height of the outside of the bottom of the pipe. The pipe shall then be bedded on this material and the remainder of the gravel deposited and carefully tamped so as to avoid disturbing the pipe, but giving a uniform support to its entire length.

5. All pipe, previous to being lowered into the trench, shall be fitted together dry on the surface and matched, so that when jointed in the trench they shall form a true line of tubes. Each pipe shall be laid so as to form a close joint with the next adjoining pipe, and bring the inverts continuously to the required line and grade.

6. Cement joints shall be made as nearly water-tight as possible, and in the following manner:- A closely twisted gasket of hemp or jute, of suitable diameter to bring the pipe into their proper relative position but in no case less than three-quarters (3/4) of an inch, and long enough to pass around the pipe, shall be soaked in neat Portland Cement grout and then rammed into the annular space between the bell and the hub with the proper calking tools. The remainder of the joint shall then be filled with cement mortar applied with the hands, protected by rubber mittens. This mortar shall be used as soon as mixed and shall be composed of equal parts of cement and sand, mixed dry with enough water added subsequently to give to it the proper consistency. This mortar shall be well pressed and calked into place, after which the joint shall be beveled off with mortar for a distance of two (2) inches from the outer edge of the bell.

The joint shall be wrapped in unbleached cotton cloth, securely tied to prevent the mortar from slipping or being otherwise injured. No surplus mortar or other foreigh substance shall project into the pipe from the joints; and, if necessary, they shall be cleaned with a "go-devil" or disk swab attached to a rope or rod sufficiently long to pass two (2) joints from the end of the pipe last laid and pulled forward as the work progresses, or in some other manner satisfactory to the Engineer.

7. Plain mortar joints shall be made as follows:- Before the pipe is laid, the lower half of the bell of the proceeding pipe shall be plastered on the inside with stiff mortar of equal parts of Portland Cement and sand, of sufficient thickness to bring the inner bottoms of the abutting pipe flush and even. After the pipe is laid, the remainder of the bell shall be thoroughly filled with similar mortar, and the joint wiped inside and finished to a smooth bevel outside.

ART. XXVI. LAYING CAST IRON PIPE.

1. The materials shall be distributed by the Contractor as required, and care shall be exercised to pre-

vent any injury inhandling. Proper tools and implements satisfactory to the Engineer for safely handling the pipe and other materials shall be provided by the Contractor, and particular care shall be taken to prevent the abrasion of the pipe coating. Whenever the pipe coating shall be found to have been rubbed off to an unusual extent, the part shall be thoroughly cleaned and re-coated by the Contractor, with paint or other coating satisfactory to the Engineer.

2. All specials and other appurtenances required for the pipe line shall be set by the Contractor, as directed by the Engineer, without additional compensation.

3. Every pipe shall be cleared of all debris, stone, dirt, etc. and inspected for cracks before being laid; and if found to be cracked, shall be removed from the work. The bell of the pipe shall be wiped out before inserting into it the spigot of the next pipe, which latter shall then be shoved home firmly against the bottom of the bell in such a manner as to prevent the pipe becoming displaced after the joints are poured with lead. The pipe shall be laid to line and grade as required.

4. Packing shall be of good sound hemp yarn, jute, or oakum, braided or twisted, cut off in lengths as nec-

essary, and tightly driven home. All packing shall be furnished by the Contractor.

5. The depth of the lead joints shall be about two (2) inches, measured from the face of the bell after calking to the back side of the groove. The lead shall be furnished by the Contractor, and shall be of the best quality, pure and soft and suitable for calking. The lead melting pot shall be at all times kept within easy reach of the joint, at a distance not over fifty (50) feet, so that the lead shall, under no circumstances, be chilled in being carried from the melting pot to the pipe. The joint shall be run at one pouring, using such ladles as may be necessary, and shall thereafter be calked by skilled mechanics, using at least two (2) sets besides the small set or chisel, in such a manner as to give a permanently tight joint flush with the end of the bell, without straining the pipe or the bell.

6. The length of pipe to be paid for will be based upon the measurements taken along the center line of the pipe, including specials and other appurtenances measured along their center lines, from center to center of manholes, or center to center of flush-holes, and will apply

to either main lines or laterals.

7. The price per linear foot agreed upon under ITEM 2 shall include the cost of furnishing the pipe, packing, lead and all other materials used for laying and jointing the pipe, together with all cutting of the pipe, and other labor necessary for the same.

ART. XXVII. BRANCHES, SIDE JUNCTIONS, ETC.

1. The "Y" branches, "T" branches, flush-holes, manholes, and drop manholes shall be placed at points indicated by the Engineer, and they shall not be covered until he has noted and recorded their exact position.

2. The "Y" branches shall be elevated to correspong to the lateral sewers and house drains entering them. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand, covered with a thin coating of cement.

3. All house connections shall be four inches (4") in diameter. They shall commence fifty (50) feet from the street intersections, unless otherwise ordered, and shall be placed every twenty-five (25) feet thereafter through the block, in a thorough and workmanlike manner.

ART. XXVIII. GENERAL STIPULATIONS.

1. The work herein specified to be done consists of furnishing materials for, and the construction of, sewers in the Village of Barrington, Town of Barrington, Illinois.

2. The Contractor shall furnish and do everything, except as herein otherwise provided, necessary to complete the work in accordance with the terms of this contract and with the requirements of the Engineer thereunder. He is to make the requisite excavations for building the various structures; to do all ditching, pumping, bailing and draining, all sheeting, shoring, bracing, cofferdamming and supporting, all fencing, lighting, and watching; to make all provisions necessary to maintain and protect existing structures of whatever kind; to repair all damage done to such structures; to construct all brick, concrete, and stonework; to set in place ironwork; to refill excavations as required; to clear away all rubbish, and surplus material, and to furnish all materials, all tools, implements and labor required, and to do all other work necessary for the completion of this contract.

3. All materials furnished and work done by the Contractor shall be subject to the inspection of the En-

gineer, and defective materials shall be removed from the site of the work and defective work repaired or replaced by order of the Engineer. Facilities for handling and inspection of materials and work shall at all times be furnished by the Contractor and delays in handling the materials involving storage charges shall be at the expense of the Contractor, who shall provide suitable and adequate storage room for materials during the progress of the work and shall be responsible for any loss or damage to materials furnished by him until the final acceptance of the completed work.

4. The order of sequence of the work and the general conduct of the work shall be subject to the approval and direction of the Engineer, which approval or direction shall, however, in no wise affect in the conduct of the work the responsibility of the Contractor.

5. All necessary lines, levels, and grades shall be given to the Contractor, who shall provide at his own expense such forms, materials and assistance as may be required by the Engineer.

6. All work shall conform during its progress or on its completion truly to the lines, levels and grades given by the Engineer and shall be built in a thoroughly

substantial and workmanlike manner, in accordance with the plans and directions given from time to time by him, subject to such modifications and additions as shall be deemed necessary by him during its execution, and in no case shall any work in excess of the plan requirements and specifications be paid for unless ordered in writing by the aforesaid Engineer.

7. All work done without lines, levels or instructions having been given therefor by the Engineer, or done during the absence of an assistant or inspector, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered removed and replaced at the Contractor's sole cost and expense.

8. The pipe grade line, or pipe water line, so called, is assumed herein to mean the bottom of the inside of the pipe, whether laid directly upon the ground or otherwise supported, and measurements of the depth of excavation (excepting rock excavation) shall be to a depth of two-tenths (0.2) of a foot below this grade line except where a concrete cradle is constructed, in which case it shall be to a depth of five-tenths (0.5) of a foot below said grade line. In case of rock excavation the

measurements shall be to a depth of five-tenths (0.5) of a foot below said grade line, except where a concrete cradle is constructed, in which case it shall be to a depth of thirty-three hundredths (0.33) of a foot below said grade line.

9. Unless otherwise specified, all trenches shall be assumed to be two (2) feet in width.

10. The Contractor shall not, without written consent of the owners, occupy any land with men, tools or materials.

ESTIMATE OF APPROXIMATE COST

of a

SANITARY SEWER SYSTEM

for the

VILLAGE OF BARRINGTON,

ILLINOIS.

ESTIMATE OF

APPROXIMATE COST OF SEWER SYSTEM.

In the accompanying estimate of approximate cost of the system, the prices used were arrived at in the following manner:-

All vitrified tile sewer pipe, both straight and "Y" branches, were figured on the basis of 70% discount from the list price.

The price of cast iron pipe was taken as $30.00 per ton, net.

The price of laying pipe, including hauling, labor, packing and cement, was taken as one cent per inch of diameter of pipe, per lineal foot laid.

The cost of trenching, including excavation, sheeting and bracing, and back-filling, was taken as fifty-five cents per cubic yard.

The approximated depth of manholes was eleven and sixth-tenths (11.6) feet, and the price was figured on the basis of $2.50 per linear foot plus $6.00 for the cover, making an average cost of each plain manhole of $35.00.

The cost of each drop manhole was estimated to be approximately $15.00 in addition to that of a plain manhole, making an approximate average cost of each drop manhole of $50.00.

The approximate average cost of each flush-hole was found to be $12.00.

The length of the sewer lines, complete, was computed to be 46,498 feet.

The cost of the sewer per linear foot, complete, exclusive of manholes, drop manholes, and flush-holes is $31,282.20 divided by 46,498 or is equal to $0.6727 per linear foot.

ESTIMATE OF APPROXIMATE COST OF SEWER SYSTEM.

38,796 feet of 8-inch straight pipe @ $0.165 per linear foot	= $6,401.34			
1,552 " " 10-inch " " @ 0.240 " " "	= 372.48			
1,566 " " 12-inch " " @ 0.300 " " "	= 469.80			
		$ 7,243.62		
1,422 "Y" branches, two feet long, @ $0.66 per length.	= $ 938.52			
53 "Y" " " " " @ 0.96 " "	= 50.88			
		$ 989.40		
480 feet of 8" C. I. pipe (Wt.=22,800#) @ $30.00 per ton	= $ 342.00			
348 " " 10" C. I. " (Wt.=22,185#) @ $30.00 " "	= 332.775			
540 " " 12" C. I. " (Wt.-44,325#) @ $30.00 " "	= 664.875			
		$ 1,339.65		
Cost of laying pipes:-				
42,120 feet of 8-inch pipe @ $0.08 per linear foot.	= $3,369.60			
2,006 " " 10-inch " @ 0.10 " " "	= 200.60			
2,106 " " 12-inch " @ 0.12 " " "	= 252.72			
		$ 3,822.92		
32,521.1 cubic yards of Trenching @ $0.55 per cubic yard	=		$17,886.61	
Total Cost of 46,498. feet of Sewer lines, exclusive of appurtenances =				$31,282.20
Appurtenances:-				
70 Plain Manholes, complete with cover, @ $35.00	= $2,450.00			
40 Drop Manholes, " " " , @ 50.00	= 2,000.00			
40 Flush-holes, " " " , @ 12.00	= 480.00			
		$ 4,930.00		$ 4,930.00
TOTAL COST OF A SANITARY SEWER SYSTEM FOR THE VILLAGE OF BARRINGTON				$36,212.20

Snaps taken on the Profile Survey,

Barrington, Illinois.

March, 1915.

9	20	21
ELEV. From(a)	NUMBER OF 12'-0" LENGTHS OF C.I. PIPE	FILL IN CU.YDS.
164.50	25	1481.4
170.77	20	
171.27	14	
179.08		
170.77	15	
171.66		
171.80		
172.59		
174.41		
176.54		
173.68		
174.23		
174.52		
176.16		
173.47		
174.19		
176.32		
178.90		
174.55		
176.08		
178.20		
176.02		
176.67		
182.55		
178.42		
185.15		
199.89		
205.15		
213.15		
178.42		
176.15		
176.31		
180.15		

J. JUCKER, JR.

Data for Sanitary Sewer System for the Village of Barrington, Illinois.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Profile Page	STREET	LOW END From (a)	HIGH END To (b)	DIAMETER IN INCHES	LENGTH IN FEET.	GRADE %	FALL IN FEET.	ELEVATIONS From(a)	ELEVATIONS To (b)	SECTIONS FROM PROFILES	AVERAGE DEPTH IN FEET	WIDTH OF TRENCH IN FEET	EXCAVATION IN CUBIC YARDS	MAN HOLES	DROP MAN-HOLES	FLUSH HOLES	"Y" BRANCHES	NUMBER OF 24' LENGTHS OF STRAIGHT PIPE	NUMBER OF 12'-0" LENGTHS OF C.T. PIPE	FILL IN CU.YDS.
	MAIN TRUNK SEWER	SEPTIC TANK	HARRISON	12	1525.0	0.0833	1.27	169.50	170.77					4				605.	25	1481.4
	" " "	HARRISON	GARFIELD	12	600.0	0.0833	0.50	170.77	171.27	4500. sq.ft.	7.5		333.3	1				170	20	
1.	GARFIELD	MAIN TRUNK SEWER	LIBERTY	10	420.0	0.125	0.53	171.27	171.80	3130.	7.45		231.8	1			8.	116.	14	
	" "	APPLEBEE	MAIN	8	530.0	0.500	2.65	179.08	181.73	3450.	6.52		255.5		1		18	245.		
1.	HARRISON	MAIN TRUNK SEWER	APPLEBEE	10	445.0	0.200	0.89	170.77	171.66	3460.	7.71		256.4				7	126.	15	
	" "	APPLEBEE	MAIN	10	525.0	0.200	1.05	171.66	172.71	7600.	14.62		563.0	1			18	243.		
7.	LIBERTY	GARFIELD	WALNUT	10	630.0	0.125	0.79	171.80	172.59	1730.	2.75		128.1	2			20	291.		
	" "	WALNUT	WILLIAMS	8	364.0	0.500	1.82	172.59	174.41	2400.	6.60		177.8	1			11	169.		
	" "	WILLIAMS.	ELA	8	425.0	0.500	2.13	174.41	176.54	3330.	7.84		246.8	1			14	197.		
	" "	ELA	N. HAWLEY	8	520.0	0.500	2.60	176.54	179.14	3460.	6.65		256.1	1			18	240.		
13.	JAMES	WALNUT	275' NE. TO JOG	8	275.0	0.200	0.55	173.68	174.23	540.	1.97		40.0	1			9	127.		
	" "	JOG, 275' NE. OF WALNUT	WILLIAMS	8	145.0	0.200	0.29	174.23	174.52	350.	2.42		25.9	1			4	67.		
	" "	WILLIAMS	300' E. TO DEAD END	8	300.0	0.200	0.60	174.52	175.12	920.	3.07		68.2	1		1	10	137.		
13.	UNNAMED, bet. James and Liberty	" "	" " " "	8	300.0	0.200	0.60	176.16	176.76	2290.	7.63		169.8	1		1	10	137.		
7.	WASHINGTON	WALNUT	WILLIAMS	8	360.0	0.200	0.72	173.47	174.19	1100.	3.06		81.5	1			11	167.		
	" "	WILLIAMS	ELA	8	425.0	0.500	2.13	174.19	176.32	2600.	6.12		192.6	1			14	197.		
	" "	ELA	N. HAWLEY	8	515.0	0.500	2.58	176.32	178.90	4060.	7.89		300.8	1			18	238.		
	" "	N. HAWLEY	338' E. TO DEAD END	8	350.0	0.500	1.75	178.90	180.65	3450.	9.86		255.5	1		1	12	160.		
5.	FRANKLIN	WALNUT	WILLIAMS	8	360.0	0.333	1.20	174.55	175.75	2890.	8.04		214.0	1			11	167.		
	" "	WILLIAMS	ELA	8	423.0	0.500	2.12	176.08	178.20	3750.	8.86		277.8	1			14	196.		
	" "	ELA.	N. HAWLEY	8	515.0	0.500	2.57	178.20	180.77	5900.	11.47		437.0	1			18	238.		
5.	CHESTNUT	WILLIAMS	195.0 S.E. TO JOG.	8	195.0	0.333	0.65	176.02	176.67	1760.	9.03		130.3	1			5	91.		
	" "	JOG, 195' S.E. OF WILLIAMS	ELA	8	265.0	0.333	0.88	176.67	177.55	2730.	10.30		202.3	1			8	123.		
	" "	ELA	N. HAWLEY	8	515.0	0.500	2.58	182.55	185.13	5470.	10.61		405.1		1		18	238.		
18.	MAIN	ELA	SPRING	8	220.0	0.333	0.73	178.42	179.15	3190.	14.51		236.0	1			6	102.		
	"	SPRING	UNNAMED STREET	8	548.0	0.500	2.74	185.15	187.89	6420.	11.71		475.0		1		19	253.		
	"	UNNAMED STREET	1000. E. OF SPRING	8	452.0	0.500	2.26	194.89	197.15	4900.	11.83		363.0		1		17	207.		
	"	1000' E. OF SPRING	1200' " " "	8	200.0	0.500	1.00	205.15	206.15	2190.	10.95		162.3		1		7	91.		
	"	1200' " " "	E. VILLAGE LIMITS	8	420.0	0.500	2.10	213.15	215.25	3900.	9.28		289.0		1	1	15	192.		
	"	ELA	270' W. TO DEAD END	8	270.0	0.500	1.35	178.42	179.77	3910.	14.49		289.5			1	10	124.		
	"	WALNUT	HOUGH	8	32.0	0.500	0.16	176.15	176.31	500.	15.62		37.1		1			14.		
	"	HOUGH	RAILROAD STREET	8	140.0	0.500	0.70	176.31	177.01	2100.	15.00		155.6	1			4	64.		
	"	WALNUT	650' W. TO DEADEND	8	650.0	0.500	3.25	180.15	183.40	5690.	8.75		422.0	1		1	24	298.		

Width of Trench, in all cases, = 2'-0"

J. JUCKER, JR.
C. J. TRINKAUS.

181.73		
172.71		
172.97	15	
175.39		
182.62		
177.96		
182.96		
187.14		
171.27		
177.01		
178.14		
180.32		
190.32		
188.27		
186.61		
189.61		
194.79		
180.50		
193.25		
189.92		
191.26		
181.16		
191.57		
192.91		
181.82		
181.82		
183.32		
192.62		
195.94		
236.50		
250.15		
240.68		
175.39		
180.97		
186.62		
188.27		

J. JUCKER, JR.
G. J. TRINKAUS.

II

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
13.	MAIN	GARFIELD	410' W. TO DEAD END	B	410.0	0.500	2.05	181.73	183.78	4260. sq ft	10.40		315.4	1		1	16	186.		
	"	HARRISON	CEMETERY	B	130.0	0.200	0,26	172.71	172.97	3180.	24.44		235.6	1			4	57.		
	"	CEMETERY	HAGER	B	1210.0	0.200	2.42	172.97	175.39	20,140.	16.62		1490.4	3	1		39	468.	15	
	"	HAGER	W. VILLAGE LIMITS.	B	165.0	0.500	0.83	175.39	176.22	1300.	7.88		963	1		1	5	75		
15.	STATION	CEMETERY	650' E. TO DEAD END	B	650.0	0.500	3.25	182.62	185.87	6650.	10.22		492.5	1		1	23	299.		
	" "	HOUGH	550' W. " " "	B	550.0	0.500	2.75	177.96	180.71	3920.	7.14		290.5			1	20	254.		
	" "	" "	275' E. " " "	B	275.0	0.500	1.38	182.96	184.34	1930.	7.03		143.0			1	9	133.		
	" "	COOK	260' E. " " "	B	260.0	0.500	1.30	187.14	188.44	2540.	9.77		188.1			1	8	121.		
14.	RAILROAD STREET	GARFIELD	WALNUT	B	795.0	0.500	3.98	171.27	175.25	11,925.	15.0		883.6	1			27	369.		
	" " " "	MAIN	COOK	B	226.0	0.500	1.13	177.01	178.14	3960.	15.31		256.5	1			7	104.		
	" " " "	COOK	GROVE	B	400.0	0.500	2.00	178.14	180.14	7000.	1750		518.0		1		10	188.		
	" " " "	SPRING	200' NW OF SPRING	B	200.0	0.500	1.00	180.32	181.32	2270.	11.35		168.1				6	94.		
	" " " "	200' NW OF SPRING	325' NW TO DEAD END	B	125.0	0.500	0.63	190.32	190.95	1230.	9.84		91.2		1		3	57.		
15.	LAKE	CEMETERY	650' E " " "	B	650.0	0.500	3.25	188.27	191.52	7810.	12.00		578.0	1		1	23	299.		
	" "	HOUGH	550' W. " " "	B	550.0	0.500	2.75	186.61	189.36	4130.	7.50		306.0			1	20	254.		
	" "	" "	275' E " " "	B	275.0	0.500	1.38	189.61	190.99	2370.	8.62		175.7			1	9	128.		
	" "	COOK	275' E " " "	B	275.0	0.500	1.38	194.79	196.17	2140.	7.79		158.6			1	9	120.		
	" "	SPRING	150' W. OF SPRING	B	150.0	0.500	0.75	180.50	181.25	1900.	12.68		140.7				4	71.		
	" "	150' W. OF SPRING	280' " " "	B	130.0	0.500	0.65	193.25	193.90	1630.	12.53		120.7		1	1	4	58.		
16.	HAWLEY	CEMETERY	650' E. TO DEAD END.	B	650.0	0.500	3.25	189.92	193.17	6210.	9.56		460.0	1		1	23	299.		
	" "	HOUGH	550' W. " " "	B	550.0	0.500	2.75	191.26	194.01	5120.	9.28		379.3			1	20	254.		
	" "	SPRING	300' E. " " "	B	300.0	0.500	1.50	181.16	182.66	2710.	9.03		200.5			1	10	139.		
16.	RUSSELL	CEMETERY	650' E. " " "	B	650.0	0.500	3.25	191.57	194.82	7230.	11.10		535.6	1		1	23	299.		
	" "	HOUGH	550' W. " " "	B	550.0	0.500	2.75	192.91	195.66	3460.	6.30		256.5			1	20	259.		
	" "	SPRING	GROVE	B	330.0	0.500	1.65	191.82	193.47	2330.	7.08		172.7				11	154.		
	" "	" "	SUMMIT	B	300.0	0.500	1.50	191.82	193.32	1510.	5.03		111.9	1			10	138.		
	" "	SUMMIT	DIVISION	B	460.0	0.500	2.30	183.32	185.62	5620.	12.21		416.5	2			15	211.		
	" "	DIVISION	PRAIRIE	B	330.0	0.500	1.65	192.62	194.27	4120.	12.45		305.0		1	1	15	151.		
14.	UNNAMED, bet. Russel and Limit.	CEMETERY	1260' E. TO DEAD END	B	1260.0	0.500	6.30	195.94	202.24	12,390.	9.84		916.0	3		1	44	579.		
17.	LIMIT	HOUGH	COOK	B	330.0	0.500	1.65	236.50	238.15	4640.	14.05		343.8		1		11	152.		
	" "	COOK	275' E. TO DEAD END	B	275.0	0.500	1.38	250.15	251.53	2230.	8.48		165.3		1	1	9	126.		
	" "	DIVISION	1075' W. " " "	B	1075.0	0.500	5.38	240.68	246.06	10,850.	10.09		803.0	1	1	1	38	495.		
2.	HAGER	MAIN	1100' S " " "	B	1100.0	0.200	2.20	175.39	177.59	6620.	6.02		490.6	3		1	39	504.		
12.	CEMETERY	" "	STATION	B	330.0	0.500	1.65	180.97	182.62	4460.	13.51		330.5				11	154.		
	" "	STATION	LAKE	B	330.0	0.500	1.65	186.62	188.27	3450.	10.45		255.5		1		11	152.		
	" "	LAKE	HAWLEY	B	330.0	0.500	1.65	188.27	189.92	2820.	8.55		208.8	2			10	152.		

J. JUCHEM, JR.
G. J. TINNIUS.

II

189.92
191.57
172.59
172.59
173.47
175.25
176.31
177.96
189.61
191.26
192.91
204.28
213.92
224.42
174.52
174.41
175.75
175.75
176.02
186.14
187.14
188.79
190.44
192.09
203.13
214.13
225.63
235.63
196.14
190.47
200.12
191.47
200.47
214.47
223.47
233.47

J. JUCKER, JR.
G. J. TRINKAUS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
12.	CEMETERY	HAWLEY	RUSSELL	8	330.0	0.500	1.65	189.92	191.57	2590.sq.ft.	7.78		192.0	1			11	152.		
	" "	RUSSELL	UNNAMED	8	273.0	0.500	1.37	191.57	192.94	3040.	11.14		225.6	1	1		9	124.		
8.	WALNUT	LIBERTY	JAMES	8	546.0	0.200	1.09	172.58	173.68	4100.	7.51		303.9				19	254.		
	" "	" "	WASHINGTON	8	265.0	0.333	0.88	172.58	173.47	1220.	4.61		90.5				9	124.		
	" "	WASHINGTON	FRANKLIN	8	325.0	0.333	1.08	173.47	174.55	1490.	4.58		110.4				10	158.		
	" "	RAILROAD STREET	MAIN	8	180.0	0.500	0.90	175.25	176.15	2540.	14.39		192.0	1			6	82.		
11.	HOUGH	MAIN	STATION	8	330.0	0.500	1.65	176.31	177.96	4000.	12.12		296.3				10	155.		
	" "	STATION	LAKE	8	330.0	0.500	1.65	177.96	179.61	4260.	12.91		315.8		1		11	152.		
	" "	LAKE	HAWLEY	8	330.0	0.500	1.65	189.61	191.26	3010.	9.13		223.0		1		11	152.		
	" "	HAWLEY	RUSSELL	8	330.0	0.500	1.65	191.26	192.91	2880.	8.73		213.4	2			10	152		
	" "	RUSSELL	UNNAMED	8	273.0	0.500	1.37	192.91	194.28	3020.	11.05		223.8	1			9	126.		
	" "	UNNAMED	600 S OF RUSSELL	8	327.0	0.500	1.64	204.28	205.92	3450.	10.55		255.5		1		12	150.		
	" "	600' S. OF RUSSELL	1100' " " "	8	500.0	0.500	2.50	213.92	216.42	4760.	9.52		353.0		1		19	279.		
	" "	1100' " " "	LIMIT	8	415.0	0.500	2.08	224.42	226.50	5170.	12.48		383.0		1		14	242.		
6.	WILLIAMS	JAMES	UNNAMED	8	328.0	0.500	1.64	174.52	176.16	1790.	5.46		132.5				11	153.		
	" "	LIBERTY	330' N. TO DEAD END	8	330.0	0.500	1.65	174.41	176.06	2620.	7.94		194.0			1	12	152.		
	" "	FRANKLIN (W. of Williams)	FRANKLIN (E. of Williams)	8	65.0	0.500	0.33	175.75	176.08	760.	11.69		56.3	1				31.		
	" "	" " " " " "	CHESTNUT	8	80.0	0.333	0.27	175.75	176.02	980.	12.25		72.6				2	38.		
	" "	CHESTNUT	230' S. TO DEAD END	8	230.0	0.500	1.15	176.02	177.17	2990.	13.10		221.5			1	7	107.		
10.	COOK	RAILROAD STREET	STATION	8	200.0	0.500	1.00	186.14	187.14	1370.	6.85		101.5				6	94.		
	" "	STATION	LAKE	8	330.0	0.500	1.65	187.14	188.79	3180.	9.64		235.5	1			11	152.		
	" "	LAKE	HAWLEY	8	330.0	0.500	1.65	188.79	190.44	4900.	14.87		363.0		1		11	152		
	" "	HAWLEY	RUSSELL	8	330.0	0.500	1.65	190.44	192.09	3960.	12.00		293.3	1			11	152.		
	" "	RUSSELL	607' S OF RUSSELL	8	607.0	0.500	3.04	192.09	195.13	5080.	8.35		376.5	1			22	280.		
	" "	607' S OF RUSSELL	807' " " "	8	200.0	0.500	1.00	203.13	204.13	2510.	12.55		186.0		1		8	90.		
	" "	807' " " "	1107' " " "	8	300.0	0.500	1.50	214.13	215.63	3950.	13.17		292.5		1		11	137.		
	" "	1107' " " "	1307' " " "	8	200.0	0.500	1.00	225.63	226.63	2090.	10.45		154.8		1		7	91.		
	" "	1307' " " "	1457' " " "	8	150.0	0.500	0.75	235.63	236.38	2010.	13.39		143.9		1	1	5	67.		
9.	GROVE	RAILROAD STREET	260' S. TO DEAD END	8	260.0	0.500	1.30	190.14	191.44	2030.	7.82		150.3		1	1	9	118.		
	" "	RUSSELL	HAWLEY	8	330.0	0.500	1.65	190.47	192.12	3130.	9.48		232.0		1		11	152.		
	" "	HAWLEY	280' N. OF HAWLEY	8	280.0	0.500	1.40	200.12	201.52	2030.	7.25		150.3		1	1	9	128.		
	" "	RUSSELL	200' S. OF RUSSELL	8	200.0	0.500	1.00	191.47	192.47	2050.	10.25		151.8				6	94.		
	" "	200' S. OF RUSSELL	400' " " "	8	200.0	0.500	1.00	200.47	201.47	2580.	12.90		191.1		1		7	91.		
	" "	400' " " "	800' " " "	8	400.0	0.500	2.00	214.47	216.47	4490.	11.23		332.8		1		15	183.		
	" "	800' " " "	1200' " " "	8	400.0	0.500	2.00	223.47	225.47	3760.	9.40		278.6		1		15	183.		
	" "	1200' " " "	1350' " " "	8	150.0	0.500	0.75	233.47	234.22	1520.	10.12		112.7		1		5	68.		

III

5	20	21
243.22		
176.54		
177.55		
179.15	25	
180.32		
180.50		
181.16		
179.14		
179.14		
178.90		
180.77		
185.13		
192.62		
200.12		
209.12		
219.18		
225.92		
237.13		
171.66		

J. JUCKER, JR.
G. J. TRINKAUS.

IV

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
9.	GROVE	1350' S. OF RUSSELL	1430' S. OF RUSSELL	8	80.0	0.500	0.40	243.22	243.62	74 lin ft	9.25		54.9		1	1	2	35.0		
6.	ELA	LIBERTY	200' N. TO DEAD END	8	200.0	0.500	1.00	176.54	177.54	1320.	6.60		97.7			1	6	93.0		
	"	CHESTNUT	MAIN	8	260.0	0.333	0.87	177.55	178.42	3320.	12.78		246.0				7	123.0		
2.	SPRING	MAIN	RAILROAD STREET	8	586.0	0.200	1.17	179.15	180.32	5900.	10.06		457.2	1			10	134.	25	
	" "	RAILROAD STREET	LAKE	8	90.0	0.200	0.18	180.32	180.50	610.	6.77		45.2	1			2	41.		
	" "	LAKE	HAWLEY	8	330.0	0.200	0.66	180.50	181.16	3650.	11.07		270.2	1			10	153.		
	" "	HAWLEY	RUSSELL	8	330.0	0.200	0.66	181.16	181.82	3730.	11.30		276.5	1			10	153.		
8	NORTH HAWLEY	LIBERTY	800' N. TO DEAD END	8	800.0	0.500	4.00	179.14	183.14	4830.	6.04		358.0	2		1	29	361.		
	" " " "	" "	210' S. " " "	8	210.0	0.500	1.05	179.14	180.19	1700.	8.10		125.9			1	7	97.		
	" " " "	WASHINGTON	210' S. " " "	8	210.0	0.500	1.05	178.90	179.95	1840.	8.76		136.3			1	7	97		
	" " " "	FRANKLIN	210' S. " " "	8	210.0	0.500	1.05	180.77	181.82	2420.	15.20		179.3	1		1	7	95.		
	" " " "	CHESTNUT	210' S. " " "	8	210.0	0.500	1.05	185.13	186.18	2640.	12.58		195.7	1		1	7	95.		
4.	DIVISION	RUSSELL	300' S. OF RUSSELL	8	300.0	0.500	1.50	192.62	194.12	3280.	10.93		243.0				16	190.		
	" "	300' S. OF RUSSELL	500' " " "	8	200.0	0.500	1.00	200.12	201.12	2360.	11.80		174.8		1		7	91.		
	" "	500' " " "	TAFT	8	212.0	0.500	1.06	209.12	210.18	2360.	11.12		174.8		1		7	97.		
	" "	TAFT	HILLSIDE	8	147.0	0.500	0.74	219.18	219.92	1630.	11.09		120.6		1		5	67.		
	" "	HILLSIDE	1300' S. OF RUSSELL	8	441.0	0.500	2.21	225.92	228.13	4220.	9.58		312.5		1		17	202.		
	" "	1300' S. OF RUSSELL	LIMIT	8	110.0	0.500	0.55	237.13	237.68	1130.	10.28		83.7		.1		3	50.		
13.	APPLEBEE	HARRISON	GARFIELD.	8	483.0	0.500	2.42	171.66	174.08	6850.	14.21		507.5				17	225.		

J. JUCKER, JR.
C. C. TRINGALI.

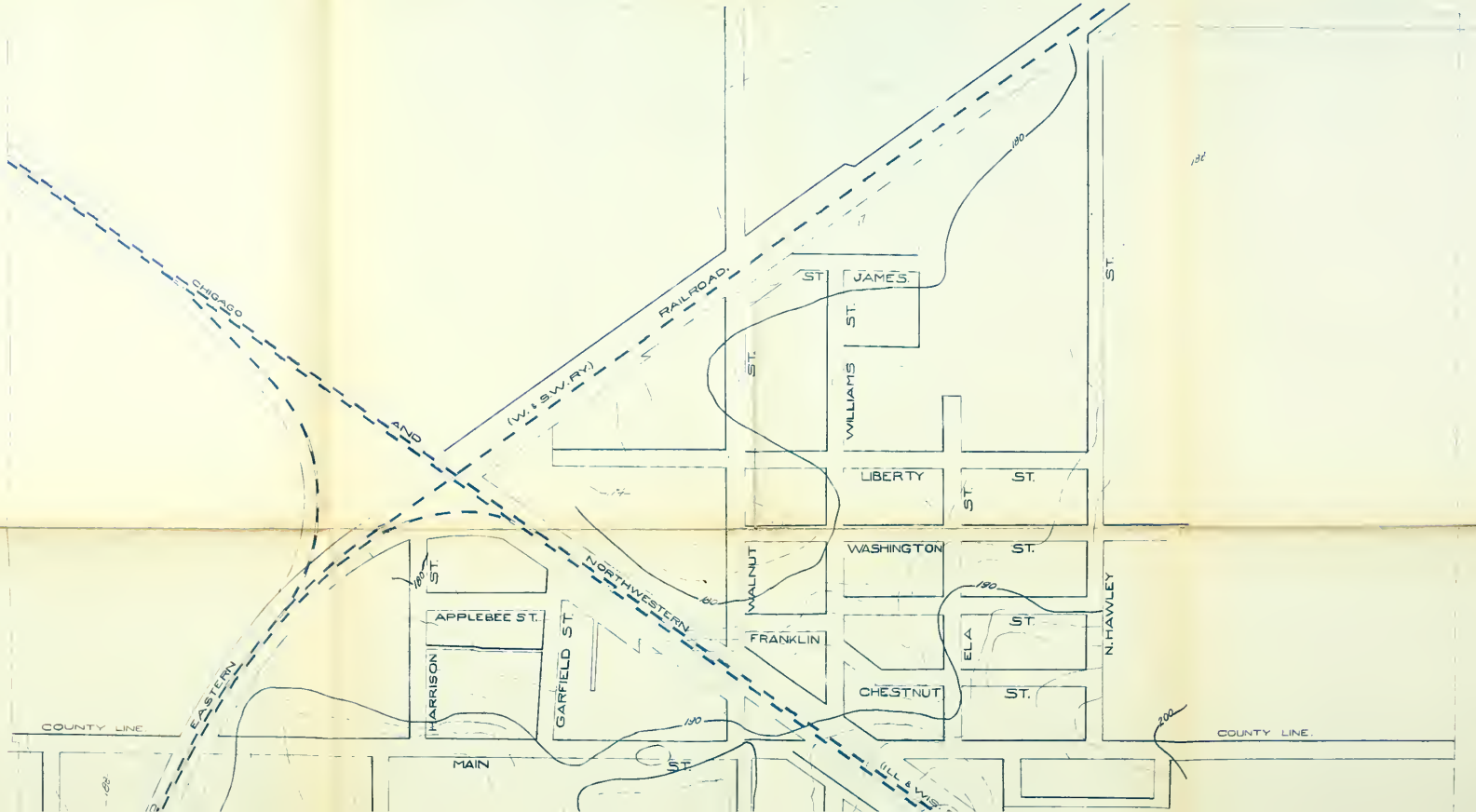
IV

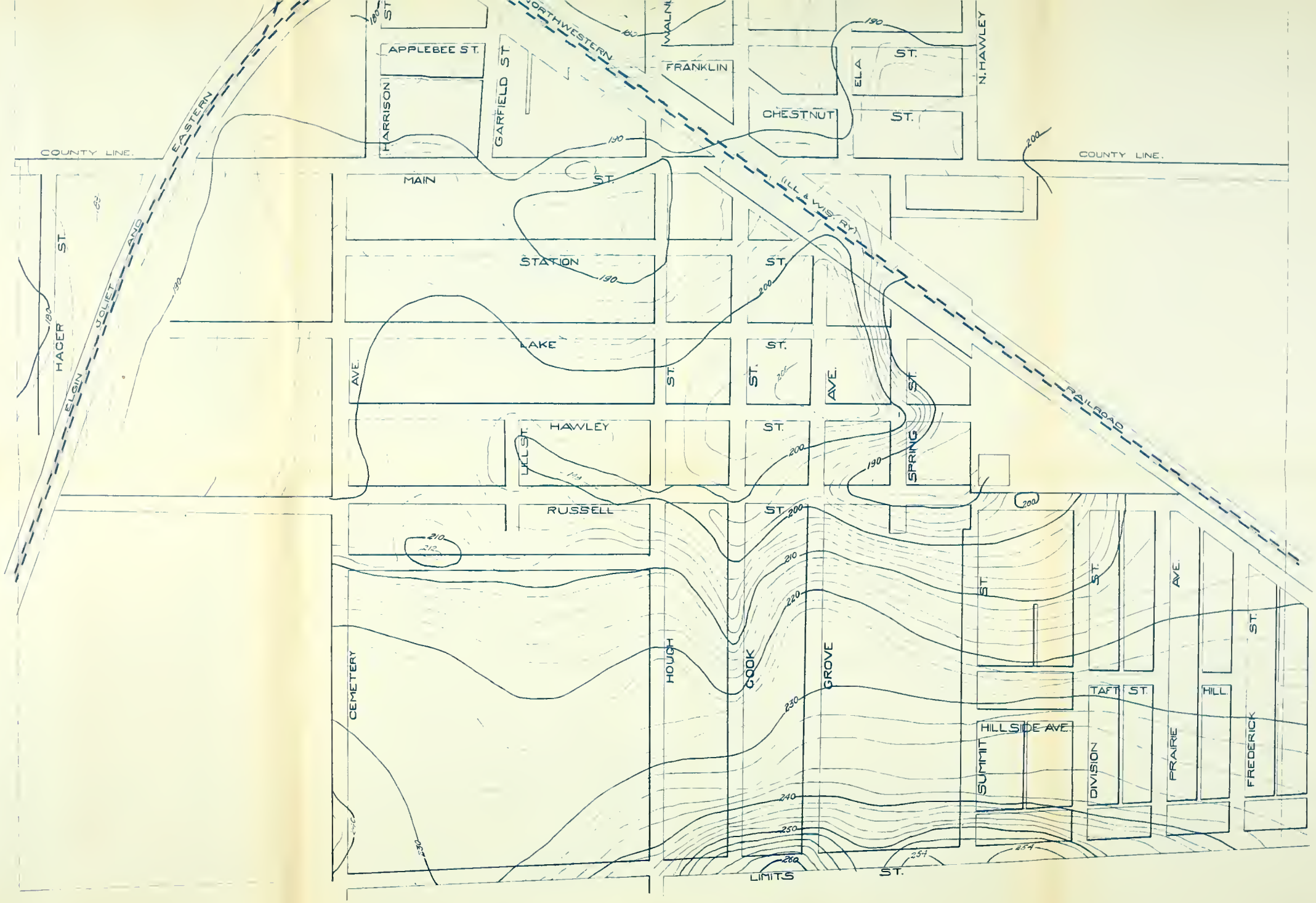
MAP OF THE
VILLAGE OF BARRINGTON
ILLINOIS

0 100 200 300 400 500 600 700 800 900 1000
SCALE - 1 INCH = 200 FEET.

COMPILED AND DRAWN FROM COUNTY RECORDS
FEB 1913.

A.E.PHILLIPS.
CONSULTING ENGINEER.
DRAWN BY-
J.JUCKER,JR.
G.J.TRINKAUS.



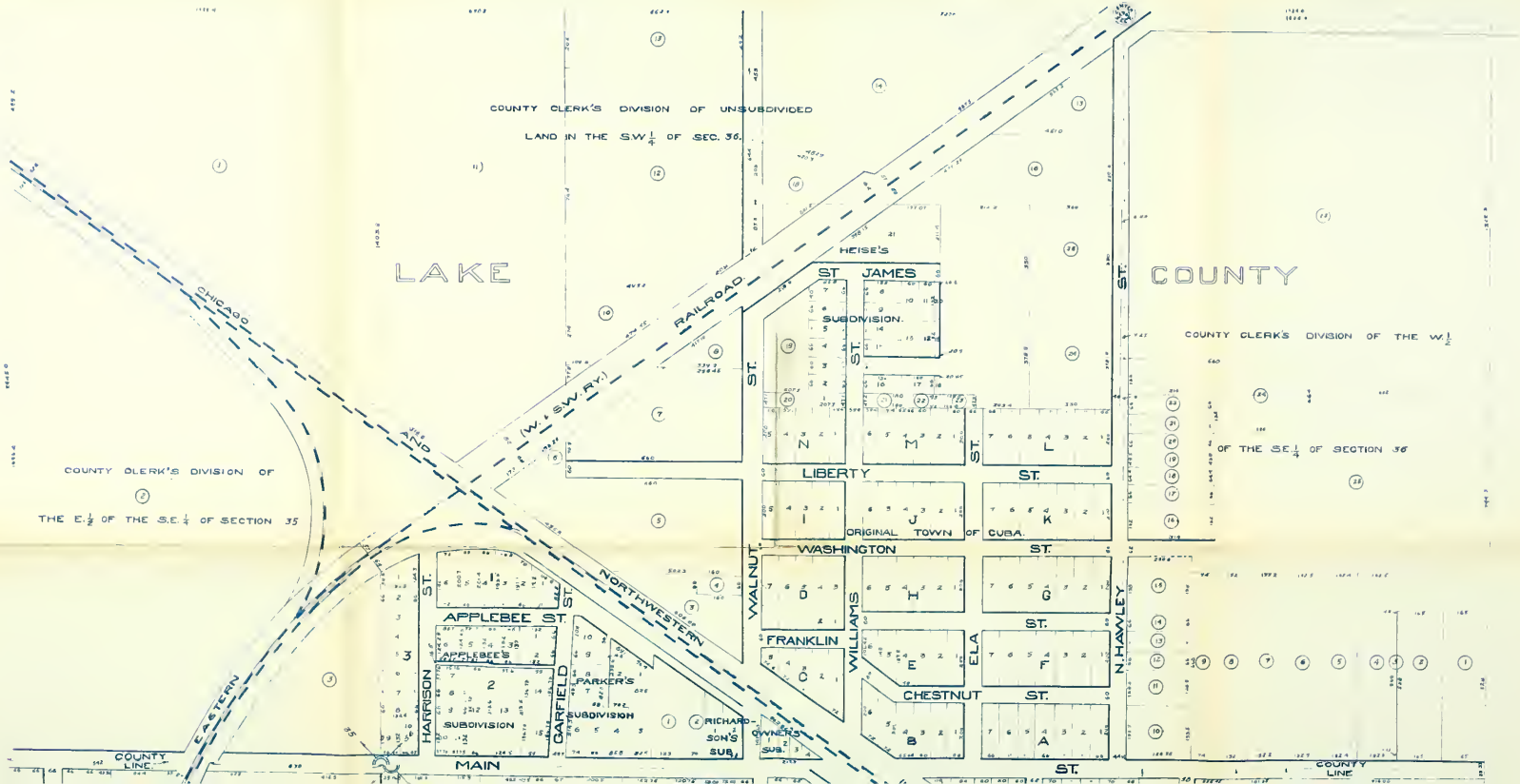

COUNTY LINE.
EASTERN
ELGIN JOLIET AND
NORTHWESTERN
ILL. & WIS. RY.
RAILROAD
APPLEBEE ST.
HARRISON
GARFIELD ST.
FRANKLIN
WALNUT
CHESTNUT
ELA
ST.
N. HAWLEY
MAIN
STATION
LAKE
HAWLEY
RUSSELL
HACER
AVE.
LEE
SPRING
CEMETERY
HOUGH
COOK
GROVE
TAFT
HILL
HILLSIDE AVE.
SUMMIT
DIVISION
PRAIRIE
FREDERICK
LIMITS
180
190
200
210
212
220
230
240
250
260
254

MAP OF THE
VILLAGE OF BARRINGTON
ILLINOIS

SCALE 1 INCH = 200 FEET.

COMPILED AND DRAWN FROM COUNTY RECORDS
FEB. 1913.

A.E. PHILLIPS.
CONSULTING ENGINEER
DRAWN BY
J.J. UCKER, JR.
G.J. TRINKAUS.



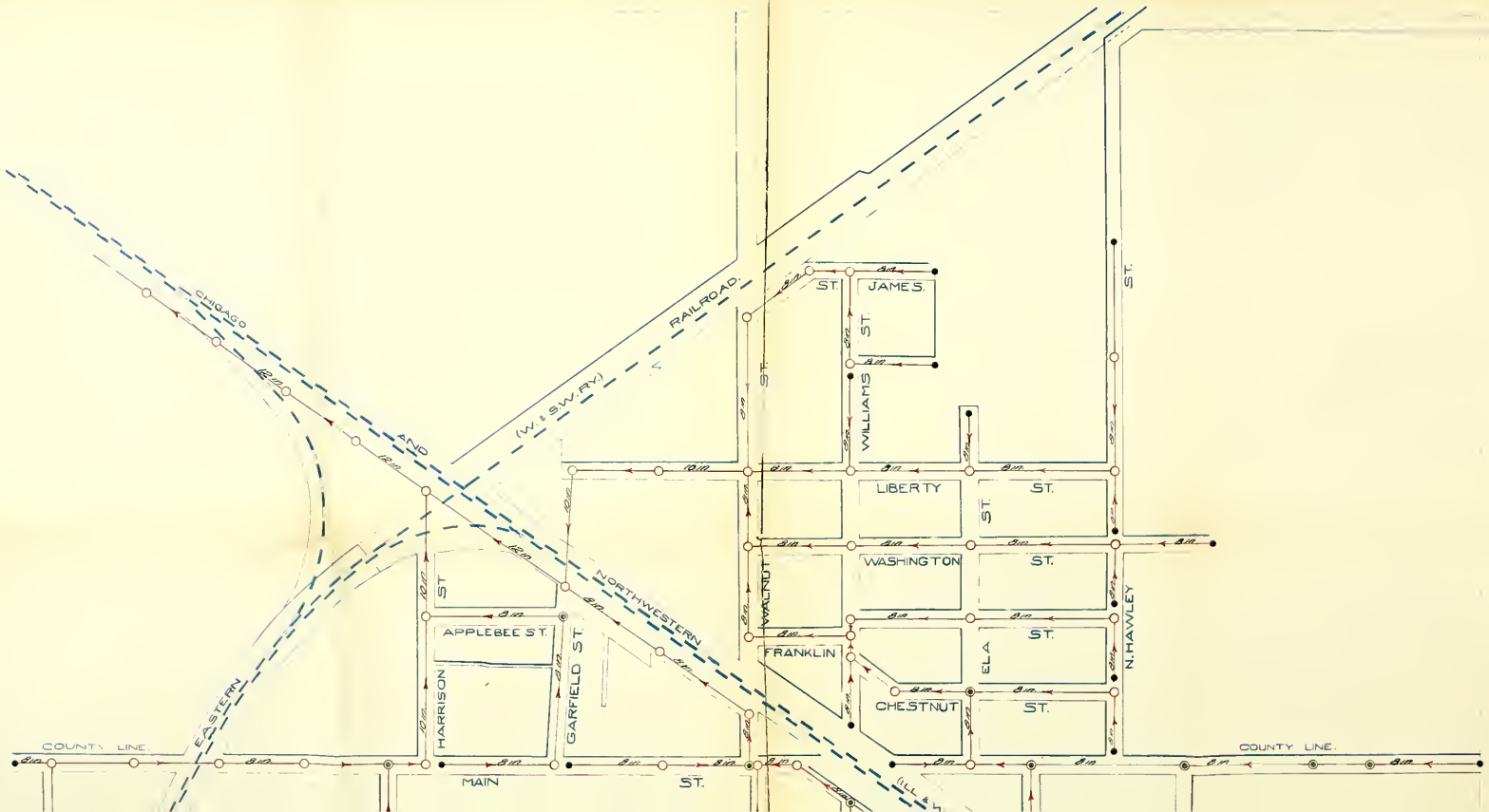

APPLEBEE ST.
APPLEBEE'S SUBDIVISION
HARRISON ST.
GARFIELD ST.
PARKER'S SUBDIVISION
RICHARDSON'S SUB.
OWNER'S SUB.
FRANKLIN
WILLIAMS ST.
ELA ST.
N. HAWLEY ST.
CHESTNUT ST.
MAIN ST.
COUNTY LINE
EASTERN
ILL. & WIS. RY.
ELGIN JOLIET AND
HAGER'S ADDITION
HAGER ST.
STATION ST.
COUNTY CLERK'S REDIVISION OF PART OF ASSESSOR'S DIVISION OF NW¼ OF NW¼ OF SECTION 1.
WEST ½ OF COUNTY CLERK'S DIVISION OF THE NE¼ OF SECTION 1
LAKE ST.
ORIGINAL TOWN OF BARRINGTON.
HAWLEY ST.
MEINER'S ADDITION.
ASSESSOR'S DIVISION OF NW¼ AND SE¼ OF NW¼ OF SEC. 1.
LILL ST.
SPRING ST.
RUSSELL ST.
RAILROAD
S. PECK'S SUBDIVISION
PART OF COUNTY CLERK'S DIVISION OF N½ OF SEC 2 IN VILLAGE.
EVERGREEN CEMETERY.
CEMETERY AVE.
HOUGH ST.
COOK COUNTY
COOK ST.
GROVE ST.
MUNDAY'S RE-SUBDIVISION.
MUNDAY'S RESUBDIVISION OF BLOCK 4 OF LANDWER'S ADD.
SUMMIT ST.
HILLSIDE AVE.
LANDWER'S ADDITION
TAFT ST.
PRAIRIE AVE.
HILL ST.
FREDERICK ST.
MUNDAY'S BARRINGTON PARK SUB.
LIMITS ST.

MAP OF THE
VILLAGE OF BARRINGTON
ILLINOIS

0 100 200 300 400 500 600 700 800 900 1000
SCALE — 1 INCH = 200 FEET.

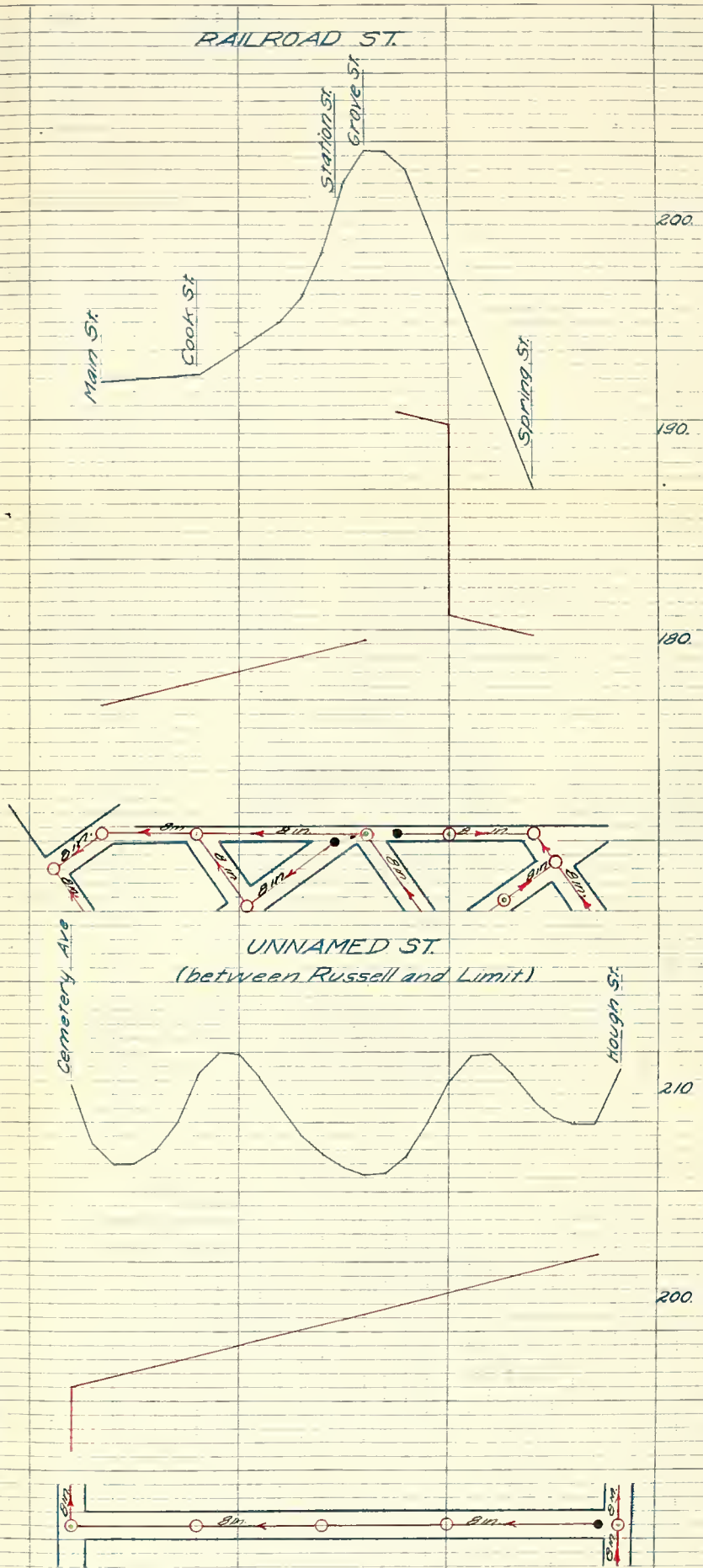
COMPILED AND DRAWN FROM COUNTY RECORDS
FEB. 1913.

A.E. PHILLIPS.
CONSULTING ENGINEER.
DRAWN BY -
J. JUCKER, JR.
G. J. TRINKAUS.

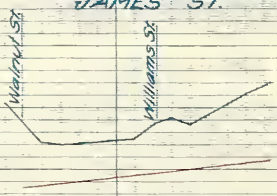


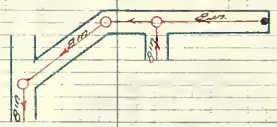

APPLEBEE ST.
HARRISON
GARFIELD ST
FRANKLIN
CHESTNUT
ST.
N. HAWV
COUNTY LINE.
COUNTY LINE.
EASTERN
ILL & WIS. RY.
MAIN
ST.
STATION
ST.
LAKE
ST.
AVE
ST.
ST.
AVE.
ST.
HAWLEY
LILL ST.
ST.
SPRING
RUSSELL
ST.
HAGER
ST
ELGIN JOLIET AND
RAILROAD
CEMETERY
HOUGH
COOK
GROVE
ST.
ST.
AVE.
ST.
TAFT
ST.
HILL.
HILLSIDE AVE.
SUMMIT
DIVISION
PRAIRIE
FREDERICK
LIMITS
ST.
LEGEND.
Sewer Line.
Man-Hole.
Drop Man-Hole.
Flush Hole.


CEMETERY AVE.
Limit St.
Linwood St.
Russell St.
Harvey St.
Lake St.
Station St.
Main St.
240.
230
220.
210.
200.
190
180.

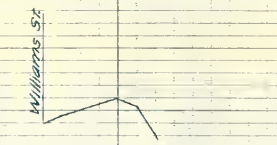

RAILROAD ST.
Station St.
Grove St
Main St.
Cook St.
Spring St.
200.
190.
180.
8 in.
UNNAMED ST.
(between Russell and Limit.)
Cemetery Ave
Hough St.
210
200.

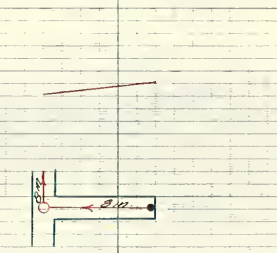
JAMES ST.



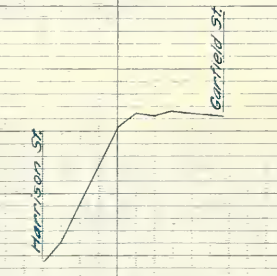


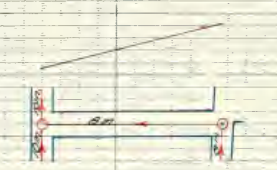
UNNAMED ST.
(between James and Liberty.)

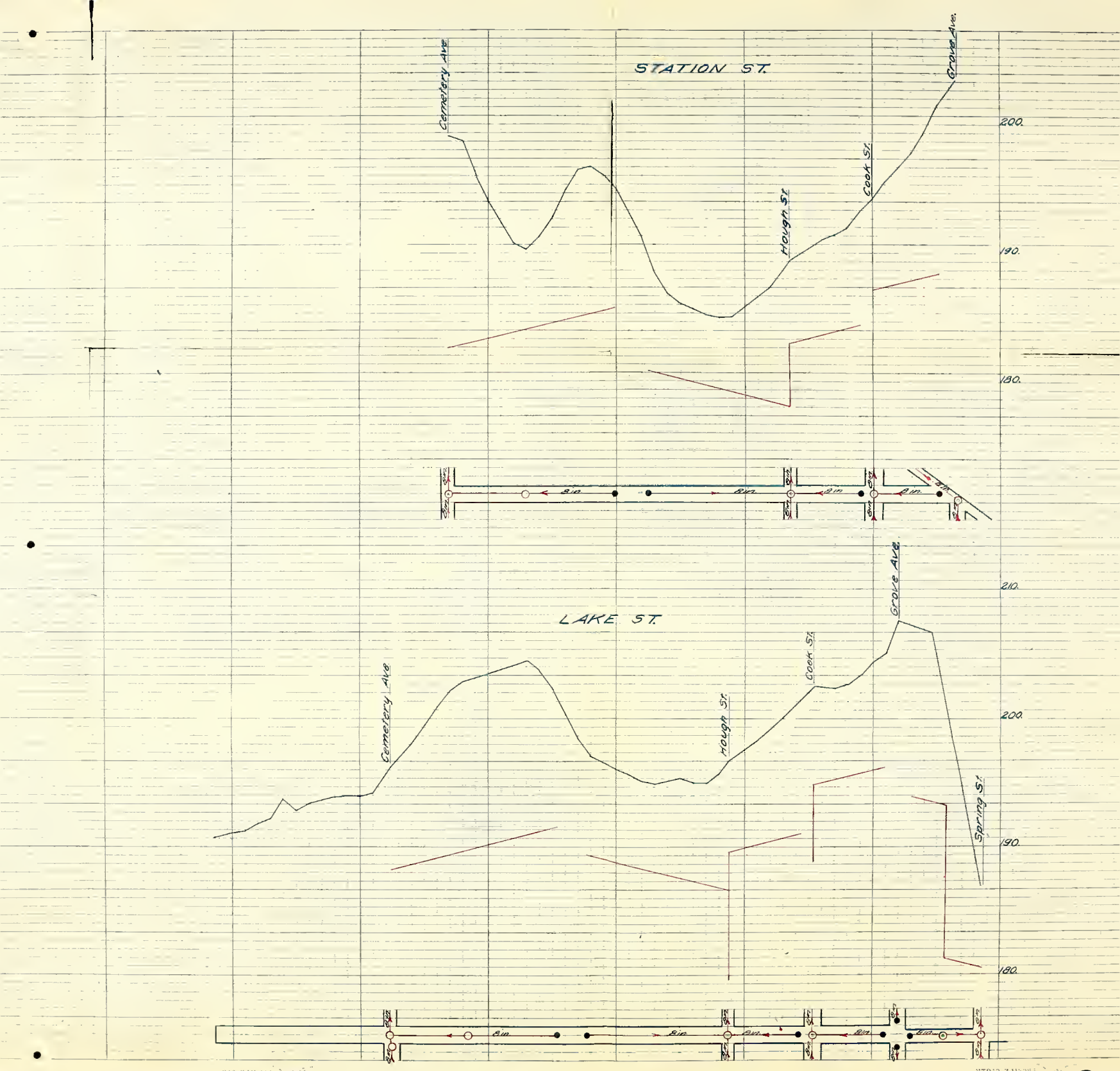


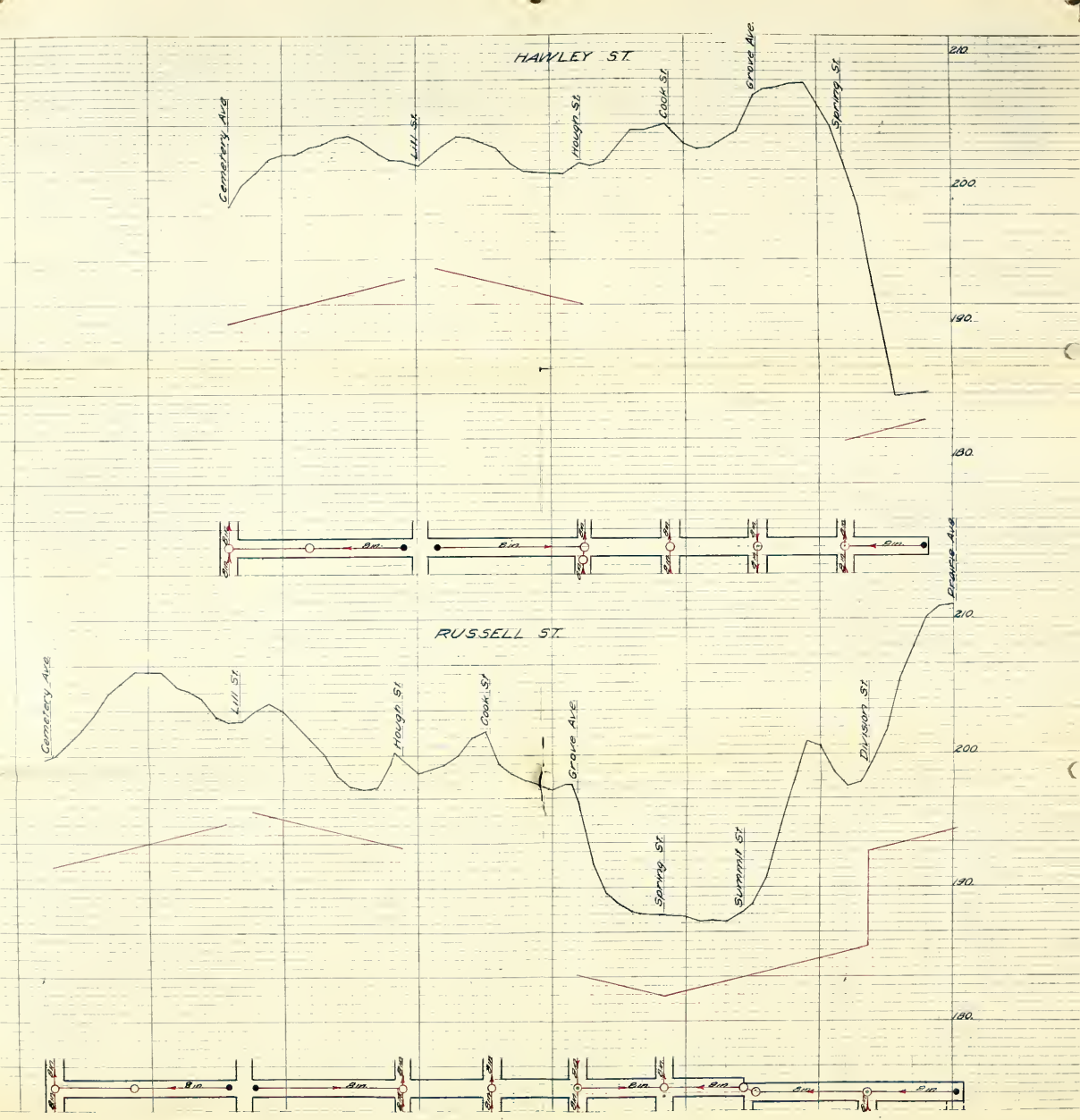


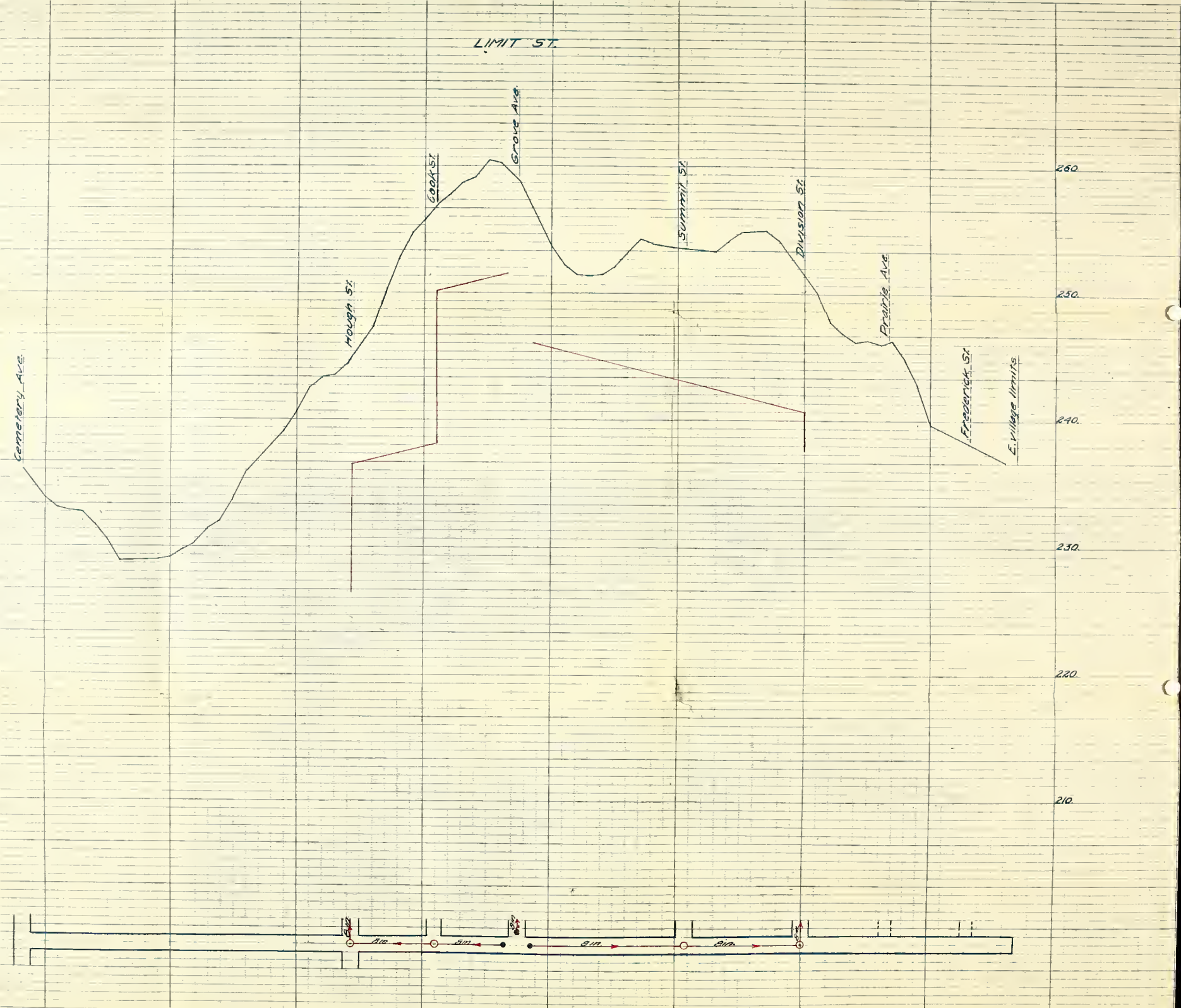
APPLEBEE ST.

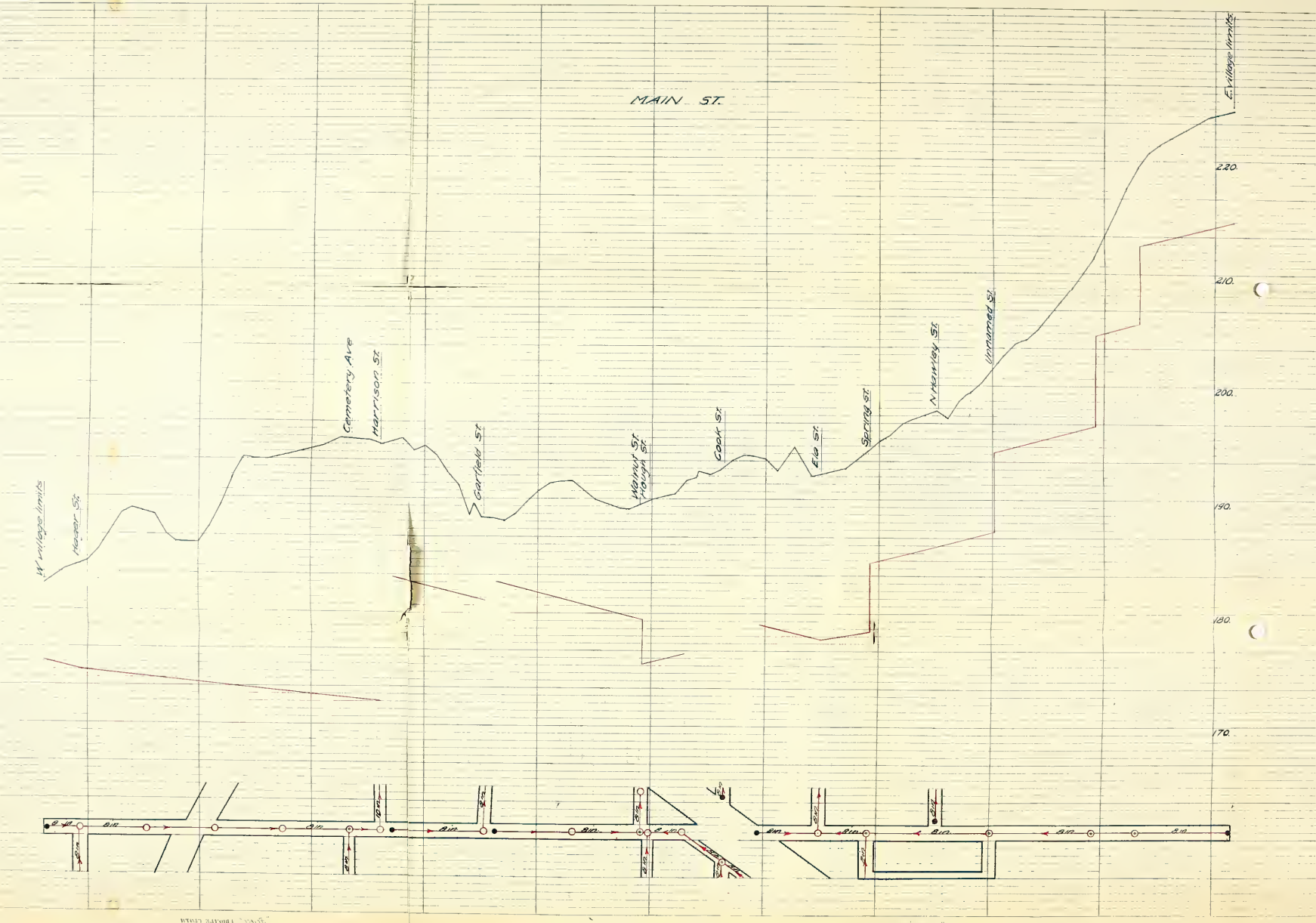


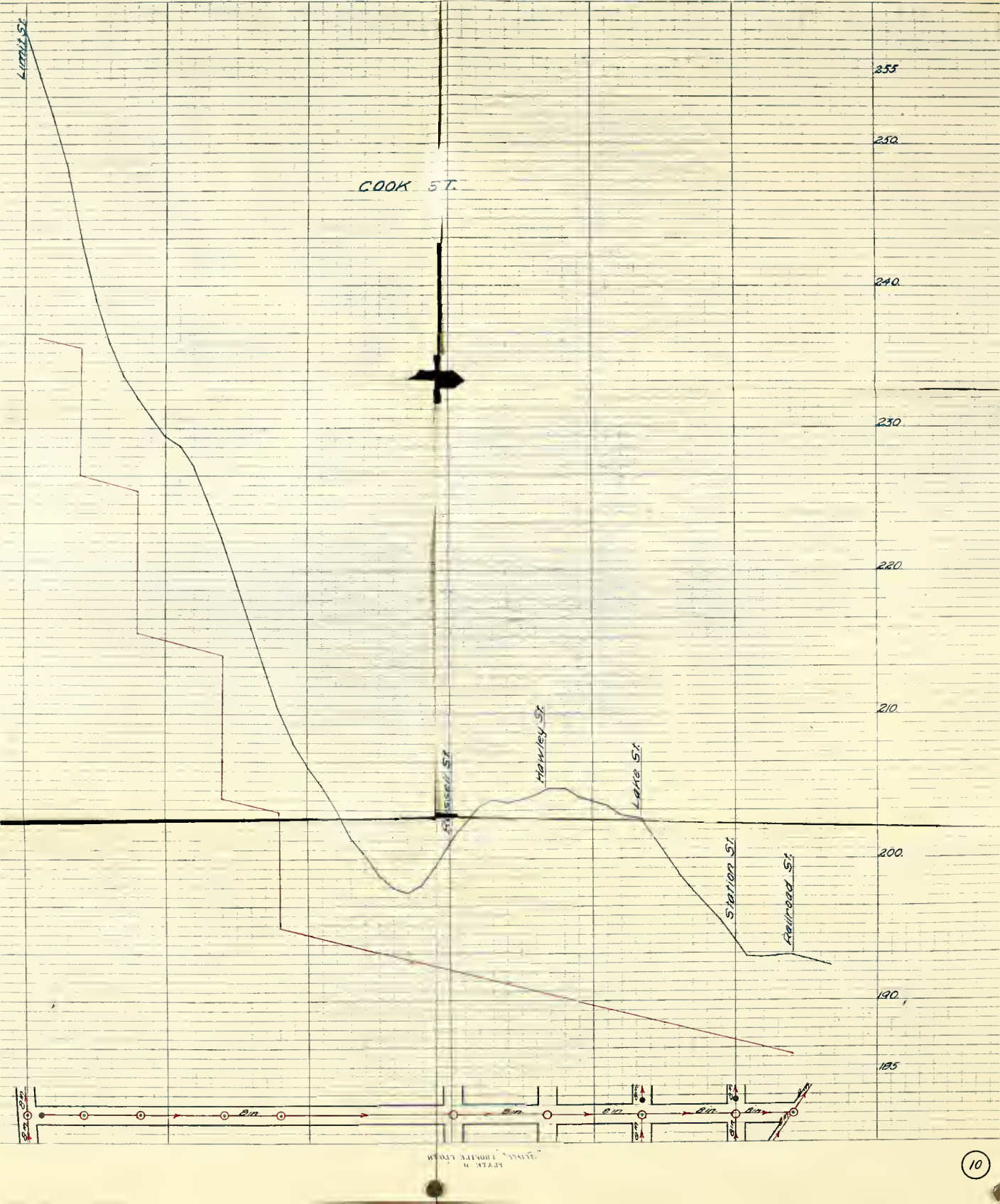


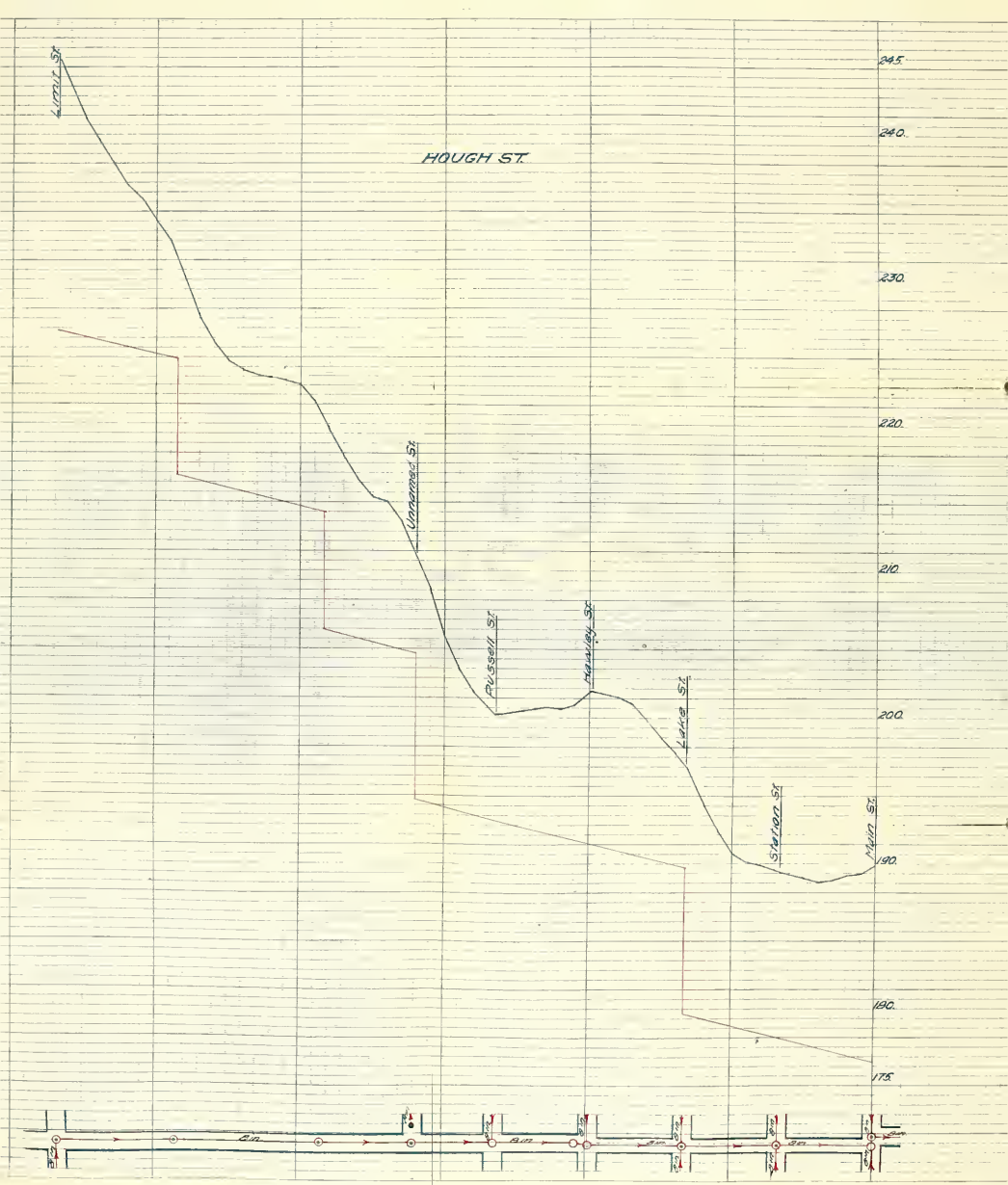

STATION ST.
Cemetery Ave.
Hough St.
Cook St.
Grove Ave.
200.
190.
180.
8in.
8in.
8in.
8in.
LAKE ST.
Grove Ave.
Cook St.
Hough St.
Cemetery Ave.
Spring St.
210.
200.
190.
180.
8in.
8in.
8in.
8in.
8in.

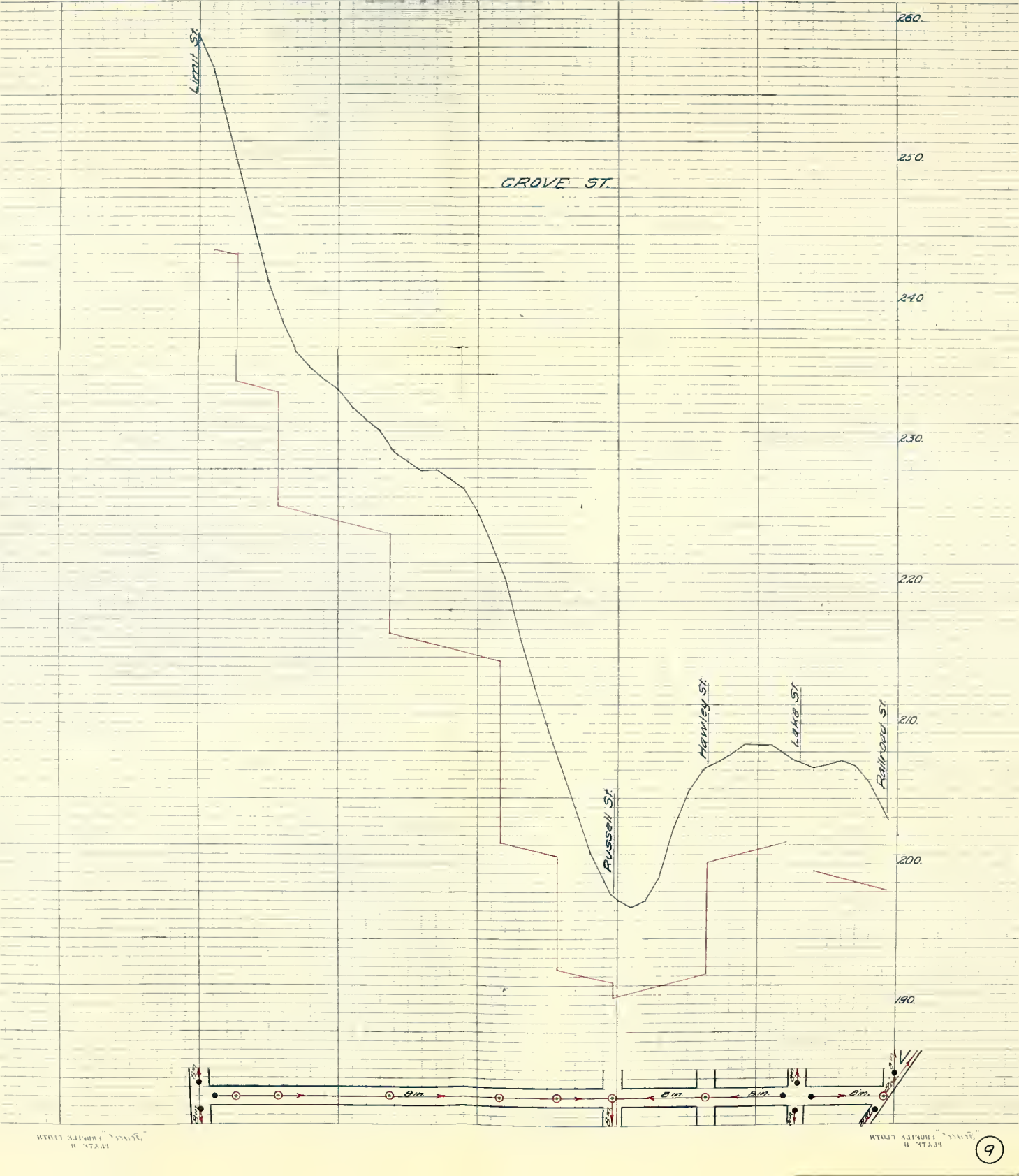

HAWLEY ST.
Cemetery Ave.
Hill St.
Hough St.
Cook St.
Grove Ave.
Spring St.
210.
200.
190.
180.
8 in.
Grove Ave.
RUSSELL ST.
Cemetery Ave.
Hill St.
Hough St.
Cook St.
Grove Ave.
Spring St.
Summit St.
Division St.
Grove Ave.
210.
200.
190.
180.
8 in.

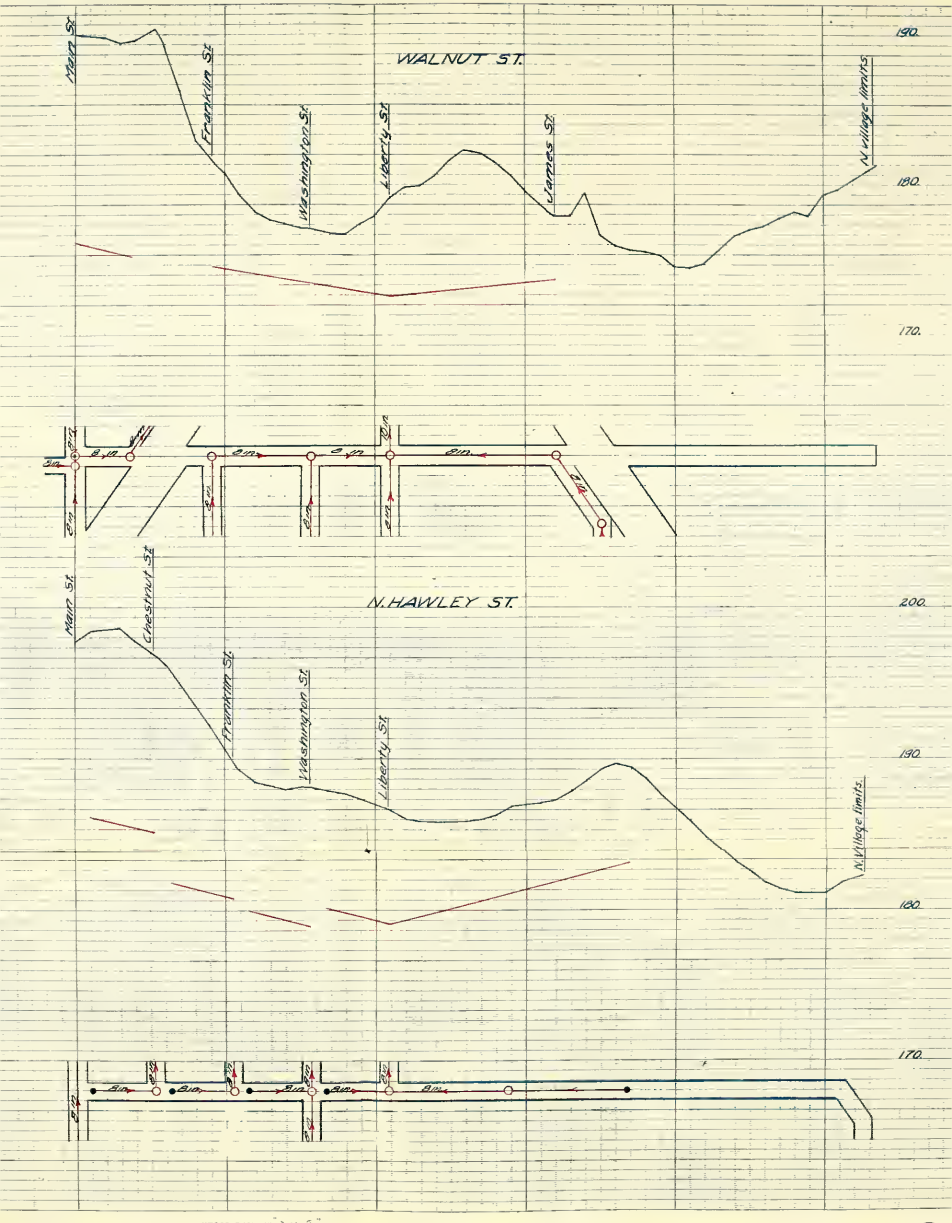

LIMIT ST.
Cemetery Ave.
Hough St.
Cook St.
Grove Ave.
Summit St.
Division St.
Prairie Ave.
Frederick St.
E. Village limits
260
250
240
230
220
210
8in
8in
8in
8in

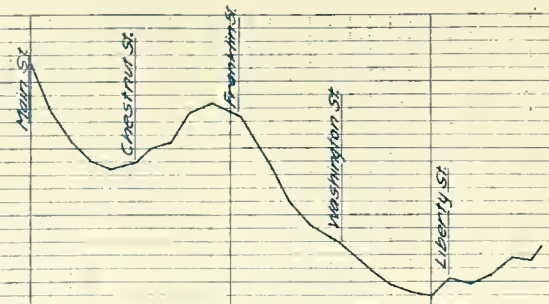

MAIN ST.
W. Village limits
Harper St.
Cemetery Ave
Harrison St.
Garfield St.
Maple St.
Hough St.
Cook St.
Elm St.
Spring St.
N. Hawley St.
Linwood St.
E. Village limits
220.
210.
200.
190.
180.
170.
8 in.
10 in.
12 in.


Lewis St.
COOK ST.
255
250
240
230
220
210
200
190
195
Russell St.
Hawley St.
Lake St.
Station St.
Railroad St.
8 in.
8 in.
8 in.
8 in.
8 in.
8 in.
8 in.
8 in.


HOUGH ST.
LINDY ST.
UNDERWOOD ST.
RUSSELL ST.
HARVEY ST.
LAKE ST.
STARLING ST.
MAIN ST.
245.
240.
230.
220.
210.
200.
190.
190.
175.


Lucas St.
GROVE ST.
260.
250.
240
230.
220.
210.
200.
190.
Russell St.
Hawley St.
Lake St.
Railroad St.
8in.
8in.
8in.
8in.


Main St.
Franklin St.
Washington St.
Liberty St.
Vannes St.
N. village limits
WALNUT ST.
190.
180.
170.
8 in.
6 in.
Main St.
Chestnut St.
Franklin St.
Washington St.
Liberty St.
N. HAWLEY ST.
N. village limits
200.
190.
180.
170.



195.

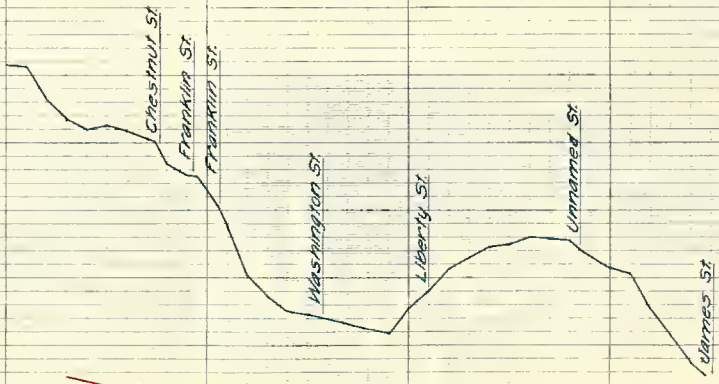
190.

180.

ELA ST.

170.

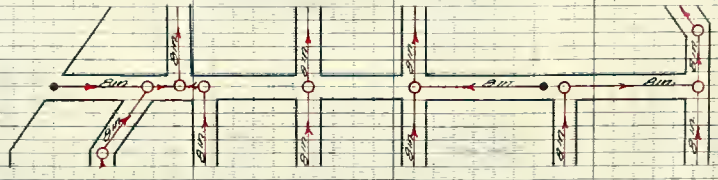
WILLIAMS ST.

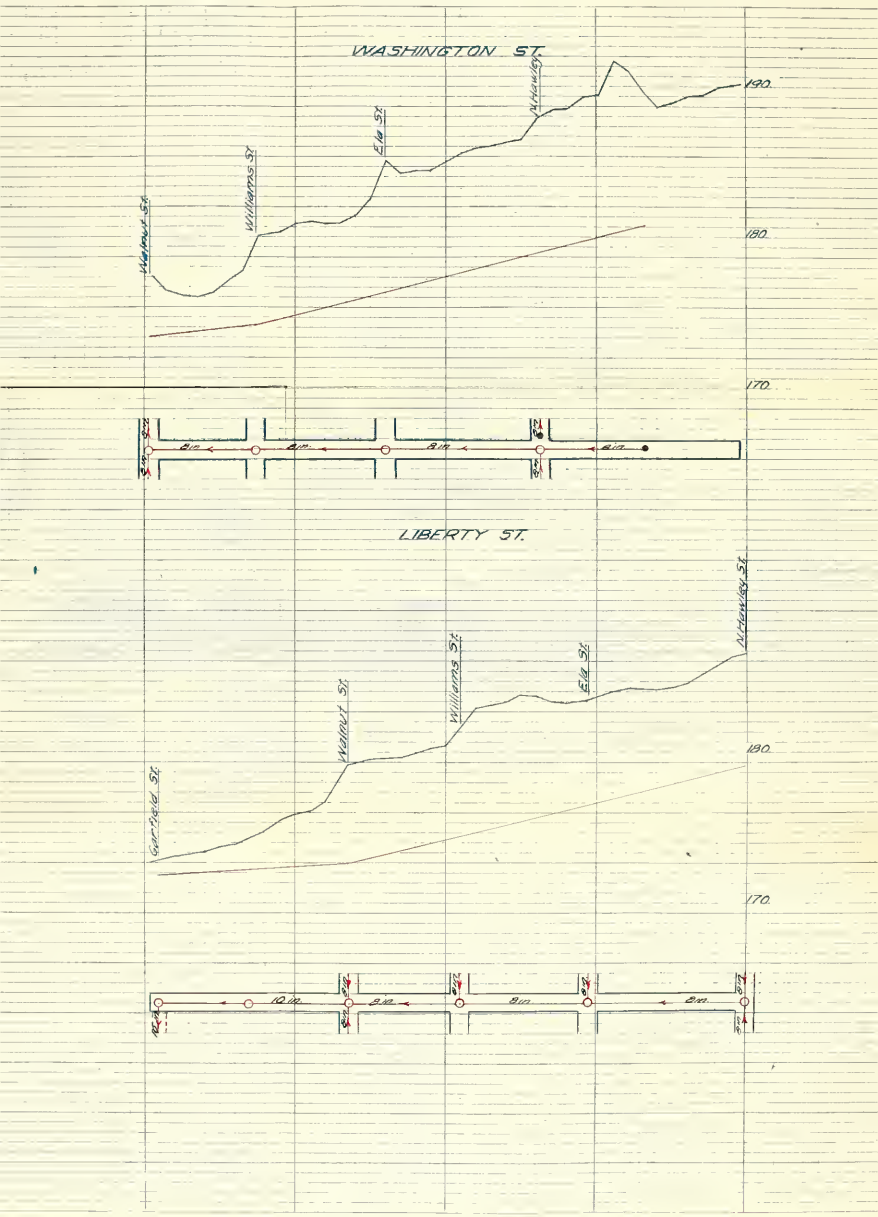


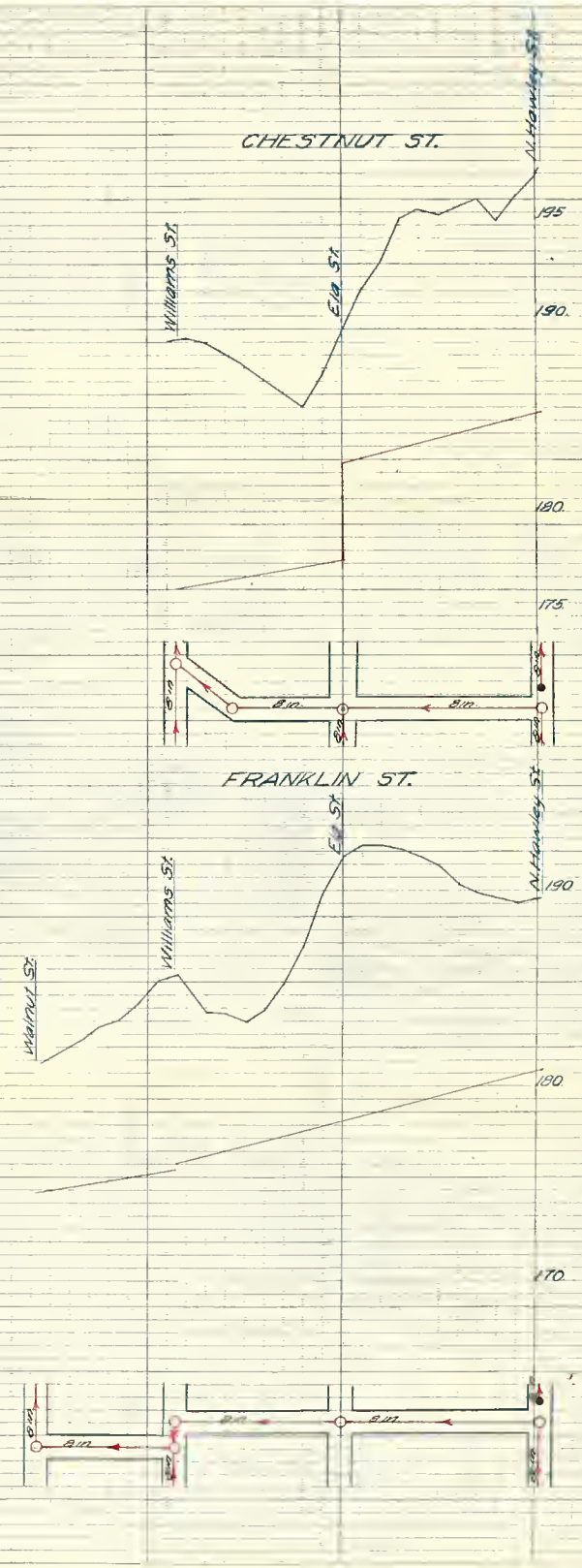
190.

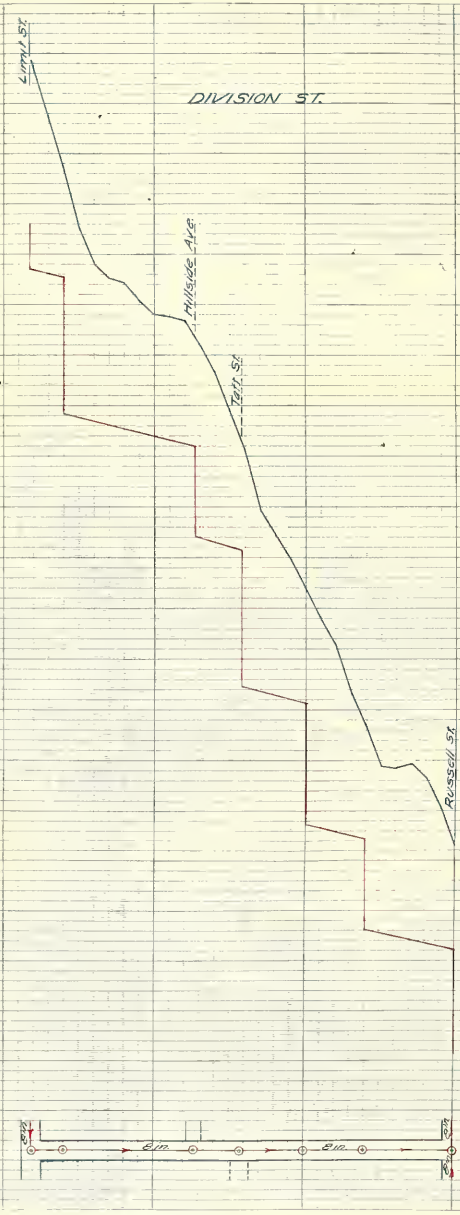
180.

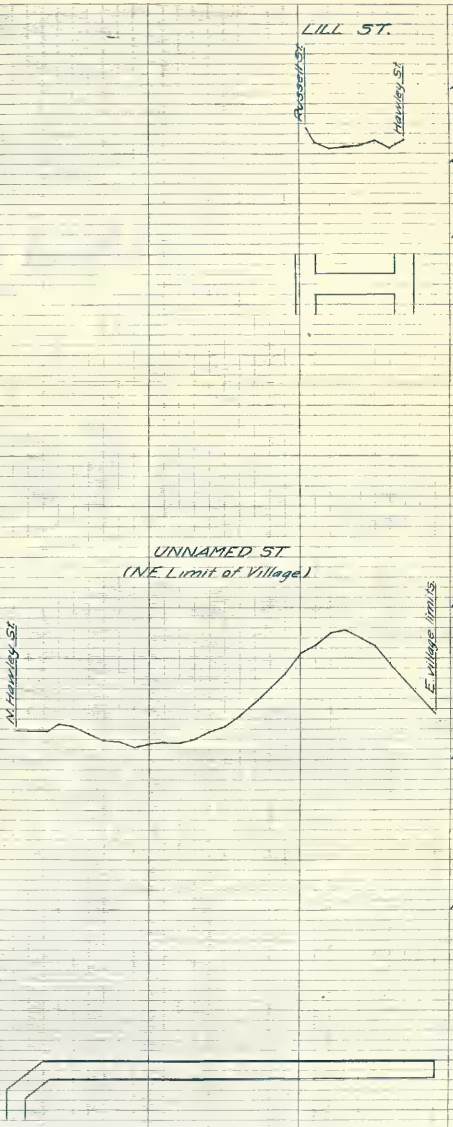
170.

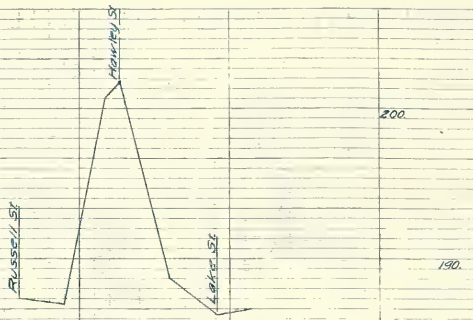



WASHINGTON ST.
Walnut St.
Williams St.
E 4th St.
N Highway
190.
180.
170.
LIBERTY ST.
Walnut St.
Williams St.
E 4th St.
N Highway St.
Gun Barrel St.
180.
170.

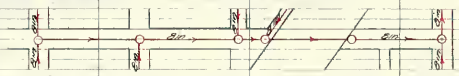

CHESTNUT ST.
N. Hawley St.
Williams St.
Elm St.
195
190.
180.
175
8 in.
8 in.
8 in.
8 in.
FRANKLIN ST.
Elm St.
N. Hawley St.
Williams St.
Thomas St.
190
180.
170.
8 in.
8 in.
8 in.
8 in.


LIMIT ST.
DIVISION ST.
250.
240.
HILLSIDE AVE.
230.
TAFT ST.
220.
210.
RUSSELL ST.
200.
190.
185.
8"W.
8"W.
8"W.
8"W.

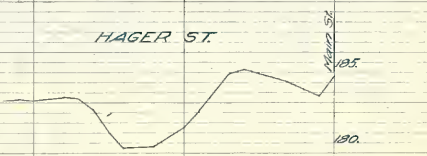

LILL ST.
Ridgeway St
Hawley St
205.
200.
195
UNNAMED ST.
(NE Limit of Village)
N. Hawley St
E. Village limits
190.
180.
170.

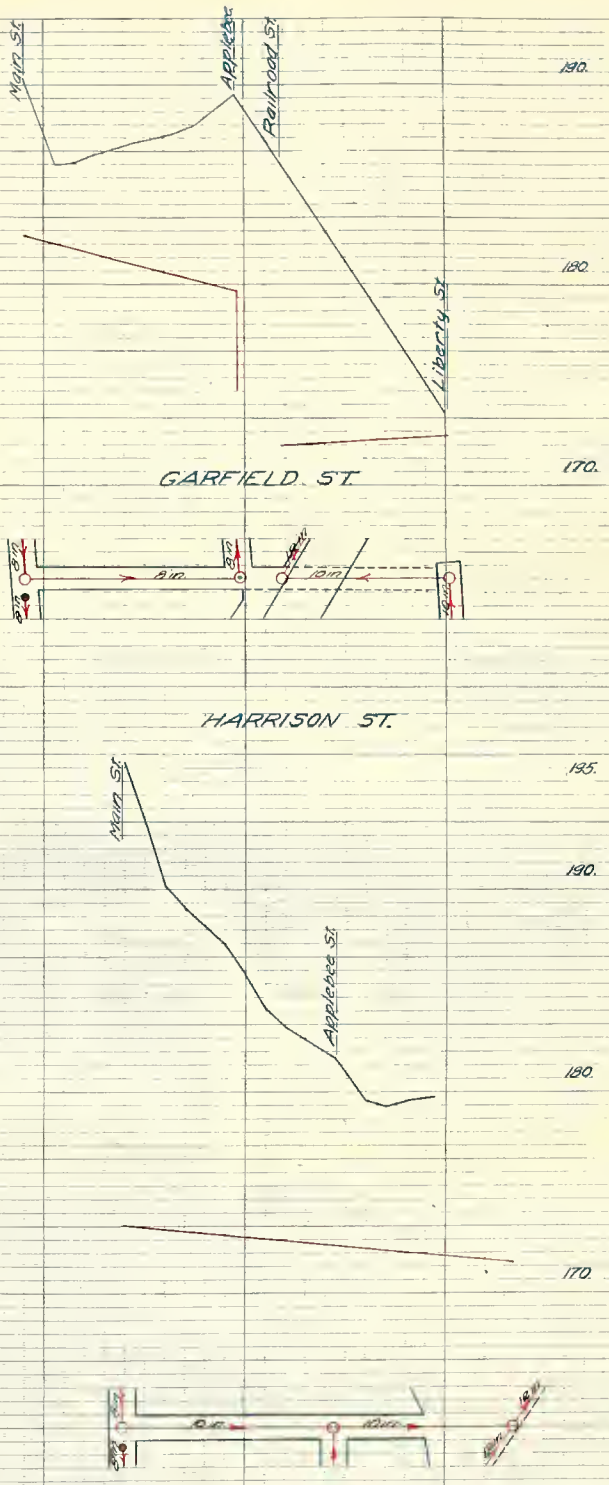


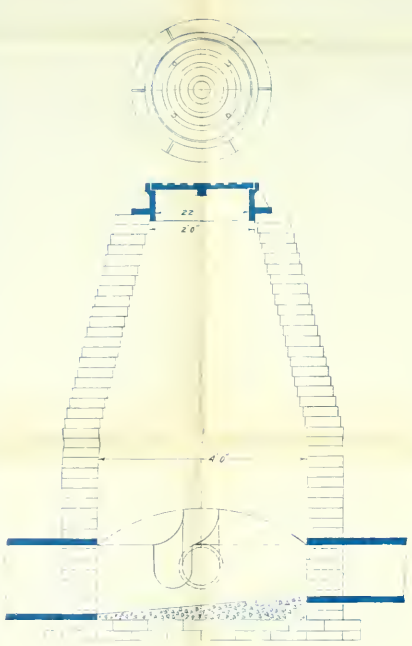
SPRING ST.



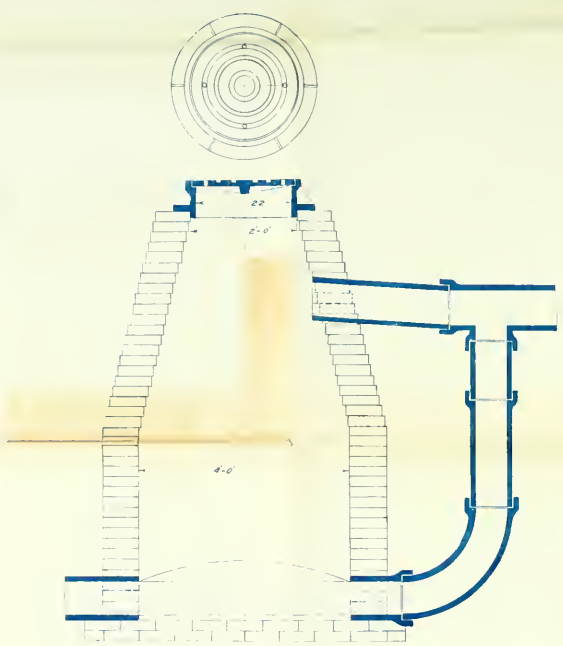
HAGER ST.



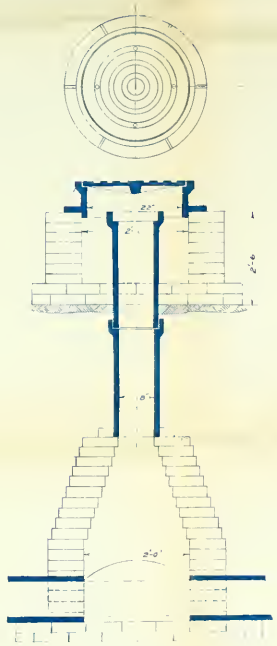

Main St.
Applebee St.
Railroad St.
Liberty St.
190.
180.
170.
GARFIELD ST.
8 in.
10 in.
HARRISON ST.
195.
190.
180.
170.



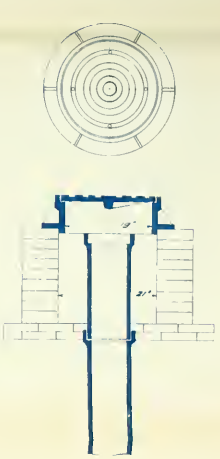
MAN-HOLE.



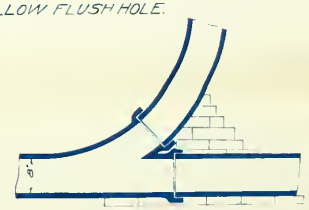
DROP MAN-HOLE.



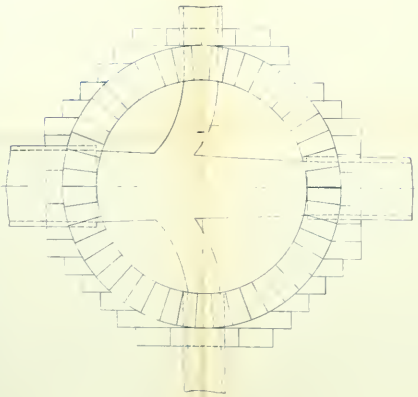
LAMP-HOLE

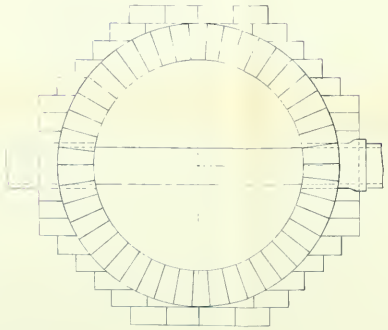


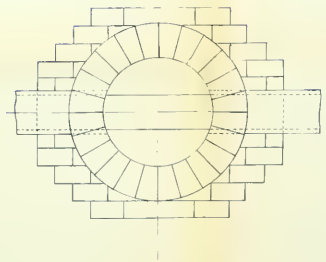
SHALLOW FLUSH HOLE.



DEEP FLUSH HOLE







SEWER DETAILS.
VILLAGE OF BARRINGTON, ILLINOIS.
1915.

Alfred E. Phillips, Consulting Engineer.

VILLAGE OF
BARRINGTON
ILLINOIS

INDEX TO PROFILES

NORTH & SOUTH STREETS

EAST & WEST STREETS

LEGEND

Sewer Line
Man-Hole
Drop Man-Hole
Flush-Hole

MAY 1915

Approved by Alfred E. Lucy, Consulting Engineer

Drawn by John Fuchser, Jr.

Checked by Geo. Trinkaus