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

for

SEWAGE DISPOSAL PLANT

MOSCOW, IDAHO.

February 1918.

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SPECIFICATIONS FOR SEWAGE DISPOSAL PLANT FOR

CITY OF MOSCOW, IDAHO.

GENERAL.

1. DESCRIPTION OF WORK:

The work embraced in these specifications and shown on accompanying plans consists in furnishing all materials, labor, tools and appliances necessary for or in any way incidental to the construction of a sewage disposal plant for the City of Moscow, Idaho. The work includes the following principal items:

(a) 4340 lineal feet of 24 inch vitrified pipe sewer from the existing septic tank to the new septic tank.

(b) Double chamber septic tank.

(c) Dosing chamber.

(d) Four contact beds.

(e) Necessary vitrified sewer to connect tanks with beds and various units of work with the sewer outlet at stream 290 feet west of new site of disposal plant.

(f) Two sludge beds (optional).

2. PLANS AND SPECIFICATIONS CO-OPERATIVE--OMISSIONS:

The plans for this improvement and the specifications accompanying them are intended to be mutually co-operative and anything shown or called for in one and omitted in the other is as binding as if called for or shown by both. Any work not herein specified which may be fairly implied as included in this improvement, shall be done by the contractor, without extra pay.

3. EXAMINE PLANS AND LOCATION OF WORK.

Bidders are notified that they must thoroughly examine these specifications, the plans, the form of proposals and form of

tract, and thoroughly familiarize themselves with all ordinances pertaining to public improvements.

They must also examine and judge for themselves as to the location and character of the proposed work, the amount of materials required and work to be done, etc.

If there be any doubt or obscurity as to the meaning of any part of the same or if any errors or omissions are discovered in the plans, the same shall be brought to the attention of the Engineer, in order that the necessary explanation or correction may be made before submitting a bid.

4. VARIANCE IN COMPUTATIONS:

The contractor being familiar with the requirements of the preceding paragraph, must therefore assume all the risk of variance in any computation or statements of amounts or quantities necessary to complete the work required in this improvement, and agrees to furnish all necessary labor and materials, and to fully complete the said work to the satisfaction of the City Council and the Engineer.

5. LAWS, EMPLOYER AND CONTRACTOR:

The attention of bidders is invited to the State laws and to the ordinances of the City of Moscow, relating to obstructing streets. barricading and guarding improvements, both day and night, the employment of labor, the hours of consecutive employment and the liability of employer, regulations governing blasting together with all other laws and ordinances.

6. ENGINEER:

Whenever the word "Engineer" shall occur in these specifications, it shall refer to and designate the Engineer duly authorized by the Council to supervise the work. The orders and

instructions of the Engineer shall be respected and obeyed, whether given in person, or by his duly accredited representatives. Decisions made by the Engineer shall be final and binding upon both parties to this contract. Work shall be commenced and shall progress in the sequence and manner directed by the Engineer.

7. INSPECTORS AND INSPECTION:

Workmanship and material shall be subject to the inspection and approval of the Engineer. The Engineer shall designate Inspectors authorized to inspect all material and workmanship entering into or appertaining to this work, but such inspection shall not relieve the Contractor from liability on account of defective work, nor shall it in any sense constitute acceptance of the work.

8. DEFECTIVE WORK OR MATERIAL:

Indications of the presence of defective work or material in the structure will be cause for examination to determine conditions, and if necessary, the Engineer may cause the removal of any portion of the structure and its replacement in conformity with the plans and specifications, charging all costs of examination, removal and replacement to the contractor, deducting the amount from any moneys then due or to become due him.

Should examination fail to reveal the presence of defects in the structure, then all costs of such examination and restoration shall be borne by the City of Moscow, the Engineer to be the arbiter of the reasonableness of the amount so claimed.

9. CHANGES IN PLANS:

The City of Moscow reserves the right, without prejudice to this contract and without altering or invalidating any of the prices therein named, to make reasonable changes in the plans as

to location, form, dimensions, grades, alignment and materials and to vary the quantities of material or work to be performed from that set forth in list of unit quantities upon which bids are based.

Changes of any kind ordered by the Engineer shall be in writing, and to be effective shall be individually signed by him.

No claims for extra compensation shall be set up, nor will they be entertained, saving and excepting upon the written, signed order of the Engineer.

Nothing herein contained shall be construed as relieving the Contractor from oblication to complete all the work without added cost to the City of Moscow, even though minor essentials may have been omitted from the plans and specifications, and which may not be mentioned specifically in bids, but which are necessary and essential to the completion of the work.

10. WORKMEN AND ARTISANS:

Where, in the opinion of the engineer, the employment of skilled laborers is necessary for the successful performance of the work to be done under this contract, then only such persons who have had experience in, and can show themselves to be skillful in their particular line of work shall be employed by the Contractor, and whenever the Engineer shall decide that any person employed on any portion of the work is incompetent, unskilled, disrespectful, disobedient, disorderly, or in any way detrimental to the interests of the City, then such person shall be discharged by the Contractor, and not be again employed on any portion of the work during its construction.

11. FOREMAN OR SUPERINTENDENT:

At all times when the work is in progress either the Contractor himself, or a competent Superintendent or Foreman must

be in direct charge of the work. A complete set of plans and specifications must be kept by the Contractor upon the work, and any orders given to a Superintendent or Foreman shall be considered as having been given to the Contractor.

12. ASSIGNING CONTRACT:

The contract for this improvement shall be assigned or sub-let in whole or in part, only with the written consent of the City Council, one copy of which assignment or sub-contract shall be filed with the City Council; and no assignment that may be made shall release the Contractor or his or their sureties, from any liability arising under said contract.

13. SUSPEND WORK:

The City Council reserves the right to suspend the work on any part of this improvement, when in their judgment it may seem necessary to do so; but every effort will be made by the said City Council and the Engineer to facilitate such work.

14. BEGINNING AND FINISHING WORK:

The work embraced in this improvement shall be begun on or before such date as is stipulated in the contract for this improvement and shall be prosecuted regularly and uninterruptedly thereafter (unless the City Council, in writing, specifically direct otherwise) with such force as to secure its full completion within the time specified by said contract; and if the contractor shall fail to complete the work within the time specified, said contractor shall pay to the City of Moscow the sum of _____ Dollars (__ _____) for each and every day said work remains uncompleted, after the expiration of said time, as agreed and liquidated damages for failure to comply with the terms of said contract with reference to the time of completion, it being understood and considered that the above damages are just and reasonable and agreed and liquidated,

and such sum may be deducted by the City from the amount due under said contract.

15. LOSS, DAMAGE AND DELAY.

Loss and Damage.

The Contractor shall sustain without claim against the City all losses or damages arising from the action of the elements, the nature of the work to be done under these specifications or from any unforeseen obstructions or encumbrances on the line of the work or which may be encountered in the prosecution of the same. The Contractor will be held responsible for work or material to the full amount of the payments made thereon, and any damage to the same from any cause whatever before the final acceptance of the work will be required to be made good by the Contractor at his own expense.

Inconvenience or Delay.

The Contractor shall not be entitled to any claim for damages, or any monetary compensation, for hindrance, inconvenience or delay from any cause whatever in the progress of the work or any portion thereof, but such hindrance, inconvenience or delay may entitle the Contractor to an extension of time for completing this contract sufficient to compensate for such hindrance, inconvenience or delay, provided that the Contractor shall at once serve written notice upon the Engineer, setting forth the causes of such hindrance, inconvenience or delay, and provided that the Engineer upon investigation of the facts shall find such cause sufficient and shall so certify in writing to the Council of the City of Moscow, stating the duration of the extension to which he finds the Contractor to be entitled.

16. EXTRA WORK:

The Contractor shall do such extra work as may be required by the Engineer for the proper construction or completion of

the whole work as herein contemplated, but shall make no claim for extra work unless it shall have been previously ordered by the Engineer in writing, and no work done or materials furnished shall be considered as extra work unless it shall have been previously so ordered by the Engineer in writing, with a statement in said written order to the effect that it is ordered and intended as extra work or material. All claims for extra work done in any month shall be filed in writing with the Engineer on or before the 15th of the following month, and in default of such claim filed within the time herein provided, the Contractor shall be debarred from any claim on account of such extra work or material. The price to be paid for all extra work shall be its actual reasonable cost to the Contractor, as determined by the Engineer, plus ten per cent for profits, engineering and overhead expenses.

All work during its progress and on its completion must conform truly to the lines and levels given by the Engineer, and must be built in accordance with the plans and directions given by him from time to time, subject to such modifications as he shall deem necessary during its execution; and in no case will any work in excess of the requirements of the plans or specifications be paid for unless ordered in writing by the Engineer as extra work.

17. MONUMENTS AND STAKES:

Contractor shall preserve all monuments and benches, and all stakes set for line, level or reference. Renewals made necessary on account of destruction, removal or change, shall be at Contractor's expense, and shall be collected from any moneys then due or to become due the Contractor.

18. COMFORT STATIONS:

Suitable privy conveniences for workmen shall be erected

and maintained in sanitary condition by the Contractor. Committing nuisances publicly or in the vicinity of the work is strictly prohibited under penalty.

19. FEES AND ROYALTIES:

All fees and royalties for any patented method, material, device, article or arrangement that may be used upon or be in any manner connected with the work or any part thereof under these specifications and the accompanying plans, shall be included in the prices named in the proposals, and the Contractor shall hold the City harmless against all demands for such fees and royalties.

20. EMPLOYER'S LIABILITY BOND:

The Contractor shall protect the City against all claims for damages, whether to person or property, arising out of his operations, and he shall be and he is hereby required to indemnify himself against accidents to his employes, purchasing an employer's liability policy covering the entire work under the contract and these specifications.

21. NO TRESPASS:

The Contractor shall not enter upon nor occupy with men, tools or material, any lands outside of public streets or roadways, or right of way lands secured by the City, without first having acquired it at his own expense, the right to such use, granted by the proper parties, and he will be held responsible for any damage committed by him or any of his employes, upon adjacent property or premises.

22. CLEARING FOR ACCEPTANCE OF WORK:

Final acceptance of the work shall be conditioned upon the removal of all surplus material and rubbish from the vicinity of the work.

Disposal of refuse material shall be subject to the direc-

tions of the Engineer.

The structures and their approaches shall be clear and ready for public traffic, all to the approval of the Engineer.

23. CAPITAL AND PLANT:

Bidders must present satisfactory evidence that they are familiar with the work and prepared with the necessary capital, materials and machinery, to conduct the work to be contracted for to the satisfaction of the City Council and the Engineer, and to begin it promptly when ordered to do so.

24. PROPOSALS IN DUPLICATE:

Proposals must be made in duplicate upon forms furnished by the Engineer. One proposal must be addressed to the City Clerk, and be accompanied by a certified check, payable to the order of the City Treasurer, for a sum of not less than ten (10) per cent of the bid submitted. No bid will be considered unless accompanied by said check. The duplicate bid must be addressed to the Mayor, but need not be accompanied by a certified check. All bids must be made in accordance with ordinances governing the same.

25. REJECTION OF BIDS:

The Council reserves the right to reject any or all bids or the bids of any firm or individual who shall have made default in payment for any material or labor pursuant to any contract with the City or with any other party; or of any party who shall have assigned, abandoned, surrendered or failed to complete any such contract within the specified time of his contract; or who shall have failed to comply with any of the provisions of the City Charter or Ordinances relating to Public Works, or to accept any bid they may deem to be for the best

interest of the City.

26. AWARDING OF CONTRACTS:

If a contract is awarded all checks may be retained ten days until a contract is entered into between the successful bidder and the City, for the making of this improvement, after which all checks will be returned. If the contract is not let within ten days after the opening of the bids, any bidder, except the lowest, may withdraw his certified check. If the successful bidder fails to enter into said contract in accordance with his bid within five (5) days from the date on which he is notified that he is the successful bidder, the said check and the amount thereof shall be forfeited to the City and the contract may be awarded to the next lowest bidder, or to any other bidder, at the option of the Council of the City of Moscow. The Council reserves the right to award the contract as a whole or in parts.

27. BOND:

Upon the awarding of the contract to the successful bidder and at the time of entering into said contract between such bidder and the City of Moscow, Idaho, the bidder shall furnish a good and sufficient bond in amount equal to _____ per cent of the contract price, to be approved by the Mayor and City Council, conditioned for the faithful performance of the contract and fulfillment of the conditions and guarantees as set forth and described in the plans and specifications. Engineering Division Form No. a3--19196.

28. PAYMENTS:

Payments for work performed shall be made according to ordinances of the City of Moscow.

29. CEMENT:

Definition:

By the term "Cement" is meant Portland Cement or the product obtained upon grinding to a fine powder, the clinker resulting from the calcination to incipient fusion of an intimate mixture of properly proportioned argillaceous and calcareous materials, and to which no admixture exceeding three (3) per cent by weight, shall have been made subsequent to calcination.

CHEMICAL COMPOSITION:

In the finished cement the following limits shall not be exceeded:

Loss on ignition for fifteen (15 minutes	4.00%
Insoluble residue	1.00%
Sulphuric Anhydride (SO3)	1.75%
Magnesia (MgO)	4.00%

PHYSICAL TESTS:

All cement submitted shall be subject to inspection and physical test by the Engineer, in accordance with the requirements of Standard Specifications for Portland Cement, adopted August 16, 1909, with amendments thereto, by the American Society for Testing Matrials.

(a) Specific Gravity.

The cement shall have a specific gravity of not less than three and one-tenth (3.1). If the samples submitted do not meet this requirement, a second test upon a sample ignited at a low red heat may be made, upon which the loss in weight shall not exceed four (4) per cent.

(b) Fineness.

Not more than eight (8) per cent of the sample shall be retained on the No. 100 screen and not more than twenty-five (25) per cent shall be retained on the No. 200 screen.

(c) Time of Setting.

The initial set shall develop in not less than thirty (30) minutes and the hard set in not less than one (1) hour nor in more than ten (10) hours.

(d) Tensile Strength.

Standard briquettes one (1) square inch in section shall develop in a standard testing machine the strength specified below:

NEAT CEMENT

24 hours in moist air	7 days 1 day in moist air 6 days in water	28 days 1 day in moist air 27 days in water
175 pounds	500 pounds	600 pounds

One part cement, three parts standard Ottawa sand.

7 days 1 day in moist air 6 days in water	28 days 1 day in moist air 27 days in water
200 pounds	275 pounds

(e) Constancy of Volume.

Three (3) pats of neat cement about three (3) inches in diameter with a thickness of one-half (½) inch at the center and tapering to a thin edge at the circumference, shall be kept in moist air for a period of twenty-four (24) hours, after which they shall be treated as follows:

One pat shall be kept in air at normal temperature and observed at intervals for a period of at least twenty-eight (28) days; the second shall be kept in water maintained as closely as possible at a temperature of 70° Fahrenheit and observed for a period of at least twenty-eight (28) days; the third pat shall be exposed in an atmosphere of steam above boiling water in a loosely closed vessel for a period of five (5) hours. If any pat shows signs of distortion, checking, cracking or disintegration, the cement shall be considered as lacking in the requirements of constancy of volume.

STORAGE.

To allow of ample time for inspection and test, cement shall

be stored in original packages, in a suitable water-tight building, with its floor raised above the surface of the ground, in such a manner that easy access to and full identification of each individual shipment may be permitted. Every storage facility shall be provided by the Vendor or Contractor and a period of at least twelve (12) days shall be allowed to permit of inspection and necessary tests. Cement which may have passed the tests required within the period above fixed, may, upon express permission of the Engineer, be released.

PACKAGES:

The cement shall be delivered in suitable packages, not allowing loss therefrom, plainly marked with the name of the manufacturer and the brand. A sack of cement shall contain ninety-four (94) pounds of cement net and each barrel shall contain the equivalent of four (4) sacks of the same weight. The unit of measurement of a barrel shall be three and eight-tenths (3.8) cubic feet.

REPACKED CEMENT:

Repacked cement shall not be submitted for test, and any such cement discovered in a shipment shall be considered sufficient cause for the rejection of the entire shipment.

REJECTION OF CEMENT:

Cement failing to meet the requirements of the seven (7) days' test may be held awaiting the result of the twenty-eight (28) days' test, and any cement not approved by the Engineer shall not be used upon any public work.

30. SAND.

All sand used shall be clean, sharp, washed and screened. It shall be of a hard, durable material--preferably of a basaltic nature. Sand shall range in size uniformly from fine to coarse.

and not more than twenty-five (25) per cent shall pass a screen having thirty (30) meshes per inch.

31. GRAVEL:

All gravel used shall be free from loam, clay or earthy particles, thoroughly washed, and screened to the required sizes. The material shall be of a hard, dense, basaltic nature. Gravel shall be carefully graded between the specified limits - Voids shall not exceed forty (40) per cent.

32. CRUSHED ROCK:

All crushed rock shall be free from dirt, dust or other foreign substances, and in size shall range uniformly between the limits fixed in the specifications in the particular kind of construction. It shall be a hard, dark-colored basaltic rock of uniform texture and sharp edges, or stone of an equal hardness having a specific gravity of not less than two and seven-tenths (2.7).

The maximum length of crushed rock passing a screen or a ring shall not be greater than fifty (50) per cent in excess of the diameter specified in the particular kind of construction.

33. REINFORCING STEEL:

The steel to be used for reinforcement shall consist of steel bars whose ultimate tensile strength shall not be less than 60,000 pounds per square inch with an elastic limit of not less than fifty (50) per cent. A bar of steel shall bend at 180 degrees Fahrenheit around a diameter equal to thickness of specimens tested. All bars shall be free from rust, dirt, oil or other foreign matter. They shall be wired together at all joints and intersections and placed in the concrete as marked and shown on plans. Bars used may be of any form approved by the engineer.

34. STRUCTURAL STEEL:

All structural steel shall meet the requirements of the

American Society for Testing Materials as given in the "Year Book" for 1915.

35. WROUGHT IRON:

All wrought iron bars and gratings shall be constructed as designed on plans and made of wrought iron which shall conform to the following specifications:

Wrought iron shall be tough, ductile and fibrous, of uniform quality, free from crystalline structure, cinders, flaws or cracks. In bars it shall have a tensile strength of not less than 50,000 pounds per square inch, with an elastic limit of not less than one-half (½) the tensile strength and the elongation shall not be less than twenty-five (25) per cent for eight (8) inches.

36. CASTIRON:

All iron castings shall be made from iron of good quality, remelted in the cupola or air furnace, tough, sound and of even grain and shall possess a tensile strength of not less than 18,000 pounds per square inch. Test bars of the metal two (2) inches by one-half (½) inch by twenty (20) inches long when broken transversely eighteen (18) inches between supports, shall have a breaking load of not less than 1000 pounds and shall have a total deflection of not less than three-tenths (.3) of an inch before breaking. All castings shall conform to the shape and dimensions required by the plans and shall be clean and perfect without blow or sand holes or defects of any kind.

37. BRICK:

Brick used on this improvement shall be whole, new brick, of compact texture, burned hard and entirely through, free from injurious cracks or flaws, tough and strong, and having a clear ring when struck together. They must have a crushing strength of not less than four thousand five hundred (4500) pounds per

square inch and must not absorb more than ten (10) per cent of their weight of water, after having been thoroughly dried, and then immersed for forty-eight (48) hours in water. Samples will be subjected to such other tests as may be required by the Engineer.

38. VITRIFIED SEWER PIPE:

The pipe and specials used on this sewer shall be designated by their respective interior diameters. They shall be of the best grade of salt glazed, vitrified sewer pipe, free from blisters, lumps or flakes which are thicker than 1-6 the nominal thickness of the pipe, and whose largest diameter is greater than 1/8 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 these defects in the top half of the sewer. Pipes or specials having fire checks or cracks of any kind extending through the thickness shall be rejected. Pipe shall not vary from a true cylinder more than one-twenty-fourth (1/24) of the diameter, or from a true line more than one-fourth (¼) of an inch. All bells or sockets shall be of sufficient diameter to receive to their full depth the spigot end of the next following pipe or special without the chipping of either, and have a space of not less than one-quarter (¼) inch for cement mortar joint.

Vitrified pipe shall not absorb more than 5 per cent of its weight in water when submitted to the following test: Take six specimens of full thickness of the wall of the pipe and approximately 3 inches square, dry thoroughly and immerse in water for 48 hours. The average per cent of gain in weight of each of the six specimens after immersion shall be considered as the result of the test.

The entire product of any pipe factory may be rejected when in the judgment of the Engineer, the methods of manufacture fail

to guarantee uniform results, or when the materials used are such as produce inferior pipe, as indicated by repeated failure to comply with the tests herein specified.

The thickness of the pipe shall not be less than the following:

For six inches in diameter 3/4 of an inch
For eight inches in diameter 3/4 of an inch.
For ten inches in diameter 7/8 of an inch.
For twelve inches in diameter 7/8 of an inch.
For fourteen inches in diameter 1 inch.
For sixteen inches in diameter 1 1/8 inches.
For eighteen inches in diameter 1 1/4 inches.
For twenty inches in diameter 1 1/4 inches.
For twenty-two inches in diameter 1 3/8 inches.
For twenty-four inches in diameter 1 1/2 inches.

39. LUMBER:

Lumber shall be Douglas Fir, Pine or other wood approved by the Engineer. Rough timbers shall not be more than one-quarter (¼) of one (1) inch scant when green, or more than one-half (½) of one (1) inch scant when S-1-S-1-E, or S-4-S. All lumber shall be from sound stock cut from standing live timber, free from injurious knots, sap, rot, wind-shakes or other imperfection which would impair its strength or durability, subject to the inspection and approval of the Engineer.

40. ALTERNATING AND TIMING SIPHONS:

The alternating siphons shall be "Miller Plural Alternating Siphons, Type 'A'." The manufacturer shall furnish with the siphons all necessary piping and metal parts for the complete installation. Siphons shall conform to the general requirements as shown on sheet 5 of the accompanying plans.

The Timing Siphons shall be "Miller Timed Siphons" of the general requirements shown on sheet 5 of the plans. By "Miller" Siphons is meant the product of the M Pacific Flush-Tank Company.

All siphons and accessories shall be of first quality and workmanship, and the Contractor shall guarantee the satisfactory

working of all siphonic apparatus.

41. SLUICE AND SHEAR GATES:

All sluice and shear gates shall be of first quality materials and workmanship. Gates shall equal in quality the "Red Devil" gates manufactured by the Vulcan Iron Works, Denver, Colorado. Gates of other manufacture, but of similar quality, will be accepted when same are approved by the Engineer. Gates shall be provided with locks.

METHODS.

42. EXCAVATION:

(a) CONTRACTOR TO FOLLOW LINES AND GRADES.

The Contractor shall follow the marks indicating the lines and grades as set by the Engineer and shall carefully protect such marks. Payment for work which may have been done beyond the limits directed by the Engineer, will not be made and the Contractor will not be relieved under his contract until he shall have performed all work in strict conformity with the instructions of the Engineer.

(b) SOFT MATERIALS TO BE REMOVED.

All soft and spongy places in the subgrade shall be excavated to a firm foundation and the places refilled with approved material. The refilled places shall be rolled as specified for embankment and brought to proper grade. Excavation below subgrade shall be paid for upon unit prices quoted for the particular material and all refilling to subgrade shall be paid for as embankment, provided, however, that if such refilling be made with broken stone or other material other than earth, payment will be made upon the basis of the unit price for the particular material.

(c) EXCAVATION OF SEWER TRENCHES AND TIMBERING:

The Contractor shall not excavate the trenches until he has

the necessary matrial on hand to construct the sewer therein. The trenches shall be opened in accordance with the lines and grades given for the work, at such times and so far in advance of the work as may be required by the inspector. Not more than six hundred feet of trench shall be opened in advance of completed sewer.

For pipe sewers of any size in diameter the trenches shall be of a width to permit proper construction. Payments will be made for a trench 12 inches wider than the outside diameter of the pipe, to a depth of point of support of pipe on bottom of trench.

Whenever the grade line of sewer comes in mud, quicksand or other objectionable material, the trench shall be "close sheeted" and such material excavated below the grade of the sewer and replaced with sand, gravel, timber or concrete, in accordance with the direction of the Engineer, and shall be paid for at the unit price bid for such material.

The contractor shall furnish, at his own expense, put in place and maintain such sheeting and bracing as may be required to support the sides of the excavation and to prevent any movement which would in any way injure the masonry, diminish the width necessary for proper drainage, or otherwise injure or delay the work.

If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports at the expense of the Contractor, and the compliance with such orders shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports.

The trenches shall be opened throughout the whole extent of the work, and no tunnelling or drifting shall be permitted except where indicated on plan or by consent of the Engineer.

Earth bridges must be broken down during back filling.

(d) PROVIDE FOR FLOW OF DRAINS:

The Contractor shall provide for the flow of all water courses, sewers or drains, and shall make such final provision for them as the Engineer may direct.

EXCAVATION FREE FROM WATER:

The excavation at the point where pipes or conduits are being laid or other structure built, shall be kept free from water during the construction of the same, and the Contractor shall provide ample facilities in the way of engines, pumps or other machinery to accomplish these results to the satisfaction of the Engineer.

(e) CLASSIFICATION OF MATERIALS.

Earth excavation will include clay, sand, gravel, loam, and all other materials, however excavated, except solid rock.

ROCK EXCAVATION:

Solid rock shall include all rock found in ledges or masses which cannot be removed without blasting, or boulders containing more than two cubic feet. Where solid rock is encountered in trenches for pipe sewers, it shall be excavated six inches below the grade line and refilled with earth or other suitable material.

(f) PAYMENT:

Excavation will be paid for at the prices bid per cubic yard.

(g) DISPOSITION OF MATERIAL:

Excavated material shall be deposited about the structures or over sewer pipe as called for on the plans or as ordered by the Engineer. Surplus excavation not needed for the completion of the work shall be placed in suitable spoil banks to be provided by the Contractor at his own expense. Spoil banks shall be leveled and graded, so as not to leave a rough, unfinished and objectionable appearance.

45. EMBANKMENT:

Embankments shall be constructed as shown on the plans or where ordered by the Engineer. The areas over which embankments are to be made shall be cleared of all rubbish, sod, roots and other materials unsuitable for foundations.

Embankment material shall be deposited in horizontal layer not greater than six (6) inches in thickness. All embankments shall be thoroughly compacted by rolling with a roller allowing not less than one hundred (100) pounds per inch for each width of roller, or by hand tamping to a compactness of material equivalent to that obtained by rolling.

Embankment will be paid for at the price bid per cubic yard.

44. LAYING VITRIFIED PIPE:

All vitrified pipe except that in the contact beds shall be laid as follows:

Before being laid, all pipe shall be carefully examined and passed upon by the inspector. The accepted pipe, before being lowered into the trench, shall be fitted together, matched and marked in the order in which they are to be laid. The trench shall be carefully shaped and graded to the line and grade given by the inspector. Crosscuts deep enough to receive the bell of the pipe shall be cut in the bottom of the trench so that the pipe shall have a solid bearing along its entire length. Before being laid, the outside of the spigot and the inside of the bell shall be carefully cleaned. The lower half of the bell of the preceding pipe shall be filled with cement mortar before the insertion of the spigot end, the pipe shall then be pressed into place so that the spigot end will not be more than one-quarter (¼) of an inch from the shoulder of the bell, care being taken to have the inside surfaces of the pipes flush and even. The bell shall then be filled flush with the outside all around, with cement mortar, pressing it into shape with the hand, carefully

rounding it off at least one inch on the body of the entering pipe. After being laid, the joint of each pipe must be carefully scraped smooth with a circular disk or swab to remove any surplus cement. After the pipe has been laid and cemented, fine earth or sand shall be carefully rammed under and half way up the sides of the pipe before the next is laid.

The cement mortar shall be composed of one part cement and two parts sand. Where water is encountered in the trench , each joint shall be carefully calked with oakum soaked in neat cement grout, before being cemented outside.

DRAINAGE:

Where water is encountered it must be drained away before any pipe or concrete is placed in the trench. In no case shall the sewer be used as a drain until it has been constructed for at least 48 hours, and in no case shall pipe be laid under water.

Split vitrified pipe for the underdrainage of the Contact Beds shall be laid true to line on the concrete floor of the Contact Bed. Pipe shall be laid with the bells pointing towards the inlet end of the bed. The pipes shall be laid with open joints. Unconnected ends of pipe shall be closed with a vitrified or cement blank.

The vitrified pipe feeders along top of Contact Beds shall be laid to lines and grades shown on plans, or as may be ordered by the Engineer. The top two-thirds (2/3) of main line pipe, excepting 8 inches, shall be cemented with a mortar composed of one (1) part cement and two (2) parts sand. All other joints shall be left open. Pipes shall be laid with bell ends pointing towards outlet end of bed.

Payment for vitrified pipe will be made at the prices bid per lineal foot for the various sizes and types of pipe in place. The cost of all special shapes, Wyes, Bends, Tees, Increasers and reducers, together with the cost of metal fastenings for

vent pipes and mortar in cemented joints shall be merged and included in the prices bid per lineal foot for the various sizes and types of pipe. The price bid per lineal foot shall cover all labor and materials other than excavation and backfilling, necessary to complete the pipe lines.

45. MANHOLES:

Manholes shall be constructed at such points and in such manner as shown on the plans or as may be directed by the Engineer. All necessary cover castings and frames, iron gratings, ladder irons, etc., shall be in strict conformity to the detail plans and shall be of the best quality of materials and workmanship of their several kinds for the purposes for which they are intended. Inlet and outlet pipes shall be laid during the construction of the manhole.

Manholes, except Nos. 16, 18 and ~~M~~ 18a (which are concrete), may be constructed of brick or ~~xxxxxx~~ concrete.

Mortar for laying brick manholes shall be composed of one (1) part cement and two (2) parts sand.

Concrete manholes shall have walls six (6) inches thick, and shall be constructed of concrete composed of one (1) part cement, two and one-half (2½) parts sand, and five (5) parts gravel or crushed rock. The concrete shall be mixed and deposited as described in section 47 g for concrete in walls. The concrete shall be sufficiently spaded to produce a dense material free from air bubbles and having a smooth, even surface next to the inner forms. All forms shall be water-tight, and shall not be removed until the concrete has thoroughly set.

Manholes will be paid for at the price bid per manhole complete with cover and frame or grating and ladder irons, together with all necessary excavation, forms, etc., required for completion.

46. BACKFILLING:

After the sewer has been constructed as specified and has been inspected and approved by the Engineer, the trench shall be backfilled and tamped or settled with water, when so ordered by the Engineer.

The filling about the pipes and for one (1) foot above the pipe shall be of earth, free from stones, or other objectionable material, carefully rammed and tamped in layers not exceeding six (6) inches so that the earth is thoroughly compact the full width of the trench, without voids or soft compressible material. The trench shall then be filled and settled with water, if so ordered by the Engineer.

Tamping of backfilling may be substituted for watering, with the approval of the Engineer. Backfilling shall be piled about and above the pipe as shown on the plans or as may be ordered by the Engineer.

All surplus earth or other material removed by the contractor shall be deposited where directed by the Engineer. The price bid for excavation shall include all backfilling, covering pipe and removing surplus material.

47. CONCRETE:

(a) Concrete shall be composed of one (1) part Portland Cement, two and one-half (2½) parts sand and five (5) parts of gravel or crushed rock.

(b) GRAVEL:

Gravel shall conform to Section 31 of the specifications and shall range in size uniformly from a minimum of one-quarter (¼) of one (1) inch material to material passing a two (2) inch ring. Not less than thirty (30) per cent by volume shall be material passing a three-quarters (¾) of one (1) inch ring.

(c) CRUSHED ROCK:

Crushed rock shall conform to Section 32 of the specifica-

The proper amount of water shall then be added and mixing shall commence and shall continue until a mass of uniform consistency shall have been produced, all ingredients being uniformly distributed throughout the mass. each particle being coated as previously described.

Retempering.

The retempering or remixing of mortar or concrete with additional water after partial setting has occurred is EXPRESSLY FORBIDDEN. All partially set concrete or mortar shall be rejected, and shall be removed from the work.

(h) FORMS FOR CONCRETE:

Material and Manner.

Forms shall be constructed to accurately and correctly mould the concrete in accordance with the detailed plans for the work, in manner and of material to the satisfaction and approval of the Engineer.

Lumber for Forms.

Lumber used for forms shall conform to Section 39 of these specifications; shall be of sizes and thicknesses necessary to mould true, straight surfaces of concrete. Lumber shall be smoothly surfaced wherever in contact with concrete. All edges shall be smoothly and truly jointed.

Construction of Forms.

The forms shall be thoroughly braced and stayed so that the finished surfaces may be true to line and grade and free from objectionable depressions or projections. They shall be made thoroughly tight to prevent leakage of mortar, and before placing concrete against them, shall be thoroughly wetted. After removal of the lagging, the tie wires shall be clipped beneath the surface and the ends pointed over, to the satisfaction of the Engineer. No forms shall be struck unless with the express approval of the Engineer.

(1) DEPOSITING AND FINISHING CONCRETE:

Transporting.

The transportation of concrete from the point of mixing to the point of deposit shall be conducted in such a manner that mortar may not be lost and the concrete shall be so handled that when deposited in place it shall be uniform in composition throughout, showing neither excess nor deficiency of mortar in any part of the mass. If the concrete be transported by wagon or cart, every such vehicle shall have a tight body and the concrete shall be in place within thirty (30) minutes after discharge from the mixer or the mixing platform. The length of haul shall not exceed three hundred (300) feet, except upon express permission of the Engineer.

Depositing.

The concrete shall be deposited evenly in layers and immediately spaded or agitated by suitable tools in such a manner as to produce a thoroughly compact concrete of maximum density. The dropping of concrete from a height without remixing and spreading the same, is expressly forbidden. All stone shall be well spaded back from the faces of the forms, so that a smooth mortar surface may be attained.

Placing Steel Reinforcement and Repairs.

No concrete shall be placed until the reinforcing steel shall have been placed as required in the plans, and firmly secured by wiring or other approved method, to prevent its displacement. Before any concrete may be placed, all shavings and debris of any nature shall be removed from within the forms and the surface of the old concrete thoroughly cleaned and slushed with neat cement, or a cement mortar not leaner than one (1) part of cement to two (2) parts of concrete sand.

Removal of Forms.

No forms shall be struck nor the wedges removed without the

express permission of the Engineer.

Finish of Exposed Surfaces:

As soon as the concrete has set sufficiently to allow of a safe removal of forms, all discoloration, irregularities in surface and joint marks of the lagging on exposed surfaces shall be rubbed down with carborundum blocks. All the tie wire shall be snipped beneath the surface and all holes or rough places pointed with a dry mortar of sand and cement in the proportions specified for the concrete. The surface film of all such pointed places shall be removed before setting occurs. A plaster finish or cement wash shall not be used unless with the express permission of the Engineer.

Protection of Work.

Freezing and Drying.

The mixture of concrete during freezing weather shall not be permitted, except upon express permission of the Engineer, and in no case shall frozen material be used in mixing. In case the Engineer permits the laying of concrete in freezing weather, the sand, water and aggregate shall be heated. Effective means shall be provided to prevent freezing of concrete in place, before the final set. All finished and unfinished concrete shall be kept thoroughly wetted for not less than twelve (12) days and in dry weather the entire surface shall be covered and protected from the sun's rays. Any concrete which may have been injured by drying, freezing or other cause, shall be removed upon order of the Engineer.

Consistency of Concrete.

The ingredients of the concrete shall be so mixed as to produce a mortar homogeneous in character and uniform in color and texture, of such consistency that when dumped in place no tamping will be necessary. Concrete shall be thoroughly spaded down, care being taken not to disturb steel reinforcing. The mass shall then be lightly tamped to level it off to the required thickness, after which surface tamping, the consistency of the mass shall be that of a quaking jelly.

BONDING SECTIONS OF WORK:

The ends of all sections of concrete wall shall be slightly recessed with a shallow V groove of a width approximately nine (9) inches, or in thin walls of a width not greater than one-third (1/3) the thickness of the wall. All joints in day's work shall be made true and straight, and shall be painted with a neat cement grout before constructing adjoining sections.

FILTERING MATERIAL:

For Contact Beds.

The filtering material for the Contact Beds may be either gravel or crushed rock. Gravel shall conform to provisions of Section 31, and crushed rock shall conform to Section 32 of the specifications as to quality. Bidders shall specify which class of material they propose to use. Bids may be made for either or both materials. The filtering material shall not exceed 40 per cent voids, and shall not be less than 30 per cent voids. The bottom eight (8) inches of each bed shall consist of material ranging in size from one-half (½) inch to matrial passing a one (1) inch ring. The remainder of the bed shall be filled with material ranging in size from one-half (½) inch to material passing a one and one-half (1½) inch ring. These specified sizes may be modified by the Engineer at any time, and the Contractor shall not order or furnish any filtering matrrial until after the exact sizes have been selected and determined upon, depending upon the material to be used. The Contractor will not have claim for extra pay because of any change in size of this material. Filtering material shall be deposited in the bed in horizontal layers.

SLUDGE BEDS.

Filtering material for Sludge Beds shall conform to the

general provisions of Sections 30, 31 and 32. Size of material shall be as shown on plan.

The construction of sludge beds is optional at the decision of the Council of the City of Moscow. The elimination of the Sludge Beds and any attendant lessening of the total amount of work shall not be a basis for any claim on the part of the Contractor.

All filtering materials will be paid for at the price bid per cubic yard for the material in place.

ALTERNATING AND TIMED SIPHONS.

The four alternating siphons and the four timed siphons, together with all piping and incidentals, shall be furnished by the Contractor and installed in working order. The price bid shall cover all material and labor needed to provide successful operation. Payment will be made at a lump sum price for the siphons installed.

SLUICE AND SHEAR GATES:

The Contractor shall furnish and install five (5) Sluice Gates and six (6) Shear Gates conforming to section 41 of the specification and to the requirements of the plans. The manufacture of gate to be used shall be determined by the Engineer upon submission of information by the Contractor. Gates of other manufacture equal to those specified may be used with the approval of the Engineer. The Contractor shall install all gates and accessories in good working order. Payment will be made at the lump sum price bid for gates in place.

SEPTIC TANK WEIRS:

The steel angle weirs at the outlet of the Septic Tanks shall be set true to grade, and no variation in the grades of the various weirs will be allowed. Payment for the steel angle

and anchor bolts will be at the price bid per pound for structural steel in place.

PAINTING STEEL:

The steel weir and all other exposed steel or iron in the Septic Tanks shall be painted two coats of red lead and oil, using thirty-three (33) pounds red lead to one (1) gallon of linseed oil.

ROOF COVERING--SEPTIC TANK AND DOSING CHAMBER:

The Contractor shall furnish all materials and labor to construct a roof covering over the Septic Tanks and Dosing Chambers as shown on the plans. All materials shall conform to general clauses of these specifications covering the materials used. The work shall include all lumber and timber, nails, bolts, hardware and roofing. All materials must be of good quality and shall be approved by the Engineer. The roofing shall be of a quality equal to a 3 ply Genasco or Malthoid roofing, laid with two-inch lap, all joints cemented or mopped and with nailing not to exceed two and one-half inch centers, caps or cleats to be used in nailing. Roofing shall be subject to the approval of the Engineer. A door shall be provided at the south end of the building for access to the Septic Tank. The door shall be provided with a strong padlock. The siding of the building shall be "rustic" of good grade. All other parts of the building shall be completed in workmanlike manner, and in conformity with customary good practice. The exterior of the building shall receive a priming coat, followed by two coats of first grade graphite paint, or lead base paint, of color and quality approved by the Engineer. Payment will be made at the lump sum price bid for the building completed. The building shall be understood

to include all the structure above the concrete.

FINAL CLEAN-UP:

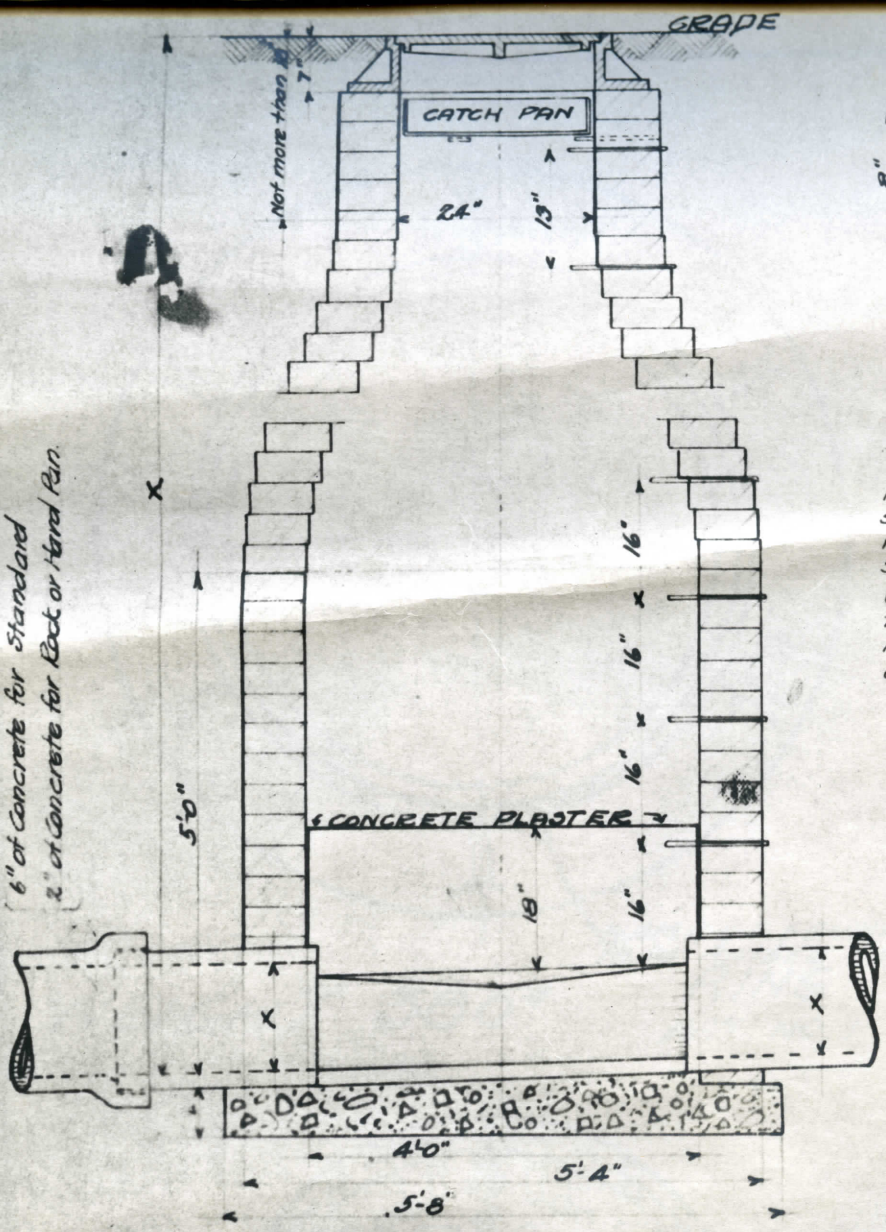
The Contractor shall remove all rubbish and surplus material from the job, and leave the entire work in orderly and neat condition.

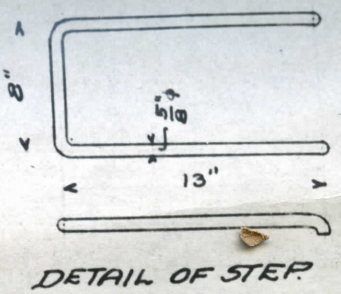
BIDDING BLANK.

Contractors will be required to bid on the following items of work:-

No.	Quantity	Unit	Item.	Unit Price	Measure of Quantity
1	11,700	Cu Yds	Earth Excavation and Back-fill		per Cu Yd
2	20	" "	Rock Excavation		" "
3	2,250	" "	Embankment		" "
4	1,275	" "	Concrete		" "
5	5,000	lbs.	Reinforcing Steel, in place		lb.
6	750	"	Structural Steel, in place		"
7	4,500	Cu Yds	Gravel or crushed Rock Filtering material (Contractor shall state the kind of material bid on)		Cu. Yd.
8	0.5	M ft.BM	Lumber, Syphon Chamber Covers		M ft. B.M.
9	5,180	Lin. ft.	24 in. Vitrified Sewer Pipe, in place,		Lin. Ft.
10	12	" "	22 in. " " " "		" "
11	860	" "	20 in. " " " "		" "
12	550	" "	16 in. " " " "		" "
13	16	" "	15 in. " " " "		" "
14	300	" "	12 in. " " " "		" "
15	2,050	" "	8 in. " " " "		" "
16	170	" "	6 in. " " " "		" "
17	120	" "	4 in. " " " "		" "
18	200	" "	24 in. Split " " "		" "
19	220	" "	20 in. " " " "		" "
20	2,400	" "	12 in. " " " "		" "
21	27	Each	Manholes, complete		Each
22			Sluice and Shear Gates, in place,		Lump Sum
23			Alternating and Timed Syphons, in place,		" "
24	"		Roof over Septic Tanks and Dosing Chamber complete		" "

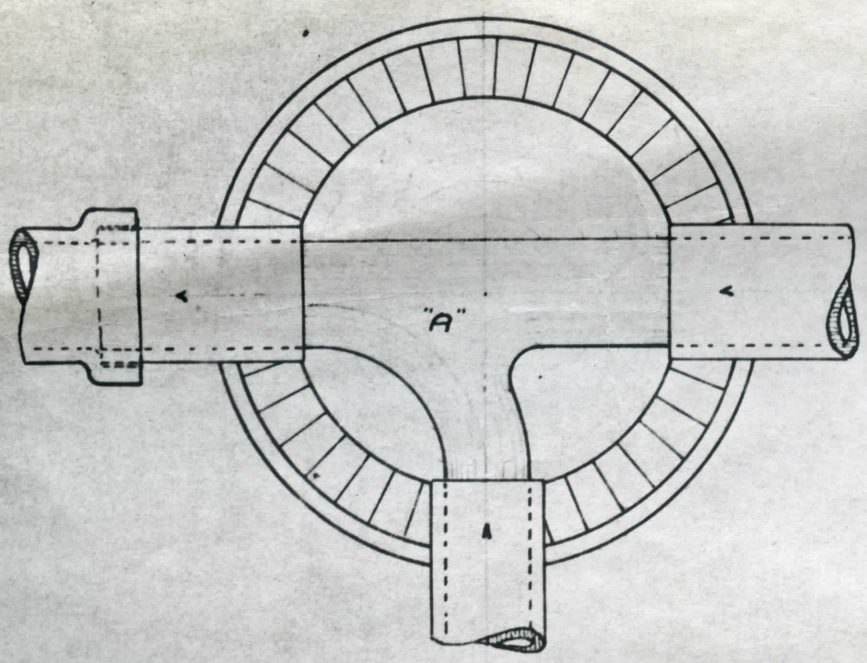
No.	Quantity	Unit	Item	Amount
1	11,700	Cu Yds	Earth Excavation and backfill at 48 cts. per cu. yd.	$ 5,616.00
2	20	Cu Yds	Rock Excavation at $2.00 per cu yd	40.00
3	2,250	Cu Yds	Embankment, at 10 cts per cu. yd.	225.00
4	1,275	Cu Yds	Concrete, at $12.00 per cu. yd.	15,300.00
5	5,000	lbs.	Reinforcing Steel, at 8 cts. per lb:	400.00
6	750	lbs.	Structural Steel, at 10 cts. per lb	75.00
7	4,500	Cu Yds	Gravel or Crushed Rock Filtering material, at $2.75 per cu. yd.	12,375.00
8	0.5	M ft.B.M.	Lumber, at $40.00 per M	20.00
9	5,180	Lin ft.	24 inch Vitrified Sewer Pipe, in place, at $2.30 per lin. ft.	11,914.00
10	12	" "	22 inch do at $2.40 " " "	28.80
11	860	" "	20 inch do " 1.80 " " "	1,548.00
12	550	" "	16 inch do " 1.20 " " "	660.00
13	16	" "	15 inch do " 1.10 " " "	17.60
14	300	" "	12 inch do " 0.75 " " "	225.00
15	2050	" "	8 inch do " 0.38 " " "	779.00
16	170	" "	6 inch do " 0.27 " " "	45.90
17	120	" "	4 inch do " 0.25 " " "	30.00
18	200	" "	24 in. Split Vitrified Sewer Pipe, in place, at $1.90 per Lin. Ft	380.00
19	220	" "	20 in, Split V. S. P., in place, at $1.25 per lin. ft	275.00
20	2,400	" "	12 in. " " ").45 " " "	1,080.00
21	27	Each	Manholes complete, at $42.00 each	1,134.00
22			Sluice and Shear Gates, in place, per lump sum	420.00
23			Alternating and Timed Syphons, in place, per lump sum	5,600.00
24			Roof over Septic Tanks and Dosing Chamber, complete, pr lump sum	2,200.00
			Total	60,388.30
			Engineering, etc., at 5%	3,021.70
				63,410.00





DETAIL OF STEP

NOTE:- Use 3 courses of stretchers to each course of headers. The trough "A" shall be made of Vit. pipe where possible. The pipe to be split longitudinally in halves and laid in cement mortar.



STANDARD MAN-HOLE

CITY ENGINEER'S OFFICE

MOSCOW - IDA.