

UNIVERSITY OF LONDON

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NO. 956.

INSTITUT
LEG.

Court of King's Bench

(APPEAL SIDE)

On appeal from a judgment of the Superior Court, for the Province of Quebec, (District of Montreal), rendered by the Honourable Mr. Justice Mercier, November 23rd, 1934.

The People of the State of New York,

(Plaintiffs in the Court below)

APPELLANTS

—vs—

Heirs of the late John M. Phillips,

(Defendants in the Court below)

—&—

*The Crown Trust Company et al.,
es-qual., for the Heirs of the
late Francis Phillips,*

Defendants severing in their defence
and en reprise d'instance.

RESPONDENTS

—&—

The Montreal Safe Deposit Company,

TIERS-SAISIS

C A S E

VOLUME 4. — PAGES 1501. TO 2000.

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C A S E

EXHIBIT C-163 (*continued*):

Even when the smoothness of the surface is satisfactory, however, and when there is no criticism possible as to the kind and quality of the aggregates, their deposition and the cleanliness with which the work is done, concrete surfaces frequently vary in color and have a cloudy light and dark appearance. In many cases there seems to be good reason for attributing this to the leaching out of lime, compounds and their deposition in the form of an efflorescence on the concrete surface. The extent of this efflorescence varies; at times the deposit is so thin as merely to give a lighter shade to the places where it appears, but it will often form an encrustation of considerable body and thickness which may be readily scraped off as a white or yellowish-white powder. The nature of this discoloration and the preventive and remedial treatments which have been practiced in its cure are discussed more fully in a succeeding paragraph.

Construction of Forms.—Very slight imperfections in the face of the forms against which the concrete is molded are sufficient to leave an unsightly impression on the plastic mixture when it hardens. Even the grain of smoothly dressed timber will show on the surface of concrete which has been deposited with a mortar facing. It is very difficult to construct forms so that they will not leave slight impressions of this character, and it is generally better not to attempt the task in any but exceptional instances. In these a straight-grained, smoothly dressed timber, with its pores filled with soap or paraffine well rubbed in, or a rougher timber covered with sheet metal, can be used. Generally speaking, all has been done that is practicable so far as the forms are concerned when the face-lagging is kept true to surface and has close-fitting joints. Grain-marks and similar minor impressions of the forms can usually be eliminated by rubbing the surface or floating it with grout, at less cost, than by attempting to perfect the molds beyond a reasonable measure. In fact many engineers experienced in concrete work prefer not to attempt to secure particularly perfect finish in the forms, but to dress the entire surface by some style of tooling or rubbing process after the forms have been removed. The most apparent imperfection in concrete surfaces is usually the joint-marks of the lagging-boards. These may be due either to slight differences in the thickness of adjoining boards or to open joints. The remedy for the first cause is obvious, but it is not so easy to insure smooth, tight joints and keep them smooth and tight when the boards swell from the

EXHIBIT C-163 (continued):



FIG. 78.

10 moisture absorbed from the wet concrete. One of the most successful forms of joint is that shown by the sketch Fig. 78. In this construction the wedge edge presses into the edge of the adjoining board without distorting or bulging the lagging. Pointing the joints with hard soap or putty, packing them with oakum and covering them with pasted strips of cloth, are other means which have been practiced for preventing joint-marks on the concrete. A method of eliminating grain-marks, which was used with success in constructing piers of the Frazer River Bridge in British Columbia, consisted in covering the tightly laid matched lagging with gloss oil and then blowing sand into the oil with hand-bellows.

20 *Mortar or Grout Facing.*—One of the most frequently employed means for securing a smooth surface finish on concrete is to use a mortar or grout facing. This facing differs from plastering in being laid on as the concrete is deposited, thus forming a single piece with it. The thickness of mortar facing employed in practice varies from $\frac{1}{2}$ in. to 3 ins., but the usual practice is to make it 1 in. or $1\frac{1}{2}$ ins. thick. A facing as thick as 3 ins. is rather unnecessary waste of mortar, while one which is much less than 1 in. thick is likely to be pierced by the stones in the concrete unless great care is taken in ramping the concrete filling behind the mortar facing. A mortar or grout facing shows the impress of small roughnesses on the mold more readily than does concrete. and particular care is necessary to secure a smooth surface in the
30 mold when the mortar facing is adopted. The composition of the facing mortar is usually specified as 1 part of Portland cement to 2 or 3 parts of sand. These ingredients are mixed rather wet, since the paste must completely fill the facing-mold, but care must be had not to have so thin a paste that the stones from the concrete behind will be pushed through it during the subsequent filling and ramming.

40 The following method of placing mortar facing is practiced by the Illinois Central R. R. and has gained wide adoption during the last few years. A sheet-iron plate 6 or 8 ins. wide and about 6 ft. long has riveted across it on side $1\frac{1}{2}$ -in. angles spaced about 2 ft. apart. One edge of this plate is provided with handles. This device is employed as a mold for the facing and is operated in the following manner: The plate is set up against the face of the form with its angle-ribs close against the timber and its handles upward. In this position of the plate there is between it and the form an open slot $1\frac{1}{2}$ ins. wide. This slot is filled with mortar

EXHIBIT C-163 (*continued*):

which is tamped thoroughly, and immediately afterwards the concrete backing is deposited behind the plate. When this has been done the plate is withdrawn by the handles and the backing and facing are rammed together to a close bond. The mortar facing is mixed in small batches as it is needed, and no delay is permitted in placing the concrete backing, the essential principle and purpose of the method being to secure as nearly as is possible the simultaneous construction of the backing of concrete and its facing of mortar.

Fig. 79 shows an excellent form of surface mold of the type just described. By varying the size of the angle-ribs any desired thickness of facing can be constructed, and the flare of the top edge facilitates the placing of the mortar, which is usually done with shovels. In lieu of a steel plate, use is sometimes made of a board provided with furring-strips on one side. This is a more unwieldy device than the one illustrated, and it is objectionable because of the large crevice left upon withdrawal into which the mortar facing is likely to slough and which is less easily closed and bonded by the final ramming. In constructing mortar facing with either iron or board molds perfect success is secured only at the expense of great care. The mortar must be mixed in small batches and only as needed, and it must be thoroughly rammed and churned into the facing-mold. The concrete backing must be deposited behind the mold without delay and firmly rammed against it, and finally the ramming together of the facing and backing must be thorough.

The following method of applying grout facing was employed with success in constructing the Atlantic Avenue subway for the Long Island R. R. in Brooklyn, N. Y. The concrete was deposited in 6-in. or 8-in. layers, and after ramming the concrete at the face was pushed back from the form about 1 in. with an ordinary gardener's spade and a thick grout of 1 part cement and 2 parts sand was poured into the space. The forms used were tongued and grooved yellow pine painted with paraffine paint. In this work a good surface was invariably secured when the men did their work faithfully, but any carelessness on their part evidenced itself in a rough spot when the forms were removed. As an indication of the susceptibility of mortar facing in taking impressions from the forms, it may be noted that even with the dressed and paraffined lagging the grain of the wood was shown perfectly on the mortar facing.

EXHIBIT C-163 (*continued*):

Finishing Mortar Facing.—When mortar or grout facing is employed as described in the preceding paragraphs the slightest imperfections in the grain of smoothly dressed wood is clearly impressed on the plastic material. There will also be occasional rough spots, pittings, or bubble-holes even with the most careful construction. To get rid of these some method of surface finishing must be resorted to. A number of methods have been practiced. In recent concrete culvert work on the New York Central & Hudson River R. R. an excellent surface finish was obtained by the following procedure. The forms of 2-in. dressed and matched pine, after being put in place, were painted with a coat of thin soft soap, then as the layers of concrete were brought up the face was drawn back with a square-pointed shovel, the edges of which had been hammered flat. Mortar in the proportion of 1 part cement to 2 parts sand, mixed rather wet, was then poured in along the form and the layer rammed against it. Hard soap was used to fill openings left by points of the lagging. When the forms were removed and while the concrete was yet "green," the surface was carefully rubbed with a circular motion, with pieces of white firebrick or briquettes of 1 cement to 1 sand, made in molds about the size of a building brick, handles being pressed in while soft. The surface was then dampened and painted with a coat of grout of 1 cement to 1 sifted sand, and this was closely followed by a final rubbing with a circular movement, using a wooden float. All edges were rounded with a Crafts edger, or with wood fillet, and the coping joints were struck with Crafts jointer.

In the specifications for concrete presented by the special committee of the Engineering and Maintenance of Way Association the following requirement for finishing was adopted:

After the forms are removed, any small cavities or openings in the concrete shall be neatly filled with mortar if necessary. Any ridges due to cracks or joints in the lumber shall be rubbed down; the entire face shall then be washed with a thin grout of the consistency of whitewash, mixed in the proportion of 1 part of cement to 2 parts of sand. The wash should be applied with a brush.

In the extensive concrete construction of the Aurora, Elgin & Chicago R. R. the exposed surfaces were all finished according to the following specifications:

EXHIBIT C-163 (continued):

10 All walls when finished must present a smooth, uniform surface of cement mortar, and all disfigurements must be effaced, and if there are any open, porous places, they must be neatly filled with mortar of 1 cement and 2 sand, well rubbed in, which finishing must be done immediately upon the removal of the forms. Compensation for all labor and material required in such finishing, including the mortar facing when required with the finishing of bridge seats and other parts, is included in the price per cubic yard for concrete work.

Mr. Edwin Thacher, in his general specifications for concrete-steel requires the following surface finish:

20 For plain flat surfaces, the concrete may be rammed directly against the molds, and, after the molds have been removed, all exposed surfaces shall be floated to a smooth finish with semi-liquid mortar, composed of 1 part cement and 2 parts of fine, sharp sand, care being taken that no body of mortar is left on the face, sufficient only being used to fill the pores and give a smooth finish.

30 A very effective finish is obtained by etching the mortar facing with acid. The method consists of using a facing mortar composed of Portland cement and finely crushed stone, the kind of stone depending upon the appearance desired. Thus any shade of red or gray granite, sandstone, etc., can be obtained, and special effects can be obtained by the use of sand, pigments, etc., in the mixture. This mortar is composed of about 1 part Portland cement to 2 or 3 parts of the finely crushed stone. The exposed surfaces are then treated by chemical or mechanical means to remove the cement matrix at the face, leaving the granular particles of stone partly exposed. In general this is done by washing the surface with a weak acid solution, then with clean water, and finally with an alkiline solution to neutralize any effects of the acid. In the finished work it is difficult to detect that the material is not natural stone, except by close inspection. The stone is crushed to pass through a sieve of 10 to 30 meshes per square inch according to the character of finish desired, and
40 enough water is used to make a soft plastic mixture.

Plastering.—Plastering as a method of finishing concrete surfaces deserve mention for the purpose alone of calling a warning against its adoption. It is practically impossible to apply mortar in thin layers to a concrete surface and make it adhere for any length of time, and when it once begins to scale off the

EXHIBIT C-163 (*continued*):

result is a surface many times worse in looks than the unfinished concrete that it was intended to render more sightly.

10 *Pebble Dash Facing.*—An effective surface finish for certain classes of concrete work can be secured by using large rounded pebbles in place of the usual aggregate for the surface layer of concrete, and then, while the concrete is soft, removing the mortar between the pebbles by wire brushing until approximately half the pebbles are exposed. The following specification for this style of facing was employed in constructing a small concrete road-bridge in the National Park at Washington, D. C.:

20 The concrete, which will be in the exterior faces of the bridge and the parapet walls for a thickness of 18 ins., will be made of gravel and rounded stone varying in the concrete below the belting course between 1½ and 2 ins. in their smallest diameters. This gravel will be mixed in the concrete as aggregate instead of broken stone. The mixture will consist of 1 part Portland cement, 2 parts sand, and 5 parts of aggregate. The parapet walls will be made in a similar manner, with the aggregate composed of gravel not exceeding 1 in. in its smallest diameter. When the forms are removed the cement and sand must be brushed from around the face of the gravel with steel brushes, leaving approximately half of the gravel exposed.

30 In this work it was found by test that at the age of 12 hours the concrete was not sufficiently set to hold the pebbles from being torn out by the brushing, and that at the age of 36 hours it was too hard to permit the brushing, to remove a sufficient depth of mortar without undue labor. At 24 hours' age the brushing proved most successful.

40 *Tooled Surfaces.*—A method of finishing concrete surfaces which is preferred by many experienced engineers is to dress the concrete after it has hardened by means of hammers or pointed chisels. The process is exactly analogous to stone dressing, and any of the forms of finish employed for cut stone can be employed equally well for concrete. In connection with tooled surfaces it is common to mold the concrete to represent ashlar masonry by means of horizontal and vertical V-shaped depressions formed as shown by Fig. 80. This style of finish has been extensively employed by Mr. E. L. Ransome, who gives the following directions for securing it: In imitating rough-dressed work the mold is removed from the concrete while it is yet tender, and with small light picks the face is picked over with great

EXHIBIT C-163 (*continued*):

rapidity, an ordinary workman finishing about 1,000 square feet per day. For imitations of finer-tooled work the concrete should be left to harden longer before being spalled or cut, and the work should be done with a chisel. Most natural stone and especially granite makes excellent material for the face, but ordinary gravel will do. Whatever is used, let it be uniform in color and of even grade. When a very fine and close imitation of a natural stone is required take the same stone, crush it and mix it with cement colored to correspond. The finer the stone is crushed the nearer the resemblance will be upon close inspection; but for fine work it is generally sufficient to reduce the stone to the size of buck-shot of fine gravel.

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Masonry Facing.—A facing of masonry is often employed on reinforced-concrete arch bridges, and is a very satisfactory solution of the problem of surface finish for such structures. Masonry facing may be of any style of stonework which is used for true masonry arches, and coursed ashlar, random rubble, and boulder masonry facings have all been employed. Exactly the same care should be exercised in selecting stones and laying them up into arch ring and wall, cornice and parapet, as if the structure were entirely of masonry. Beyond this the most important feature to be observed is close bonding of the masonry facing to the concrete backing. To insure this there should be a liberal use of stretchers reaching well into the backing, and these can be supplemented with metal cramps to the advantage of the work in many instances. For facing the arch ring the stones should be cut to true voussoir shape, and laid quite as perfectly as if they were a part of a true voussoir arch ring. The soffit of the arch ring is not stone-faced. In place of stone a brick facing may be employed.

The following specifications for stone and brick facing, which were prepared by Mr. Edwin Thacher, M. Am. Soc. C. E., to control work conducted by him, give a fair idea of the requirements of high-class work of this character:

40
Stone Facing.—If stone facing is used, the ring stones, cornices, and faces of spandrels, piers, and abutments shall be an approved quality of stone. The stone must be of a compact texture, free from loose seams, flaws, discolorations, or imperfections of any kind, and of such a character as will stand the action of the weather. The spandrel-walls will be backed with concrete, or rubble masonry, to the thickness required. The stone facing shall in all cases be securely bonded or clamped to the

EXHIBIT C-163 (continued):

backing. All stone shall be rock-faced with the exception of
cornices and string courses, which shall be sawed or bush-ham-
mered. The ring stones shall be dressed to true radial lines, and
laid in Portland cement mortar, with $\frac{1}{4}$ in. joints. All other
stones shall be dressed to true beds and vertical joints. No joint
shall exceed $\frac{1}{2}$ in. in thickness and shall be laid to break joints
at least 9 ins. with the course below. All joints shall be cleaned,
10 wet, and neatly pointed. The faces of the walls shall be laid in
true lines, and to the dimensions given on plans, and the corners
shall have a chisel draft 1 in. wide carried up to the springing
lines of the arch, or string course. All cornices, moldings,
capitals, keystones, brackets, etc., shall be built into the work
in the proper positions and shall be of the forms and dimensions
shown on plans.

Brick Facing with Concrete Trimmings.—The arch rings,
cornices, string courses, and quoins shall be concrete-faced as de-
20 scribed above, the arch rings and quoins being marked and be-
veled to represent masonry. The piers, abutments, and spandrels
shall be faced with vitrified brick, as shown on plans. The brick
facing shall be plain below the springing lines of the arches, and
rock-faced above these lines. All rock-faced brick shall be
shipped by hand from true pitch lines. All brick-facing shall be
bonded as shown on plans, at least one-fifth of the face of the
wall being headers. The brick must be of the best quality of
hard-burned paving brick, and must stand all tests as to durab-
30 ility and fitness required by the engineer in charge. The bricks
must be regular in shape and practically uniform in size and
color. They shall be free from lime and other impurities; shall
be free from checks or fire cracks, and as nearly uniform in every
respect as possible; shall be burned so as to secure the maximum
hardness; so annealed as to reach the ultimate degree of tough-
ness; and be thoroughly vitrified so as to make a homogeneous
mass.

The backing shall be carried up simultaneously with the
face work, and be thoroughly bonded with it.

40 The use of boulder facing will ordinarily be limited to
structures of special character, and its success will depend very
largely upon the care with which the stones are selected, their
size, and their arrangement in the structure. In constructing a
boulder-faced concrete arch at Washington, D. C., the following
requirements were specified for the facing:

EXHIBIT C-163 (*continued*):

The term boulder here is meant to cover loose rock, which shall be hard, durable, and of a quality to be approved by the engineer, whose edges have become weathered or water-worn, or both, and are more or less rounded. It is the intention to obtain a decidedly rustic effect on the facing, and to that end extreme care must be taken in the selection of the stones, and only mechanics who show an aptitude for this class of work shall be employed. No tool marks or fresh fractures will be allowed on the showing faces.

The boulder face of such stone shall project at least 2 ins. beyond the neat lines of the bridge, and this projection shall not exceed 15 ins., nor shall it be greater than one-half the least horizontal dimension of the stone. All joints shall be scraped and brushed clear of mortar to the depth indicated by the engineer. The mortar shall consist of 1 part Portland cement and 2 parts sand. The backs of all boulders shall be plastered with a layer of mortar as specified, at least $\frac{1}{4}$ in. thick, immediately before ramming the concrete against them.

The arch-stones shall have a depth of between 3 and 4 ft., a width of not less than 18 ins., nor more than 36 ins.; all dimensions to be measured exclusive of the projections beyond the neat lines. The joints shall be dressed so as not to exceed $1\frac{1}{2}$ ins. at any point for at least two-thirds their depth and two-thirds their length, and as much more as the stones will admit. Each arch-stone shall be cramped to the adjacent steel girder by means of a wrought-iron cramp made from $\frac{3}{4} \times \frac{3}{8}$ -inch. bar, the cramps to reach at least 2 ins. into each boulder, to be well cemented into them, and securely cramped to the top of the girder. The outside girders shall be cramped to the adjacent bidders by 10 wrought-iron cramps made from $\frac{3}{4} \times \frac{3}{8}$ -in. bar (in construction we used $\frac{3}{4}$ -in., as it bent cold without fracture).

No dressing will be required on the stones used in abutments, spandrels, and wing walls of the work, but only well-shaped boulders, laid on their broadest bed, will be allowed. Dressing will be permitted on such stones as cannot be properly bedded without it. The parapet walls will be a continuation of the spandrel and wing walls. The boulder stone must reach entirely through the wall.

Cast Concrete Slab Veneer.—In constructing the arch bridge at Soissons, France, which is described on p. 244, the faces of the arch-ribs and the spandrel facing were formed of slabs of

EXHIBIT C-163 (*continued*):

concrete-steel molded separately and set in place like stone veneer with the remainder of the concrete forming a backing. An essentially similar construction was employed in Chicago, Ill., in 1902, in constructing a number of recreation buildings in one of the city parks. In the last example mentioned the slabs were cast face down in wooden molds; the mode of procedure being as follows:

10

A layer of mortar composed of 1 part cement and 2 or 3 parts of finely crushed stone was first placed in the bottom of the mold to a depth of from $\frac{1}{2}$ in. to 1 in.; on this bed of mortar a 1-2-4, concrete, with $\frac{1}{2}$ to $\frac{3}{4}$ in. stone, was placed to the thickness desired and carefully rammed. After hardening, the blocks were removed from the molds and set aside to season until they were placed in the structure.

20

The construction of the slab veneer for the Soissons Bridge was as follows: For molding the arch-rib facing a smooth level platform or pavement of concrete was constructed on an adjacent level piece of ground. This molding platform was large enough to permit the arch-ribs to be delineated to full size on its surface. To prepare the mold the platform was covered smoothly with gunny cloth held down by battens, which also served to outline the extrados and intrados of the arch-rib. Radical strips of wood were then placed to divide the mold into voussoir-like sections. A thin bed of mortar was placed on the bottom of the mold and on this was laid four reinforcing-bars, one near and parallel to each edge of the voussoir being molded, so as to intersect at the corners. Under these bars at several points wire stirrups were looped with their fine ends projecting upward. The metal was then covered with a rich concrete of fine stone laid on the mortar-bed and compacted so that the total thickness was about 2 ins. When hardened, the product of the mold was a set of voussoir-shaped slabs with smooth faces and edges and a rough back with a number of projecting wires. In construction these facing slabs were set in place with mortar joints and backed with concrete. For the spandrel-wall facing the slabs were cast in rectangular

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Moldings and Ornamental Shapes.—The finishing of concrete structures in many instances comprehends the construction of moldings and ornamental shapes for cornices, corbels, medal-

EXHIBIT C-163 (*continued*):

lions, key-stones, and other architectural parts. These may either be molded in place by suitable construction of the stationary forms or they may be cast separately in portable molds and set in place in the structure as would be cut stone. Panels of simple form or plain cornice moldings can usually be molded in place without great trouble and expense, but in constructing corbels, complicated moldings, balusters, etc., particularly where one pattern is duplicated a number of times, time and expense will usually be saved by casting them separately or in sections, and afterwards erecting the separate pieces in the structure.

The casting of ornamental shapes in concrete may be accomplished either in sand-molds or in rigid molds of wood, metal, or plaster of Paris. Some very handsome work has been recently performed by sand-molding. The mode of procedure followed in making concrete castings in sand varies somewhat in practice, but it is substantially as follows: A pattern of the shape to be cast is first made in wood and to the exact size required, since no allowance for shrinkage is necessary. The pattern is then molded in sand in flasks exactly as is done in casting iron. The mixture used usually consists of cement and finely crushed stone of about the consistency of cream, and this is poured into the mold by means of a funnel and T pipe. The excess water in the mixture soaks into the sand and serves to keep the casting moist during setting. Generally the casting is left in the mold for three or four days, and is then removed and the projecting fins, if any, are cut off. The cast stone may be used immediately in the work, but it is preferable to let it season and harden for a fortnight or more before using. The product of these sand-molds has an unusually attractive surface texture. Sand-molding is particularly advantageous when balusters, corbels, medallions, and intricate moldings have to be cast, but for plain cornices and facing slabs it is generally as cheap and convenient to use wooden forms.

Efflorescence.—The leaching out of certain lime compounds and their deposition on the surfaces of concrete work are quite frequently the cause of the uneven color of such surfaces. In relation to this source of discoloration Mr. Clifford Richardson, Director of the New York Testing Laboratory, says:

It is primarily due to variations in the amount of water in the mortar of which the cement is composed. It will be readily understood that when any excess of water is used, segregation of the coarse and fine particles will take place, with a resulting

EXHIBIT C-163 (continued):

difference in color. When a large amount of water is used the concrete is more porous and the very considerable percentage of free lime liberated from the Portland cement in the course of setting is more readily brought to the surface at such point. . . . The amount of water in a concrete, the face of which is to be exposed, should be neither too small nor too large, but such a concrete should certainly not be dry or the exposed face will be
10 honeycombed. . . . Where the greatest care is used as to the amount of water added to the mortar and to prevent its loss, and where separation of the mortar from the broken stone is carefully avoided in depositing the concrete and in ramming it, the exposed surface, after the removal of the molds, is fairly uniform in color. . . . A more uniform color will always be obtained when some puzzolanic material is ground in with the cement such as slag or tross. This hydrated silicious material combines with the lime which has been liberated and prevents it washing out
20 on the surface. . . . Exactness in the amount of water used in the concrete, when the elimination of the stain caused by the free lime is considered desirable, the addition of some substance containing silica in an active form are the two steps to be taken to produce a concrete surface which should present a uniform color and a pleasing appearance.

The measures whose adoption are recommended in the quotation just made are designed to prevent the occurrence of efflorescence by adopting certain precautions in the materials and workmanship of the original construction. Their adoption,
30 however, if it gives the success that Mr. Richardson anticipates, is obviously the way to get at the root of the trouble, but such action involves a degree of skill and watchfulness in constructing concrete work which is difficult of attainment under ordinary construction of engineering construction, and which if attained will add materially to the cost of construction. They have the further objection that a special mixture of cement is required about which our information is not entirely certain. In default
40 of preventive measures, which recommend themselves to general use, the engineer who encounters the trouble of efflorescence must overcome it by remedial measures. There are a number of these available. The most practical ones are the washing of the discolored surfaces by solution, which will remove the incrustation, or the removal of the original surface by dressing it down with hammers or tooling of some sort.

EXHIBIT C-163 (*continued*):

The manner of dressing down concrete surfaces to eliminate surface imperfections is discussed in a previous paragraph. The following account of the method of cleaning a concrete-steel bridge at Washington, D. C., gives instructive data as to this mode of procedure: The bridge in question had a mortar facing and after this was completed a heavy rain caused the entire north facade to become discolored by efflorescence. This discoloration was not uniform, but in streaks and blotches of a white color, which after weathering a short time turned into a dirty yellow. To clean the bridge trial was first made of water and wire brushes, but after a little work this method was considered impracticable owing chiefly to its cost, which was estimated at \$2.40 per square yard. Washes of dilute hydrochloric acid, of dilute acetic acid, and of dilute oxalic acid were then tried in conjunction with ordinary scrubbing-brushes. The hydrochloric-acid wash proved the best, and the acetic-acid wash came next in efficiency. The wash finally adopted consisted of a solution of 1 part hydrochloric acid and 5 parts water. This was applied vigorously with scrubbing-brushes, water being constantly played on the work with a hose to prevent the penetration of the acid. One house-cleaner and five laborers were employed on the work, which cost 60 cents per square yard. This high cost was due largely to the difficulty of cleaning the balustrades; it was estimated that the cost of cleaning the spandrel- and wing-walls did not exceed 20 cents per square yard. The cleaning was thoroughly satisfactory. Some of the floor removed by the brushes was analyzed and found to be silicate of lime.

EXHIBIT C-163 (continued):

TABLES OF QUANTITIES OF MATERIALS.
(Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 228.)

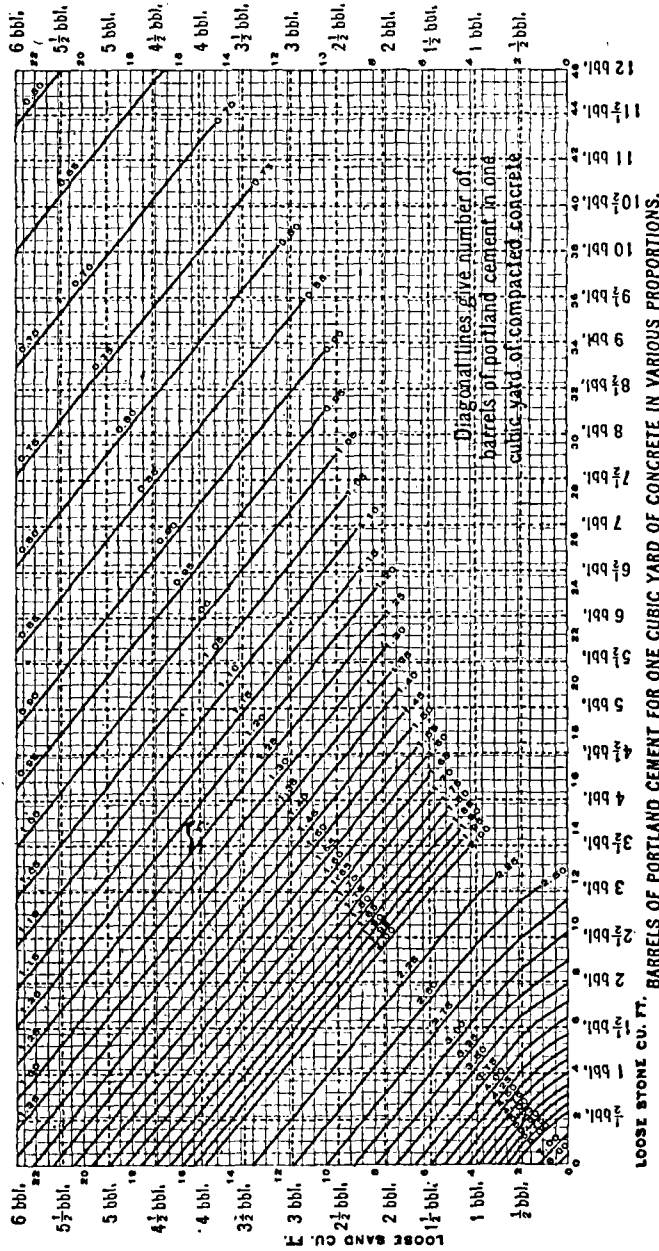


Fig. 77. (See important rules below, also examples on page 229, and formula (7) on page 224)

1. Dotted cross section lines represent barrels of sand or stone per cubic yard of concrete (assumed) 3.8 cu. ft.
2. Full cross section lines represent cubic feet of sand and stone to one barrel (4 bags) Portland cement.
3. Diagonal lines represent number of barrels of Portland cement in one cubic yard of compacted concrete.
4. To find number of cubic yards of sand or stone per cubic yard of concrete, multiply number of barrels cement, as above, by 0.141 times the number of parts of sand or stone.
5. To find number of cubic feet of concrete, in any proportions, made from one barrel of cement, divide 27 by the number of barrels of cement per cubic yard, obtained as above.

EXHIBIT C-163 (continued):

*Reprinted by permission from Taylor & Thompson's
"Concrete Plain and Reinforced," page 229*

**VOLUME OF PLASTIC MORTAR MADE FROM DIFFERENT PROPORTIONS
OF CEMENT AND SAND.
QUANTITIES OF MATERIALS PER CUBIC YARD. (SEE P. 227.)**

| Relative proportions by volume* | | Volume of Compacted Plastic Mortar | | | | | | Materials for 1 cu. yd. Compact Plastic Mortar Based on barrel of | | | | | |
|---------------------------------|-------|------------------------------------|-----------------------|---------------------|--------------------|--------------|-----------|---|------------|---------------|------------|---------------|------------|
| | | from 1 cu. ft. Cement | | | from 1 bbl. Cement | | | 3.5 cu. ft. | | 3.8 cu. ft.† | | 4 cu. ft. | |
| | | Based on Portland Cement weighing | | | Based on barrel of | | | Packed Cement | Loose Sand | Packed Cement | Loose Sand | Packed Cement | Loose Sand |
| Cement | Sand | 108 lbs. per cu. ft. | 100 lbs. per cu. ft.† | 95 lbs. per cu. ft. | 3.5 cu. ft. | 3.8 cu. ft.† | 4 cu. ft. | bbl. | cu. yd. | bbl. | cu. yd. | bbl. | cu. yd. |
| 1 | 0 | 0.93 | 0.86 | 0.80 | 3.2 | 3.2 | 3.2 | 8.31 | | 8.31 | | 8.31 | |
| 1 | 1/4 | 1.12 | 1.06 | 1.02 | 3.9 | 4.0 | 4.1 | 6.92 | 0.46 | 6.73 | 0.47 | 6.61 | 0.49 |
| 1 | 1/2 | 1.48 | 1.42 | 1.38 | 5.2 | 5.4 | 5.5 | 5.22 | 0.68 | 5.01 | 0.71 | 4.85 | 0.72 |
| 1 | 3/4 | 1.84 | 1.78 | 1.74 | 6.4 | 6.7 | 7.0 | 4.20 | 0.81 | 4.00 | 0.84 | 3.87 | 0.86 |
| 1 | 2 | 2.20 | 2.14 | 2.11 | 7.7 | 8.1 | 8.4 | 3.51 | 0.91 | 3.32 | 0.93 | 3.21 | 0.95 |
| 1 | 2 1/2 | 2.56 | 2.50 | 2.47 | 9.0 | 9.5 | 9.9 | 3.01 | 0.98 | 2.84 | 1.00 | 2.74 | 1.01 |
| 1 | 3 | 2.92 | 2.80 | 2.83 | 10.2 | 10.9 | 11.3 | 2.64 | 1.03 | 2.45 | 1.05 | 2.39 | 1.06 |
| 1 | 3 1/2 | 3.28 | 3.23 | 3.19 | 11.5 | 12.2 | 12.8 | 2.35 | 1.06 | 2.20 | 1.08 | 2.12 | 1.10 |
| 1 | 4 | 3.64 | 3.59 | 3.55 | 12.8 | 13.6 | 14.2 | 2.12 | 1.10 | 1.93 | 1.11 | 1.90 | 1.13 |
| 1 | 4 1/4 | 4.01 | 3.95 | 3.91 | 14.0 | 15.0 | 15.6 | 1.92 | 1.12 | 1.80 | 1.14 | 1.72 | 1.15 |
| 1 | 5 | 4.37 | 4.31 | 4.28 | 15.3 | 16.4 | 17.1 | 1.77 | 1.15 | 1.65 | 1.16 | 1.58 | 1.17 |
| 1 | 5 1/2 | 4.73 | 4.67 | 4.64 | 16.6 | 17.7 | 18.5 | 1.63 | 1.16 | 1.52 | 1.18 | 1.46 | 1.19 |
| 1 | 6 | 5.09 | 5.03 | 5.00 | 17.8 | 19.1 | 20.0 | 1.52 | 1.18 | 1.41 | 1.19 | 1.35 | 1.20 |
| 1 | 6 1/2 | 5.45 | 5.39 | 5.36 | 19.1 | 20.5 | 21.4 | 1.41 | 1.19 | 1.32 | 1.21 | 1.26 | 1.21 |
| 1 | 7 | 5.81 | 5.76 | 5.72 | 20.3 | 21.9 | 22.9 | 1.33 | 1.21 | 1.23 | 1.21 | 1.18 | 1.22 |
| 1 | 7 1/2 | 6.18 | 6.12 | 6.08 | 21.6 | 23.2 | 24.3 | 1.25 | 1.21 | 1.16 | 1.22 | 1.11 | 1.23 |
| 1 | 8 | 6.54 | 6.48 | 6.44 | 22.9 | 24.6 | 25.8 | 1.18 | 1.22 | 1.10 | 1.24 | 1.05 | 1.24 |

NOTE.—Variations in the fineness of the sand and the cement, and in consistency of the mortar may affect the values by 10% in either direction.

*Cement as packed by manufacturer, sand loose.

† Use these columns ordinarily.

EXHIBIT C-163 (continued):

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"Concrete Plain and Reinforced," page 232.*

**QUANTITIES OF MATERIALS FOR ONE CUBIC YARD OF RAMMED CONCRETE,
BASED ON A BARREL OF 4 CUBIC FEET.**
(See important foot-notes, also p 225.)

| Cement | PROPORTIONS BY PARTS | | | PROPORTIONS BY VOLUMES | | | Volume of mortar in terms of percentage of volume of stone | PERCENTAGES OF VOIDS IN BROKEN STONE OR GRAVEL | | | | | | | | | | | | | | | | | |
|--------|----------------------|---------|-------|------------------------|------------|-------------|--|--|---------|-------|---------|---------|-------|---------|---------|-------|---------|---------|-------|---------|---------|-------|---------|---------|--|
| | Cement | Sand | Stone | Packed Cement | Loose Sand | Loose Stone | | 50%* | | | | | 45%† | | | 40%‡ | | | 30%§ | | | 20%¶ | | | |
| | | | | | | | | Cement | Sand | Stone | Cement | Sand | Stone | Cement | Sand | Stone | Cement | Sand | Stone | Cement | Sand | Stone | | | |
| bbbl. | cu. ft. | cu. ft. | bbbl. | cu. ft. | cu. ft. | % | bbbl. | cu. yd. | cu. yd. | bbbl. | cu. yd. | cu. yd. | bbbl. | cu. yd. | cu. yd. | bbbl. | cu. yd. | cu. yd. | bbbl. | cu. yd. | cu. yd. | bbbl. | cu. yd. | cu. yd. | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 80 | 4.99 | 0.74 | 4.50 | 0.71 | 4.62 | 0.69 | 4.23 | 0.63 | 3.91 | 0.53 | | | | | | | | |
| 1 | 1 | 2 | 1 | 1 | 1 | 4 | 49 | 3.57 | 1.06 | 3.37 | 1.00 | 3.20 | 0.93 | 2.81 | 0.84 | 2.56 | 0.76 | | | | | | | | |
| 1 | 1 | 3 | 1 | 1 | 1 | 12 | 35 | | | 2.60 | 1.16 | 2.15 | 1.09 | 2.13 | 0.95 | 1.90 | 0.84 | | | | | | | | |
| 1 | 1 | 4 | 1 | 1 | 1 | 16 | 28 | | | | | | 1.71 | | 1.51 | 0.89 | | | | | | | | | |
| 1 | 1 | 5 | 1 | 1 | 1 | 20 | 21 | | | | | | 1.43 | | 1.26 | 0.83 | | | | | | | | | |
| 1 | 1 | 6 | 1 | 1 | 1 | 24 | 22 | | | | | | 1.22 | | 1.07 | 0.95 | | | | | | | | | |
| 1 | 1 | 7 | 1 | 1 | 1 | 28 | 20 | | | | | | | | 0.91 | 0.98 | | | | | | | | | |
| 1 | 1 | 8 | 1 | 1 | 1 | 32 | 18 | | | | | | | | 0.83 | 0.98 | | | | | | | | | |
| 1 | 1 | 9 | 1 | 1 | 1 | 36 | 17 | | | | | | | | 0.75 | 1.00 | | | | | | | | | |
| 1 | 1 | 10 | 1 | 1 | 1 | 40 | 16 | | | | | | | | 0.68 | 1.01 | | | | | | | | | |
| 1 | 1 | 11 | 1 | 1 | 1 | 44 | 15 | | | | | | | | 0.62 | 1.01 | | | | | | | | | |
| 1 | 1 | 12 | 1 | 1 | 1 | 48 | 15 | | | | | | | | 0.57 | 1.01 | | | | | | | | | |
| 1 | 1 | 1 1/2 | 1 | 1 | 4 | 6 | 96 | 3.08 | 0.46 | 0.68 | 2.97 | 0.41 | 0.66 | 2.87 | 0.42 | 0.61 | 2.69 | 0.40 | 0.60 | 2.53 | 0.38 | 0.56 | | | |
| 1 | 1 | 2 | 1 | 1 | 4 | 8 | 73 | 2.71 | 0.11 | 0.81 | 2.63 | 0.39 | 0.78 | 2.52 | 0.37 | 0.75 | 2.33 | 0.31 | 0.69 | 2.17 | 0.32 | 0.61 | | | |
| 1 | 1 | 2 1/2 | 1 | 1 | 4 | 10 | 59 | 2.47 | 0.37 | 0.91 | 2.35 | 0.35 | 0.87 | 2.25 | 0.33 | 0.83 | 2.06 | 0.31 | 0.76 | 1.90 | 0.28 | 0.71 | | | |
| 1 | 1 | 3 | 1 | 1 | 4 | 12 | 50 | 2.25 | 0.33 | 1.00 | 2.13 | 0.32 | 0.95 | 2.03 | 0.30 | 0.90 | 1.85 | 0.27 | 0.82 | 1.70 | 0.25 | 0.76 | | | |
| 1 | 1 | 3 1/2 | 1 | 1 | 6 | 8 | 92 | 2.39 | 0.53 | 0.71 | 2.30 | 0.51 | 0.68 | 2.22 | 0.49 | 0.66 | 2.07 | 0.46 | 0.61 | 1.94 | 0.43 | 0.58 | | | |
| 1 | 1 | 4 1/2 | 1 | 1 | 6 | 10 | 74 | 2.18 | 0.48 | 0.81 | 2.09 | 0.46 | 0.77 | 2.01 | 0.45 | 0.74 | 1.86 | 0.41 | 0.69 | 1.73 | 0.38 | 0.64 | | | |
| 1 | 1 | 5 1/2 | 1 | 1 | 6 | 12 | 62 | 2.31 | 0.45 | 0.89 | 1.91 | 0.42 | 0.85 | 1.83 | 0.41 | 0.81 | 1.68 | 0.37 | 0.75 | 1.56 | 0.35 | 0.69 | | | |
| 1 | 1 | 6 1/2 | 1 | 1 | 6 | 14 | 54 | 1.86 | 0.41 | 0.96 | 1.77 | 0.39 | 0.92 | 1.68 | 0.37 | 0.87 | 1.54 | 0.34 | 0.80 | 1.42 | 0.32 | 0.71 | | | |
| 1 | 1 | 7 1/2 | 1 | 1 | 6 | 16 | 43 | 1.73 | 0.38 | 1.03 | 1.64 | 0.36 | 0.97 | 1.56 | 0.35 | 0.92 | 1.42 | 0.32 | 0.84 | 1.30 | 0.29 | 0.77 | | | |
| 1 | 1 | 8 1/2 | 1 | 1 | 6 | 18 | 33 | 1.62 | 0.36 | 1.08 | 1.53 | 0.34 | 1.02 | 1.45 | 0.32 | 0.97 | 1.31 | 0.29 | 0.87 | 1.20 | 0.27 | 0.80 | | | |
| 1 | 1 | 9 1/2 | 1 | 1 | 6 | 20 | 39 | 1.52 | 0.34 | 1.13 | 1.43 | 0.32 | 1.06 | 1.35 | 0.30 | 1.00 | 1.22 | 0.27 | 0.90 | 1.11 | 0.25 | 0.82 | | | |
| 1 | 1 | 10 1/2 | 1 | 1 | 8 | 12 | 74 | 1.81 | 0.51 | 0.80 | 1.74 | 0.52 | 0.77 | 1.67 | 0.50 | 0.74 | 1.54 | 0.46 | 0.68 | 1.44 | 0.43 | 0.64 | | | |
| 1 | 1 | 2 3/4 | 1 | 1 | 8 | 14 | 61 | 1.69 | 0.50 | 0.88 | 1.61 | 0.48 | 0.83 | 1.54 | 0.46 | 0.80 | 1.42 | 0.42 | 0.74 | 1.31 | 0.39 | 0.68 | | | |
| 1 | 1 | 3 1/4 | 1 | 1 | 8 | 16 | 56 | 1.58 | 0.47 | 0.94 | 1.51 | 0.45 | 0.89 | 1.44 | 0.43 | 0.85 | 1.32 | 0.39 | 0.78 | 1.21 | 0.36 | 0.72 | | | |
| 1 | 1 | 4 1/4 | 1 | 1 | 8 | 18 | 51 | 1.49 | 0.44 | 0.99 | 1.41 | 0.42 | 0.94 | 1.34 | 0.40 | 0.89 | 1.23 | 0.36 | 0.82 | 1.13 | 0.34 | 0.75 | | | |
| 1 | 1 | 5 1/4 | 1 | 1 | 8 | 20 | 46 | 1.40 | 0.42 | 1.04 | 1.33 | 0.39 | 0.98 | 1.26 | 0.37 | 0.93 | 1.15 | 0.34 | 0.85 | 1.05 | 0.31 | 0.78 | | | |
| 1 | 1 | 6 1/4 | 1 | 1 | 8 | 22 | 42 | 1.33 | 0.39 | 1.08 | 1.26 | 0.37 | 1.03 | 1.19 | 0.35 | 0.97 | 1.08 | 0.32 | 0.88 | 0.98 | 0.29 | 0.80 | | | |
| 1 | 1 | 7 1/4 | 1 | 1 | 8 | 24 | 39 | 1.26 | 0.37 | 1.12 | 1.19 | 0.35 | 1.06 | 1.13 | 0.34 | 1.00 | 1.02 | 0.30 | 0.91 | 0.93 | 0.28 | 0.83 | | | |
| 1 | 1 | 8 1/4 | 1 | 1 | 10 | 12 | 86 | 1.65 | 0.61 | 0.73 | 1.59 | 0.59 | 0.71 | 1.53 | 0.57 | 0.68 | 1.42 | 0.52 | 0.63 | 1.33 | 0.49 | 0.59 | | | |
| 1 | 1 | 9 1/4 | 1 | 1 | 10 | 14 | 75 | 1.55 | 0.57 | 0.80 | 1.48 | 0.55 | 0.77 | 1.42 | 0.52 | 0.74 | 1.32 | 0.49 | 0.68 | 1.23 | 0.46 | 0.64 | | | |
| 1 | 1 | 10 1/4 | 1 | 1 | 10 | 16 | 66 | 1.46 | 0.54 | 0.87 | 1.39 | 0.51 | 0.82 | 1.33 | 0.49 | 0.79 | 1.23 | 0.46 | 0.73 | 1.14 | 0.42 | 0.68 | | | |
| 1 | 1 | 11 1/4 | 1 | 1 | 10 | 18 | 59 | 1.38 | 0.51 | 0.92 | 1.31 | 0.48 | 0.87 | 1.25 | 0.46 | 0.83 | 1.15 | 0.43 | 0.77 | 1.06 | 0.39 | 0.71 | | | |
| 1 | 1 | 12 1/4 | 1 | 1 | 10 | 20 | 54 | 1.31 | 0.48 | 0.97 | 1.24 | 0.46 | 0.92 | 1.18 | 0.44 | 0.87 | 1.08 | 0.40 | 0.80 | 0.99 | 0.37 | 0.73 | | | |
| 1 | 1 | 13 1/4 | 1 | 1 | 10 | 22 | 49 | 1.24 | 0.46 | 1.01 | 1.18 | 0.44 | 0.96 | 1.12 | 0.41 | 0.91 | 1.02 | 0.38 | 0.83 | 0.93 | 0.34 | 0.76 | | | |
| 1 | 1 | 14 1/4 | 1 | 1 | 10 | 24 | 45 | 1.18 | 0.44 | 1.03 | 1.12 | 0.41 | 1.00 | 1.06 | 0.39 | 0.94 | 0.96 | 0.36 | 0.85 | 0.88 | 0.33 | 0.72 | | | |
| 1 | 1 | 15 1/4 | 1 | 1 | 10 | 26 | 42 | 1.13 | 0.42 | 1.04 | 1.07 | 0.40 | 1.03 | 1.01 | 0.37 | 0.97 | 0.92 | 0.34 | 0.89 | 0.84 | 0.31 | 0.81 | | | |
| 1 | 1 | 16 1/4 | 1 | 1 | 10 | 28 | 39 | 1.08 | 0.40 | 1.13 | 1.02 | 0.38 | 1.06 | 0.96 | 0.36 | 1.00 | 0.87 | 0.32 | 0.90 | 0.79 | 0.29 | 0.82 | | | |
| 1 | 1 | 17 1/4 | 1 | 1 | 12 | 16 | 75 | 1.35 | 0.60 | 0.80 | 1.30 | 0.58 | 0.77 | 1.25 | 0.56 | 0.74 | 1.15 | 0.51 | 0.68 | 1.08 | 0.45 | 0.61 | | | |
| 1 | 1 | 18 1/4 | 1 | 1 | 12 | 18 | 67 | 1.28 | 0.57 | 0.87 | 1.23 | 0.55 | 0.82 | 1.18 | 0.52 | 0.79 | 1.08 | 0.45 | 0.72 | 1.01 | 0.45 | 0.67 | | | |
| 1 | 1 | 19 1/4 | 1 | 1 | 12 | 20 | 60 | 1.22 | 0.54 | 0.90 | 1.16 | 0.52 | 0.86 | 1.11 | 0.49 | 0.82 | 1.02 | 0.45 | 0.76 | 0.94 | 0.42 | 0.70 | | | |
| 1 | 1 | 20 1/4 | 1 | 1 | 12 | 22 | 55 | 1.16 | 0.52 | 0.93 | 1.11 | 0.49 | 0.90 | 1.06 | 0.47 | 0.86 | 0.97 | 0.43 | 0.79 | 0.89 | 0.40 | 0.72 | | | |
| 1 | 1 | 21 1/4 | 1 | 1 | 12 | 24 | 50 | 1.11 | 0.49 | 0.99 | 1.06 | 0.47 | 0.94 | 1.01 | 0.45 | 0.90 | 0.92 | 0.41 | 0.82 | 0.84 | 0.37 | 0.75 | | | |
| 1 | 1 | 22 1/4 | 1 | 1 | 12 | 26 | 48 | 1.06 | 0.47 | 1.03 | 1.01 | 0.45 | 0.97 | 0.96 | 0.43 | 0.92 | 0.87 | 0.39 | 0.84 | 0.80 | 0.36 | 0.77 | | | |
| 1 | 1 | 23 1/4 | 1 | 1 | 12 | 28 | 44 | 1.02 | 0.45 | 1.06 | 0.97 | 0.43 | 1.01 | 0.92 | 0.41 | 0.95 | 0.83 | 0.37 | 0.86 | 0.76 | 0.34 | 0.79 | | | |
| 1 | 1 | 24 1/4 | 1 | 1 | 12 | 30 | 42 | 0.98 | 0.44 | 1.09 | 0.93 | 0.41 | 1.03 | 0.88 | 0.39 | 0.98 | 0.79 | 0.35 | 0.88 | 0.73 | 0.32 | 0.81 | | | |
| 1 | 1 | 25 1/4 | 1 | 1 | 12 | 32 | 39 | 0.94 | 0.42 | 1.11 | 0.89 | 0.40 | 1.05 | 0.84 | 0.37 | 1.00 | 0.76 | 0.34 | 0.90 | 0.69 | 0.31 | 0.82 | | | |
| 1 | 1 | 26 1/4 | 1 | 1 | 16 | 20 | 75 | 1.08 | 0.64 | 0.80 | 1.03 | 0.61 | 0.76 | 0.99 | 0.59 | 0.73 | 0.92 | 0.55 | 0.68 | 0.86 | 0.51 | 0.64 | | | |
| 1 | 1 | 27 1/4 | 1 | 1 | 16 | 24 | 63 | 0.99 | 0.59 | 0.88 | 0.95 | 0.56 | 0.84 | 0.91 | 0.54 | 0.81 | 0.83 | 0.49 | 0.74 | 0.77 | 0.46 | 0.68 | | | |
| 1 | 1 | 28 1/4 | 1 | 1 | 16 | 28 | 55 | 0.92 | 0.54 | 0.95 | 0.88 | 0.52 | 0.91 | 0.83 | 0.49 | 0.86 | 0.76 | 0.45 | 0.79 | 0.70 | 0.42 | 0.73 | | | |
| 1 | 1 | 29 1/4 | 1 | 1 | 16 | 32 | 48 | 0.86 | 0.51 | 1.02 | 0.81 | 0.48 | 0.98 | 0.77 | 0.46 | 0.91 | 0.70 | 0.42 | 0.83 | 0.64 | 0.38 | 0.76 | | | |
| 1 | 1 | 30 1/4 | 1 | 1 | 16 | 36 | 43 | 0.80 | 0.47 | 1.07 | 0.76 | 0.45 | 1.01 | 0.72 | 0.43 | 0.96 | 0.65 | 0.39 | 0.87 | 0.60 | 0.36 | 0.80 | | | |
| 1 | 1 | 31 1/4 | 1 | 1 | 16 | 40 | 40 | 0.75 | 0.44 | 1.11 | 0.71 | 0.42 | 1.05 | 0.67 | 0.40 | 0.99 | 0.61 | 0.36 | 0.90 | 0.55 | 0.33 | 0.81 | | | |
| 1 | 1 | 32 1/4 | 1 | 1 | 20 | 40 | 47 | 0.70 | 0.52 | 1.04 | 0.66 | 0.49 | 0.98 | 0.63 | 0.47 | 0.93 | 0.57 | 0.42 | 0.84 | 0.52 | 0.35 | 0.77 | | | |
| 1 | 1 | 33 1/4 | 1 | 1 | 24 | 48 | 46 | 0.59 | 0.52 | 1.05 | 0.56 | 0.50 | 1.00 | 0.53 | 0.47 | 0.94 | 0.48 | 0.43 | 0.85 | 0.44 | 0.39 | 0.78 | | | |

NOTE.—Variations in the fineness of the sand and the compacting of the concrete may affect the quantities by the 10% in either direction.
 *Use 50% columns for broken stone screened to uniform size.
 †Use 45% columns for average conditions and for broken stone with dust screened out.
 ‡Use 40% columns for gravel or mixed stone and gravel.
 §Use these columns for scientifically graded mixtures.

EXHIBIT C-163 (continued):

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"Concrete Plain and Reinforced," page 233.*

VOLUME OF CONCRETE BASED ON A BARREL OF 35 CUBIC FEET.

(See important foot-notes, also p. 225.)

| PROPORTIONS BY PARTS | | | PROPORTIONS BY VOLUME | | | Volume of mortar in terms of percentage of volume of stone | AVERAGE VOLUME OF RAMMED CONCRETE MADE FROM ONE BARREL CEMENT | | | | |
|----------------------|------|-------|-----------------------|---------|---------|--|---|---------|---------|---------|------|
| Cement | Sand | Stone | Cement | Sand | Stone | | Percentages of Voids in Broken Stone or Gravel | | | | |
| | | | | | | | 50%* | 45%† | 40%‡ | 30%§ | 20%¶ |
| | | | bbl. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | |
| 1 | | 1 | 1 | | 2.5 | 101 | 5.1 | 5.3 | 5.5 | 6.0 | 6.4 |
| 1 | | 2 | 1 | | 7.0 | 54 | 7.0 | 7.4 | 7.8 | 8.7 | 9.6 |
| 1 | | 3 | 1 | | 10.5 | 30 | | 9.5 | 10.0 | 11.5 | 12.8 |
| 1 | | 4 | 1 | | 14.0 | 21 | | | | 14.2 | 16.0 |
| 1 | | 5 | 1 | | 17.5 | 17 | | | | 17.0 | 19.2 |
| 1 | | 6 | 1 | | 21.0 | 13 | | | | 19.7 | 22.4 |
| 1 | | 7 | 1 | | 24.5 | 11 | | | | | 25.6 |
| 1 | | 8 | 1 | | 28.0 | 9 | | | | | 28.8 |
| 1 | | 9 | 1 | | 31.5 | 8 | | | | | 32.0 |
| 1 | | 10 | 1 | | 35.0 | 7 | | | | | 35.2 |
| 1 | | 11 | 1 | | 38.5 | 6 | | | | | 38.4 |
| 1 | | 12 | 1 | | 42.0 | 5 | | | | | 41.6 |
| 1 | 1 | 1½ | 1 | 3.5 | 5.2 | 104 | 8.0 | 8.3 | 8.6 | 9.1 | 9.7 |
| 1 | 1 | 2 | 1 | 3.5 | 7.0 | 73 | 8.9 | 9.3 | 9.7 | 10.5 | 11.2 |
| 1 | 1 | 2½ | 1 | 3.5 | 8.7 | 64 | 9.9 | 10.4 | 10.8 | 11.8 | 12.7 |
| 1 | 1 | 3 | 1 | 3.5 | 10.5 | 54 | 10.8 | 11.4 | 12.0 | 13.1 | 14.2 |
| 1 | 1½ | 2 | 1 | 5.2 | 7.0 | 95 | 10.2 | 10.6 | 11.0 | 11.7 | 12.5 |
| 1 | 1½ | 2½ | 1 | 5.2 | 8.7 | 78 | 11.2 | 11.6 | 12.1 | 13.0 | 14.0 |
| 1 | 1½ | 3 | 1 | 5.2 | 10.5 | 65 | 12.1 | 12.7 | 13.2 | 14.4 | 15.5 |
| 1 | 1½ | 3½ | 1 | 5.2 | 12.2 | 56 | 13.0 | 13.7 | 14.4 | 15.7 | 17.0 |
| 1 | 1½ | 4 | 1 | 5.2 | 14.0 | 50 | 14.0 | 14.8 | 15.5 | 17.0 | 18.5 |
| 1 | 1½ | 4½ | 1 | 5.2 | 15.7 | 45 | 14.9 | 15.8 | 16.6 | 18.3 | 20.0 |
| 1 | 1½ | 5 | 1 | 5.2 | 17.5 | 41 | 15.9 | 16.8 | 17.8 | 20.0 | 21.6 |
| 1 | 2 | 3 | 1 | 7.0 | 10.5 | 77 | 13.4 | 13.9 | 14.5 | 15.6 | 16.8 |
| 1 | 2 | 3½ | 1 | 7.0 | 12.2 | 67 | 14.3 | 15.0 | 15.6 | 17.0 | 18.3 |
| 1 | 2 | 4 | 1 | 7.0 | 14.0 | 59 | 15.3 | 16.0 | 16.8 | 18.3 | 19.8 |
| 1 | 2 | 4½ | 1 | 7.0 | 15.7 | 53 | 16.2 | 17.0 | 17.9 | 19.6 | 21.3 |
| 1 | 2 | 5 | 1 | 7.0 | 17.5 | 48 | 17.1 | 18.1 | 19.0 | 20.9 | 22.8 |
| 1 | 2 | 5½ | 1 | 7.0 | 19.2 | 44 | 18.1 | 19.1 | 20.2 | 22.2 | 24.3 |
| 1 | 2 | 6 | 1 | 7.0 | 21.0 | 41 | 19.0 | 20.2 | 21.3 | 23.6 | 25.8 |
| 1 | 2½ | 3 | 1 | 8.7 | 10.5 | 90 | 14.6 | 15.2 | 15.8 | 16.9 | 18.0 |
| 1 | 2½ | 3½ | 1 | 8.7 | 12.2 | 73 | 15.6 | 16.2 | 16.9 | 18.2 | 19.6 |
| 1 | 2½ | 4 | 1 | 8.7 | 14.0 | 63 | 16.5 | 17.3 | 18.0 | 19.6 | 21.1 |
| 1 | 2½ | 4½ | 1 | 8.7 | 15.7 | 61 | 17.5 | 18.3 | 19.2 | 20.9 | 22.6 |
| 1 | 2½ | 5 | 1 | 8.7 | 17.5 | 55 | 18.4 | 19.4 | 20.3 | 22.2 | 24.1 |
| 1 | 2½ | 5½ | 1 | 8.7 | 19.2 | 51 | 19.4 | 20.4 | 21.4 | 23.5 | 25.6 |
| 1 | 2½ | 6 | 1 | 8.7 | 21.0 | 47 | 20.3 | 21.4 | 22.6 | 24.8 | 27.1 |
| 1 | 2½ | 6½ | 1 | 8.7 | 22.7 | 44 | 21.2 | 22.5 | 23.7 | 26.2 | 28.6 |
| 1 | 2½ | 7 | 1 | 8.7 | 24.5 | 41 | 22.2 | 23.5 | 24.8 | 27.5 | 30.2 |
| 1 | 3 | 4 | 1 | 10.5 | 14.0 | 77 | 17.8 | 18.5 | 19.3 | 20.8 | 22.3 |
| 1 | 3 | 4½ | 1 | 10.5 | 15.7 | 69 | 18.7 | 19.6 | 20.4 | 22.1 | 23.8 |
| 1 | 3 | 5 | 1 | 10.5 | 17.5 | 62 | 19.7 | 20.6 | 21.6 | 23.4 | 25.3 |
| 1 | 3 | 5½ | 1 | 10.5 | 19.2 | 57 | 20.6 | 21.7 | 22.7 | 24.8 | 26.8 |
| 1 | 3 | 6 | 1 | 10.5 | 21.0 | 53 | 21.6 | 22.7 | 23.8 | 26.1 | 28.4 |
| 1 | 3 | 6½ | 1 | 10.5 | 22.7 | 49 | 22.5 | 23.7 | 25.0 | 27.4 | 29.9 |
| 1 | 3 | 7 | 1 | 10.5 | 24.5 | 46 | 23.5 | 24.8 | 26.1 | 28.7 | 31.4 |
| 1 | 3 | 7½ | 1 | 10.5 | 26.2 | 43 | 24.4 | 25.8 | 27.2 | 30.1 | 32.9 |
| 1 | 3 | 8 | 1 | 10.5 | 28.0 | 40 | 25.3 | 26.9 | 28.4 | 31.4 | 34.4 |
| 1 | 4 | 5 | 1 | 14.0 | 17.5 | 77 | 22.2 | 23.2 | 24.1 | 26.0 | 27.9 |
| 1 | 4 | 6 | 1 | 14.0 | 21.0 | 65 | 24.1 | 25.2 | 26.4 | 28.6 | 30.9 |
| 1 | 4 | 7 | 1 | 14.0 | 24.5 | 66 | 26.0 | 27.3 | 28.6 | 31.3 | 33.9 |
| 1 | 4 | 8 | 1 | 14.0 | 28.0 | 50 | 27.9 | 30.4 | 30.9 | 33.9 | 36.9 |
| 1 | 4 | 9 | 1 | 14.0 | 31.5 | 45 | 29.8 | 31.5 | 33.2 | 36.6 | 40.0 |
| 1 | 4 | 10 | 1 | 14.0 | 35.0 | 41 | 31.7 | 33.6 | 35.4 | 39.2 | 43.0 |
| 1 | 5 | 10 | 1 | 17.5 | 35.0 | 48 | 34.2 | 36.1 | 38.0 | 41.8 | 45.5 |
| 1 | 6 | 12 | 1 | 21.0 | 42.0 | 46 | 40.5 | 42.8 | 45.0 | 49.6 | 54.1 |

NOTE.—Variations in the fineness of the sand and the compacting of the concrete may affect the volumes by 10% in either direction.

*Use 50% column for broken stone screened to uniform size.

†Use 45% column for average conditions and for broken stone with dust screened out.

‡Use 40% column for gravel or mixed stone and gravel.

§Use these columns for scientifically graded mixtures.

EXHIBIT C-163 (continued):

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"Concrete Plain and Reinforced," page 234.*

VOLUME OF CONCRETE BASED ON A BARREL OF 3.8 CUBIC FEET.

(See important foot-notes, also p. 225.)

| PROPORTIONS BY PARTS | | | PROPORTIONS BY VOLUME | | | Volume of mortar in terms of percentage of volume of stone | AVERAGE VOLUME OF RAMMED CONCRETE MADE FROM ONE BARREL CEMENT | | | | |
|----------------------|------|-------|-----------------------|------|-------|--|---|---------|---------|---------|---------|
| Cement | Sand | Stone | Cement | Sand | Stone | | Percentages of Voids in Broken Stone or Gravel | | | | |
| | | | | | | bbbl | cu. ft. | cu. ft. | % | 50%* | 45%† | 40%‡ | 30%§ | 20%¶ |
| | | | | | | | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. |
| 1 | | 1 | 1 | | 3.8 | 94 | 5.3 | 5.5 | 5.7 | 6.2 | 6.7 |
| 1 | | 2 | 1 | | 7.6 | 51 | 7.4 | 7.8 | 8.2 | 9.2 | 10.2 |
| 1 | | 3 | 1 | | 11.4 | 36 | | 10.0 | 10.6 | 12.2 | 13.6 |
| 1 | | 4 | 1 | | 15.2 | 29 | | | | 15.2 | 17.1 |
| 1 | | 5 | 1 | | 19.0 | 25 | | | | 18.2 | 20.6 |
| 1 | | 6 | 1 | | 22.8 | 22 | | | | 21.1 | 24.0 |
| 1 | | 7 | 1 | | 26.6 | 20 | | | | | 27.5 |
| 1 | | 8 | 1 | | 30.4 | 19 | | | | | 31.0 |
| 1 | | 9 | 1 | | 34.2 | 18 | | | | | 34.4 |
| 1 | | 10 | 1 | | 38.0 | 17 | | | | | 37.9 |
| 1 | | 11 | 1 | | 41.8 | 16 | | | | | 41.4 |
| 1 | | 12 | 1 | | 45.5 | 15 | | | | | 44.8 |
| 1 | 1 | 1½ | 1 | 3.8 | 5.7 | 99 | 8.5 | 8.8 | 9.1 | 9.7 | 10.3 |
| 1 | 1 | 2 | 1 | 3.8 | 7.6 | 75 | 9.5 | 9.9 | 10.3 | 11.1 | 11.9 |
| 1 | 1 | 2½ | 1 | 3.8 | 9.5 | 61 | 10.5 | 10.0 | 11.5 | 12.6 | 13.6 |
| 1 | 1 | 3 | 1 | 3.8 | 11.4 | 51 | 11.5 | 12.2 | 12.8 | 14.0 | 15.2 |
| 1 | 1½ | 2 | 1 | 5.7 | 7.6 | 93 | 10.8 | 11.3 | 11.7 | 12.5 | 13.3 |
| 1 | 1½ | 2½ | 1 | 5.7 | 9.5 | 76 | 11.9 | 12.4 | 12.9 | 13.9 | 15.0 |
| 1 | 1½ | 3 | 1 | 5.7 | 11.4 | 64 | 12.9 | 13.5 | 14.1 | 15.4 | 16.6 |
| 1 | 1½ | 3½ | 1 | 5.7 | 13.3 | 55 | 13.9 | 14.6 | 15.4 | 16.8 | 18.2 |
| 1 | 1½ | 4 | 1 | 5.7 | 15.2 | 49 | 15.0 | 15.8 | 16.6 | 18.2 | 19.9 |
| 1 | 1½ | 4½ | 1 | 5.7 | 17.1 | 44 | 16.0 | 16.9 | 17.8 | 19.7 | 21.5 |
| 1 | 1½ | 5 | 1 | 5.7 | 19.0 | 40 | 17.0 | 18.0 | 19.1 | 21.1 | 23.2 |
| 1 | 2 | 3 | 1 | 7.6 | 11.4 | 75 | 14.3 | 14.9 | 15.5 | 16.7 | 18.0 |
| 1 | 2 | 3½ | 1 | 7.6 | 13.3 | 65 | 15.3 | 16.0 | 16.8 | 18.2 | 19.6 |
| 1 | 2 | 4 | 1 | 7.6 | 15.2 | 57 | 16.3 | 17.2 | 18.0 | 19.6 | 21.3 |
| 1 | 2 | 4½ | 1 | 7.6 | 17.1 | 51 | 17.4 | 18.3 | 19.2 | 21.0 | 22.9 |
| 1 | 2 | 5 | 1 | 7.6 | 19.0 | 47 | 18.4 | 19.4 | 20.4 | 22.5 | 24.5 |
| 1 | 2 | 5½ | 1 | 7.6 | 20.9 | 43 | 19.4 | 20.5 | 21.7 | 23.9 | 26.2 |
| 1 | 2 | 6 | 1 | 7.6 | 22.8 | 40 | 20.4 | 21.7 | 22.9 | 25.4 | 27.8 |
| 1 | 2½ | 3 | 1 | 9.5 | 11.4 | 87 | 15.7 | 16.3 | 16.9 | 18.1 | 19.3 |
| 1 | 2½ | 3½ | 1 | 9.5 | 13.3 | 75 | 16.7 | 17.4 | 18.1 | 19.6 | 21.0 |
| 1 | 2½ | 4 | 1 | 9.5 | 15.2 | 66 | 17.7 | 18.5 | 19.3 | 21.0 | 22.6 |
| 1 | 2½ | 4½ | 1 | 9.5 | 17.1 | 60 | 18.7 | 19.6 | 20.6 | 22.4 | 24.3 |
| 1 | 2½ | 5 | 1 | 9.5 | 19.0 | 54 | 19.8 | 20.8 | 21.8 | 23.9 | 25.9 |
| 1 | 2½ | 5½ | 1 | 9.5 | 20.9 | 49 | 20.8 | 21.9 | 23.0 | 25.3 | 27.6 |
| 1 | 2½ | 6 | 1 | 9.5 | 22.8 | 46 | 21.8 | 23.0 | 24.3 | 26.7 | 29.2 |
| 1 | 2½ | 6½ | 1 | 9.5 | 24.7 | 42 | 22.8 | 24.2 | 25.5 | 28.2 | 30.8 |
| 1 | 2½ | 7 | 1 | 9.5 | 26.6 | 40 | 23.9 | 25.3 | 26.7 | 29.6 | 32.5 |
| 1 | 3 | 4 | 1 | 11.4 | 15.2 | 76 | 19.1 | 19.9 | 20.7 | 22.4 | 24.0 |
| 1 | 3 | 4½ | 1 | 11.4 | 17.1 | 68 | 20.1 | 21.0 | 21.9 | 23.8 | 25.6 |
| 1 | 3 | 5 | 1 | 11.4 | 19.0 | 61 | 21.1 | 22.1 | 23.2 | 25.2 | 27.2 |
| 1 | 3 | 5½ | 1 | 11.4 | 20.9 | 56 | 22.1 | 23.3 | 24.4 | 26.7 | 28.9 |
| 1 | 3 | 6 | 1 | 11.4 | 22.8 | 52 | 23.2 | 24.4 | 25.6 | 28.1 | 30.6 |
| 1 | 3 | 6½ | 1 | 11.4 | 24.7 | 48 | 24.2 | 25.5 | 26.9 | 29.5 | 32.2 |
| 1 | 3 | 7 | 1 | 11.4 | 26.6 | 45 | 25.2 | 26.7 | 28.1 | 31.0 | 33.9 |
| 1 | 3 | 7½ | 1 | 11.4 | 28.5 | 42 | 26.2 | 27.8 | 29.3 | 32.4 | 35.7 |
| 1 | 3 | 8 | 1 | 11.4 | 30.4 | 40 | 27.3 | 28.9 | 30.6 | 33.8 | 37.1 |
| 1 | 4 | 5 | 1 | 15.2 | 19.0 | 76 | 23.9 | 24.9 | 25.9 | 28.0 | 30.0 |
| 1 | 4 | 6 | 1 | 15.2 | 22.8 | 61 | 25.9 | 27.2 | 28.4 | 30.8 | 33.3 |
| 1 | 4 | 7 | 1 | 15.2 | 26.6 | 55 | 28.0 | 29.4 | 30.8 | 33.7 | 36.6 |
| 1 | 4 | 8 | 1 | 15.2 | 30.4 | 49 | 30.0 | 31.7 | 33.3 | 36.6 | 39.9 |
| 1 | 4 | 9 | 1 | 15.2 | 34.2 | 44 | 32.1 | 33.9 | 35.8 | 39.4 | 43.1 |
| 1 | 4 | 10 | 1 | 15.2 | 38.0 | 40 | 34.1 | 36.2 | 38.2 | 42.3 | 46.4 |
| 1 | 5 | 10 | 1 | 19.0 | 38.0 | 47 | 36.9 | 38.9 | 41.0 | 45.1 | 49.2 |
| 1 | 6 | 12 | 1 | 22.8 | 45.5 | 46 | 43.7 | 46.2 | 48.6 | 53.8 | 58.5 |

NOTE.—Variations in the fineness of the sand and the compacting of the concrete may affect the volumes by 10% in either direction.

- *Use 50% column for broken stone screened to uniform size
- †Use 45% column for average conditions and for broken stone with dust screened out.
- ‡Use 40% column for gravel or mixed stone and gravel.
- §Use these columns for scientifically graded mixtures.

EXHIBIT C-163 (continued):

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VOLUME OF CONCRETE BASED ON A BARREL OF 4 CUBIC FEET.

(See important foot-notes, also p. 225)

| Cement | PROPORTIONS BY PARTS | | PROPORTIONS BY VOLUME | | | Volume of mortar in terms of percentage of volume of stone | AVERAGE VOLUME OF RAMMED CONCRETE MADE FROM ONE BARREL CEMENT | | | | |
|--------|----------------------|---------|-----------------------|---------|---------|--|---|---------|---------|---------|------|
| | Sand | Stone | Cement | Sand | Stone | | Percentages of Voids in Broken Stone or Gravel | | | | |
| | | | | | | | 50%* | 45%† | 40%‡ | 30%§ | 20%¶ |
| bbl. | cu. ft. | cu. ft. | bbl. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | cu. ft. | |
| 1 | | 1 | 1 | | 4 | 89 | 5.4 | 5.6 | 5.8 | 6.4 | 6.9 |
| 1 | | 2 | 1 | | 8 | 49 | 7.6 | 8.0 | 8.4 | 9.5 | 10.5 |
| 1 | | 3 | 1 | | 12 | 35 | | 10.4 | 11.0 | 12.7 | 14.2 |
| 1 | | 4 | 1 | | 16 | 28 | | | | 15.8 | 17.8 |
| 1 | | 5 | 1 | | 20 | 24 | | | | 18.9 | 21.5 |
| 1 | | 6 | 1 | | 24 | 22 | | | | 22.1 | 25.1 |
| 1 | | 7 | 1 | | 28 | 20 | | | | | 28.8 |
| 1 | | 8 | 1 | | 32 | 18 | | | | | 32.4 |
| 1 | | 9 | 1 | | 36 | 17 | | | | | 36.1 |
| 1 | | 10 | 1 | | 40 | 18 | | | | | 39.7 |
| 1 | | 11 | 1 | | 44 | 15 | | | | | 43.4 |
| 1 | | 12 | 1 | | 48 | 15 | | | | | 47.0 |
| 1 | 1 | 1½ | 1 | 4 | 6 | 96 | 8.8 | 9.1 | 9.4 | 10.0 | 10.7 |
| 1 | 1 | 2 | 1 | 4 | 8 | 73 | 9.8 | 10.3 | 10.7 | 11.6 | 12.4 |
| 1 | 1 | 2½ | 1 | 4 | 10 | 59 | 10.9 | 11.5 | 12.0 | 13.1 | 14.2 |
| 1 | 1 | 3 | 1 | 4 | 12 | 50 | 12.0 | 12.7 | 13.3 | 14.6 | 15.9 |
| 1 | 1½ | 2 | 1 | 6 | 8 | 92 | 11.3 | 11.7 | 12.2 | 13.0 | 13.9 |
| 1 | 1½ | 2½ | 1 | 6 | 10 | 74 | 12.4 | 12.9 | 13.5 | 14.5 | 15.6 |
| 1 | 1½ | 3 | 1 | 6 | 12 | 62 | 13.5 | 14.1 | 14.8 | 16.0 | 17.3 |
| 1 | 1½ | 3½ | 1 | 6 | 14 | 54 | 14.5 | 15.3 | 16.0 | 17.6 | 19.1 |
| 1 | 1½ | 4 | 1 | 6 | 16 | 48 | 15.6 | 16.5 | 17.3 | 19.1 | 20.8 |
| 1 | 1½ | 4½ | 1 | 6 | 18 | 43 | 16.7 | 17.7 | 18.6 | 20.6 | 22.5 |
| 1 | 1½ | 5 | 1 | 6 | 20 | 39 | 17.8 | 18.9 | 19.9 | 22.1 | 24.3 |
| 1 | 2 | 3 | 1 | 8 | 12 | 74 | 14.9 | 15.6 | 16.2 | 17.5 | 18.8 |
| 1 | 2 | 3½ | 1 | 8 | 14 | 64 | 16.0 | 16.7 | 17.5 | 19.0 | 20.5 |
| 1 | 2 | 4 | 1 | 8 | 16 | 56 | 17.1 | 17.9 | 18.8 | 20.5 | 22.3 |
| 1 | 2 | 4½ | 1 | 8 | 18 | 51 | 18.1 | 19.1 | 20.1 | 22.0 | 23.9 |
| 1 | 2 | 5 | 1 | 8 | 20 | 46 | 19.2 | 20.3 | 21.4 | 23.5 | 25.7 |
| 1 | 2 | 5½ | 1 | 8 | 22 | 42 | 20.3 | 21.5 | 22.7 | 25.1 | 27.4 |
| 1 | 2 | 6 | 1 | 8 | 24 | 39 | 21.4 | 22.7 | 24.0 | 26.6 | 29.2 |
| 1 | 2½ | 3 | 1 | 10 | 12 | 86 | 16.3 | 17.0 | 17.6 | 18.9 | 20.2 |
| 1 | 2½ | 3½ | 1 | 10 | 14 | 75 | 17.4 | 18.2 | 18.9 | 20.5 | 22.0 |
| 1 | 2½ | 4 | 1 | 10 | 16 | 66 | 18.5 | 19.4 | 20.2 | 21.9 | 23.7 |
| 1 | 2½ | 4½ | 1 | 10 | 18 | 59 | 19.6 | 20.6 | 21.5 | 23.5 | 25.4 |
| 1 | 2½ | 5 | 1 | 10 | 20 | 54 | 20.7 | 21.8 | 22.8 | 25.0 | 27.2 |
| 1 | 2½ | 5½ | 1 | 10 | 22 | 49 | 21.8 | 22.9 | 24.1 | 26.5 | 28.9 |
| 1 | 2½ | 6 | 1 | 10 | 24 | 45 | 22.8 | 24.1 | 25.4 | 28.0 | 30.6 |
| 1 | 2½ | 6½ | 1 | 10 | 26 | 42 | 23.9 | 25.3 | 26.7 | 29.5 | 32.3 |
| 1 | 2½ | 7 | 1 | 10 | 28 | 39 | 25.0 | 26.5 | 28.0 | 31.0 | 34.0 |
| 1 | 3 | 4 | 1 | 12 | 16 | 75 | 20.0 | 20.8 | 21.7 | 23.4 | 25.1 |
| 1 | 3 | 4½ | 1 | 12 | 18 | 67 | 21.0 | 22.0 | 23.0 | 24.9 | 26.8 |
| 1 | 3 | 5 | 1 | 12 | 20 | 60 | 22.1 | 23.2 | 24.3 | 26.4 | 28.6 |
| 1 | 3 | 5½ | 1 | 12 | 22 | 55 | 23.2 | 24.4 | 25.6 | 28.0 | 30.3 |
| 1 | 3 | 6 | 1 | 12 | 24 | 50 | 24.3 | 25.6 | 26.9 | 29.5 | 32.1 |
| 1 | 3 | 6½ | 1 | 12 | 26 | 48 | 25.4 | 26.8 | 28.2 | 31.0 | 33.8 |
| 1 | 3 | 7 | 1 | 12 | 28 | 44 | 26.4 | 27.9 | 29.4 | 32.5 | 35.5 |
| 1 | 3 | 7½ | 1 | 12 | 30 | 42 | 27.5 | 29.1 | 30.6 | 34.0 | 37.2 |
| 1 | 3 | 8 | 1 | 12 | 32 | 39 | 28.6 | 30.3 | 32.0 | 35.5 | 39.0 |
| 1 | 4 | 5 | 1 | 16 | 20 | 75 | 25.0 | 26.1 | 27.2 | 29.3 | 31.5 |
| 1 | 4 | 6 | 1 | 16 | 24 | 63 | 27.2 | 28.5 | 29.8 | 32.4 | 35.0 |
| 1 | 4 | 7 | 1 | 16 | 28 | 55 | 29.3 | 30.8 | 32.4 | 35.4 | 38.4 |
| 1 | 4 | 8 | 1 | 16 | 32 | 48 | 31.5 | 33.2 | 34.9 | 38.4 | 41.9 |
| 1 | 4 | 9 | 1 | 16 | 36 | 43 | 33.6 | 35.6 | 37.5 | 41.4 | 45.3 |
| 1 | 4 | 10 | 1 | 16 | 40 | 40 | 35.8 | 38.0 | 40.1 | 44.4 | 48.8 |
| 1 | 5 | 10 | 1 | 20 | 40 | 47 | 38.7 | 40.9 | 43.0 | 47.3 | 51.7 |
| 1 | 6 | 12 | 1 | 24 | 48 | 46 | 45.9 | 48.5 | 51.1 | 56.3 | 61.4 |

NOTE.—Variations in the fineness of the sand and the compacting of the concrete may affect the volumes by 10% in either direction.
 *Use 50% column for broken stone screened to uniform size.
 †Use 45% column for average conditions and for broken stone with dust screened out.
 ‡Use 40% column for gravel or mixed stone and gravel.
 §Use these columns for scientifically graded mixtures.

EXHIBIT C-163 (continued):

THEORY OF REINFORCED CONCRETE.

10 It is not our intention to give here a complete mathematical analysis of the stresses which occur in reinforced concrete structures. For such an analysis we would refer to any of the standard text books on the theory of reinforced concrete, where the subject is treated to a much larger scale than would be possible in the scope of this book.

The following formulas are now recommended by practically all the best authorities on reinforced concrete. They are based on the "straight line," or linear distribution of stress:

Notation.

- 20 F_s = unit fibre stress in steel in pounds per square inch.
 F_c = unit fibre stress in concrete, extreme fibre in compression.
 E_s = modulus of elasticity of the steel.
 E_c = modulus of elasticity of the concrete.

n = ratio $\frac{E_s}{E_c}$

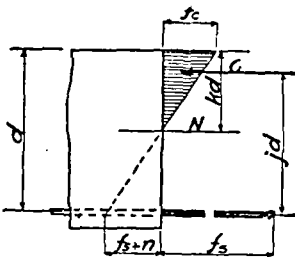
M_s = resisting moment in inch pounds due to steel.

M_c = resisting moment in inch pounds due to concrete.

b = breadth in inches of rectangular beam.

d = depth in inches of center of steel from compression face of concrete.

k = ratio of depth of neutral axis below the top to the effective depth d .



j = ratio of arm of resisting couple to depth d .

A = area in square inches of cross section of steel.

40 p = steel ratio (not percent) = $\frac{A}{bd}$

The position of the neutral axis is shown by the formula

$$K = \sqrt{2pn + (pn)^2} - pn$$

The lever arm of the resisting couple is shown by

$$j = 1 - \frac{1}{3}k$$

EXHIBIT C-163 (continued):

Resisting Moment as governed by the steel,

$$M_s = f_p j b d^2$$

Resisting Moment as governed by the concrete,

$$M_c = \frac{1}{2} f_c k j b d^2$$

10 For approximate results use the average values, $k = \frac{3}{8}$ and $j = \frac{7}{8}$, which gives

$$M_s = \frac{7}{8} d A f_s \dots (1)$$

$$M_c = \frac{1}{6} b d^2 f_c \dots (2)$$

Both moments should be figured and the lesser one used.

Tee-beams.

20 The same formulae hold good for the tee-beams except that the breadth (b) of the beam is in this case the width of the flange and not the width of the stem. Where tee-beams are formed by casting the rectangular beams monolithic with the floor slab, the resisting moment will in ordinary construction depend on the resistance of the steel in tension, so that it will only be necessary to use the formula for (M_s) in order to determine the resisting moment of the section.

Bending Moments.

30 If slabs and girders be reinforced to take care of negative bending moments over supports, they will act as continuous beams, and the bending moment at the center of the span will be reduced. It is considered good practice to use the following values:

For beams and slabs continuous over both supports,

$$M = \frac{1}{12} w l^2$$

Continuous over one support only,

$$M = \frac{1}{10} w l^2$$

Freely supported,

$$M = \frac{1}{8} w l^2$$

40 When $M =$ Bending Moment at center of span in foot pounds.

$w =$ total uniform live and dead load in pounds per square foot.

$l =$ length of span in feet. When these moments are substituted in equation (1) and (2) they are to be multiplied by 12 to reduce the moment to inch pounds.

EXHIBIT C-163 (continued):

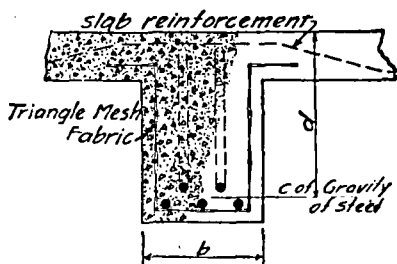
Unless care be taken to insure proper position of steel over supports, we would recommend using $M = 1/10 wl^2$.

Shear in Rectangular Beams.

Let V = total shear at the sections in pounds.
 b = width of section in inches.
 d = depth of section to center of steel in inches.
10 v = unit shear in pounds per square inch.
then $v = \frac{V}{bd}$

With beams having no web reinforcement the working stresses should not exceed 35 to 40 pounds per square inch of cross section area of the concrete above the plane of the horizontal steel. If the beam has sufficient web reinforcement the working stresses may be taken at 100 to 125 pounds per square inch.

20 The web reinforcement may be supplied by using either vertical or inclined stirrups, or by bending up a portion of the main tension bars, or both combined. By using Triangle Mesh



30

Beam Section.

40

Wire Fabric in the form of a cage as shown by the accompanying cut the cross wires will give sufficient web reinforcement for all ordinary cases. By referring to the tables on pp. 110 and 111 it is seen that these cross wires may be either No. 14 or No. 12½ gauge spaced either 2" or 4" apart, thus giving a variation in amount of web reinforcement. This material, having a joint at each longitudinal, can be placed in forms at a very small expense as compared with loose stirrups. Another point in favor of Triangle Mesh fabric for web reinforcement is the truss action which this material gives, thus adding another factor of safety to the structure.

In cases of tee-beams it is necessary that the web reinforcement be carried well up into the slab to prevent shearing off on a plane between the flange and stem.

EXHIBIT C-163 (continued):

EXPLANATION OF TABLES FOR REINFORCED CON-
CRETE SLABS (PP. 74-86).

10 The following tables are based on the "straight line" formula, or linear distribution of stress as shown on page 66. The ratio of the modulus of elasticity of steel to concrete is taken as fifteen. Values of resisting moments of slabs are given per foot of width for various maximum values for steel and concrete. Below and to the left of the heavy zigzag line values of Resisting Moments are given as governed by the maximum allowable fibre stress in steel; the values above and to the right of this line are governed by maximum allowable fibre stress in concrete. The various values for maximum fibre stresses are thus given so that almost any specifications may be complied with.

20 The tables have been arranged in such a manner that a uniform reinforcement may be used and by increasing or decreasing the thickness of the slabs, spans of greater or less length than the average spans of the floor may be taken care of economically with the same reinforcement.

The second column gives the distance in inches from the center of the steel to the bottom of the slab. The third column gives the weight of the concrete slab per square foot of floor area, this weight being based on concrete weighing 144 pounds per cubic foot. Although in the following examples, we have used
30 the formula $B.M. = \frac{Wl^2}{10}$, it is considered good practice to use

$B.M. = \frac{Wl^2}{12}$ when the slab is continuous over both supports;

however, care must be taken to have the reinforcement near the top of the slab over supports in order to resist the negative bending moments at these points:

40 Examples of the use of these tables:
Given:

A live load of 75 pounds per square foot.

Span of slab eight feet.

Floor—cement finish of slab—no plaster below.

Maximum allowable fibre stress in steel 18,000 pounds per square inch.

Maximum allowable fibre stress in concrete 650 pounds per square inch.

EXHIBIT C-163 (continued):

Look in the Table No. 13 giving minimum thickness of slabs for various spans. From this table we find for a load of 100 pounds per square foot and span of eight feet, a minimum thickness of $3\frac{1}{2}$ inches is recommended. It is better, however, to make this slab 4 inches thick.

10 The total dead load consists of the 4 inch slab, which will weigh

48 pounds per square foot.
Live loads 75 pounds per square foot.

Total 123 pounds per square foot.

For slabs continuous over supports figure the bending moment as follows: (Or use Diagrams No. 1 or No. 2, pp. 88 and 89).

20 Bending Moment in foot pounds is equal to the total load per square foot multiplied by the span of the slab (in feet) squared and divided by ten. Or expressed as a formula (see article on Bending Moments page 67).

$$\text{B.M.} = \frac{wl^2}{10}$$

In which

B.M. = Bending moment in foot pounds.
w = Total load in pounds per square foot.
l = Length of span in feet.

30

For this particular example—

w = 123 (pounds per square foot).
l = 8 (feet span of slab).

Then

$$\text{B.M.} = \frac{123 \times 8^2}{10} = 787 \text{ foot pounds.}$$

40 Now it is necessary to find in Table No. 7 (corresponding to the given allowable stresses) the reinforcement for a four inch slab that will resist a bending moment of 787 foot pounds.

In this table we find a cross sectional area of steel of 0.18 square inches per foot width of slab will be needed to make a 4 inch slab capable of resisting a bending moment of this amount.

This area will be supplied with our Triangle Mesh Reinforcement Style number (33) as shown in the next to the last

EXHIBIT C-163 (*continued*):

column in the tables p. 110; or the slab thickness can be changed back to 3½ inches, in which case approximately 0.22 square inches will be required (exact amount may be determined by deducting 6 pounds from the total load and again determining the B. M.). Style No. 32 having a cross sectional area of 0.225 square inches per foot width will give the necessary steel area.

10

Slabs Reinforced in Two Directions.

It is very often desirable to reinforce the floor slab in two directions, and support the slab by means of beams (or walls) on four sides. If the panel is square then one-half of the total load is carried in each direction. In this case the bending moment due to the total load will be:

$$\text{B.M.} = \frac{1}{20} \times w \times l^2$$

20

Example:

Given: A live load of 75 pounds per square foot; size of panel 12' x 12'; floor—cement finish of slab; maximum allowable fibre stress in steel 18,000 pounds per square inch; fibre stress in concrete 650 pounds per square inch; bending moment = $\frac{wl^2}{20}$.

30

We will assume a 4 inch slab. In this example w = live load of 75 pounds plus weight of a 4 inch slab or 48 pounds, giving a total load of 123 pounds per square foot; l = 12 feet, there

fore B.M. = $\frac{123 \times (12)^2}{20} = 886$ foot pounds.

40

Now, referring to Table No. 7, in order to find the reinforcement for a four inch slab that will resist a bending moment of 886 foot pounds, we find a cross sectional area of steel of 0.205 square inches per foot width of slab will be needed to make a 4 inch slab capable of resisting a bending moment of 886 foot pounds. This area will be supplied with our Triangle Mesh Reinforcement, Style No. 41, (see p. 110) one layer placed in each direction.

EXHIBIT C-163 (continued):

Panels Having Greater Length Than Breadth.

The distribution of load is first determined by the formula

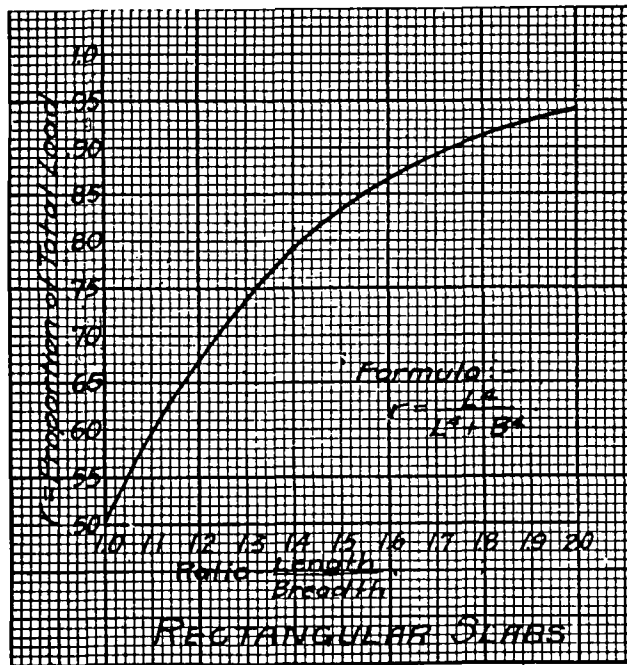
$$r = \frac{l^4}{l^4 + b^4}$$

10 in which r equals proportion of load carried by the reinforcement placed the short way of the slab, l = length and b = breadth of slab.

The following diagram shows the value of r for various ratios of $\frac{\text{length}}{\text{breadth}}$

20

30



Rectangular Slabs.

40

Example:

Given: A live load of 75 pounds per square foot; size of panel 12' x 10'; floor—cement finish of slab; maximum allowable fibre stress in steel 18,000 pounds per square inch; maximum allowable fibre stress in concrete 650 pounds per square inch.

EXHIBIT C-163 (continued):

In this example we will assume a 4 inch slab, then $w = 75$ pounds live load plus weight of a 4 inch slab or 48 pounds, giving a total load of 123 pounds per square foot.

Now, to determine what portions of this load are carried by the two systems of reinforcement, divide the length of panel by breadth, or

10
$$\frac{l}{b} = \frac{12}{10} = 1.2$$

Now, with this value for $\frac{l}{b}$ we will enter the diagram for

Rectangular slabs (p. 71). We find the value of $\frac{l}{b} = 1.2$ and

20 follow the vertical line to the point of its intersection with the curved line; now following the horizontal line to the left we find

that $\frac{67}{100}$ of the total load is carried by the short span reinforcement;

then necessarily the remaining part of $\frac{33}{100}$ of the total load

is carried by the long span reinforcement. The two systems of reinforcement are now treated as separate problems.

30 The Bending Moment for the short span = B.M. = $\frac{1}{10} \times$

load \times span squared.

But load = $\frac{67}{100} \times 123$ pounds = 83 pounds per square

40 foot; therefore B.M. = $\frac{83 \times 10^2}{10} = 830$ foot pounds.

Referring to Table No. 7 to find the reinforcement for a 4 inch slab that will resist a B.M. of 830 foot pounds. We find a cross sectional area of steel of 0.19 square inches per foot width of slab will be needed to make a 4 inch slab capable of resisting

EXHIBIT C-163 (*continued*):

a bending moment of 830 foot pounds. This can be supplied by our Style No. 33. (See p. 110.)

The Bending Moment for the long span =

$$\text{B.M.} = \frac{1}{10} \times \text{load} \times \text{span squared. But load} = \frac{33}{100} \times 123$$

10 = 40 pounds per square foot.

$$\text{Therefore B.M.} = \frac{40 \times 12^2}{10} = 576 \text{ foot pounds.}$$

20 Again referring to Table No. 7 we find a cross sectional area of steel of 0.125 square inches per foot width will be needed to make a 4 inch slab capable of resisting a bending moment of 576 foot pounds. This can be supplied by our style No. 25. (See p. 110.)

Note: When a sectional area of steel is required which is greater than can be supplied by one layer of our heaviest material, either use two layers of fabric, or one layer of fabric with a sufficient number of loose bars to make up the required area.

30

40

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wl^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{wl^2}{20} = \text{Bending Moment for square slab supported on four sides.}$$

*For a slab that is not square, supported on four sides see page 11

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 1 **Maximum Stresses: Steel = 16,000 pounds, Concrete = 500 pounds** **Conc. 1:3:6**

| Total Thickness of Slab in Inches | Center of Steel to Bottom of Slab | Width of Slab in Feet | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|-----------------------------------|-----------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|------|--|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 90 | 1.00 | |
| 2½ | ¾ | 30 | 86 | 130 | 168 | 210 | 229 | 242 | 252 | 262 | 271 | 290 | | | | | | | | | | | | | | |
| 3 | ¾ | 36 | 114 | 165 | 222 | 271 | 327 | 368 | 383 | 400 | 413 | 445 | 470 | | | | | | | | | | | | | |
| 3½ | ¾ | 42 | 137 | 203 | 268 | 332 | 395 | 458 | 520 | 558 | 578 | 623 | 660 | 692 | | | | | | | | | | | | |
| 4 | ¾ | 48 | 160 | 237 | 329 | 404 | 478 | 552 | 625 | 697 | 759 | 821 | 874 | 919 | 958 | | | | | | | | | | | |
| 4½ | ¾ | 54 | 192 | 275 | 377 | 458 | 557 | 636 | 734 | 812 | 890 | 1038 | 1111 | 1168 | 1219 | 1264 | | | | | | | | | | |
| 5 | 1 | 60 | 313 | 407 | 498 | 589 | 679 | 769 | 858 | 968 | 1158 | 1231 | 1301 | 1357 | 1411 | 1456 | | | | | | | | | | |
| 5½ | 1 | 66 | 337 | 455 | 572 | 659 | 774 | 888 | 973 | 1086 | 1337 | 1504 | 1583 | 1654 | 1717 | 1780 | 1832 | | | | | | | | | |
| 6 | 1 | 72 | 489 | 634 | 742 | 849 | 991 | 1095 | 1201 | 1313 | 1784 | 1880 | 1975 | 2051 | 2120 | 2190 | 2248 | | | | | | | | | |
| 6½ | 1 | 78 | 547 | 678 | 811 | 941 | 1071 | 1199 | 1327 | 1664 | 1957 | 2204 | 2314 | 2402 | 2492 | 2565 | 2641 | 2711 | | | | | | | | |
| 7 | 1 | 84 | | 756 | 913 | 1017 | 1172 | 1326 | 1478 | 1831 | 2179 | 2524 | 2674 | 2770 | 2886 | 2979 | 3052 | 3132 | 3206 | 3276 | | | | | | |
| 7½ | 1½ | 90 | | 764 | 934 | 1103 | 1216 | 1383 | 1548 | 1877 | 2257 | 2632 | 2846 | 2972 | 3086 | 3176 | 3273 | 3362 | 3434 | 3512 | | | | | | |
| 8 | 1½ | 96 | | 1023 | 1156 | 1352 | 1483 | 1678 | 2062 | 2443 | 2820 | 3252 | 3385 | 3506 | 3617 | 3721 | 3817 | 3906 | 4005 | 4084 | 4229 | 4360 | | | | |
| 8½ | 1½ | 102 | | 1104 | 1257 | 1409 | 1636 | 1786 | 2232 | 2673 | 3037 | 3470 | 3804 | 3929 | 4067 | 4194 | 4311 | 4404 | 4508 | 4605 | 4770 | 4931 | | | | |
| 9 | 1½ | 108 | | | 1346 | 1508 | 1670 | 1831 | 2309 | 2703 | 3172 | 3560 | 4015 | 4179 | 4303 | 4444 | 4532 | 4674 | 4769 | 4877 | 5058 | 5221 | | | | |
| 9½ | 1½ | 114 | | | 1437 | 1623 | 1807 | 1992 | 2447 | 2897 | 3343 | 3874 | 4313 | 4622 | 4784 | 4925 | 5082 | 5203 | 5318 | 5427 | 5644 | 5824 | | | | |
| 10 | 1½ | 120 | | | | 1728 | 1936 | 2144 | 2630 | 3068 | 3573 | 4075 | 4572 | 5063 | 5300 | 5465 | 5620 | 5763 | 5874 | 6028 | 6242 | 6456 | | | | |

Note:—For sectional areas, weights, etc., of Triangle M-sh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{w_1 l^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{w_1 l^2}{20} = \text{Bending Moment for square slab supported on four sides.}$$

*For a slab that is not square supported on four sides see page 71.

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line. For examples showing use of tables see page 69.

Maximum Stresses: Steel = 16,000 pounds, Concrete = 600 pounds

Conc. 1:2½:15

| Total Thickness of Slab Inches | Center of Steel to Bot. of Slab | Weight of Slab Pounds | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|---------------------------------|--------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 |
| 2½ | ¾ | 30 | 86 | 130 | 168 | 210 | 248 | 289 | 302 | 315 | 325 | 348 | | | | | | | | | | | | |
| 3 | ¾ | 36 | 114 | 165 | 222 | 271 | 327 | 375 | 423 | 478 | 496 | 534 | 564 | | | | | | | | | | | |
| 3½ | ¾ | 42 | 137 | 203 | 268 | 332 | 385 | 458 | 520 | 592 | 653 | 747 | 830 | | | | | | | | | | | |
| 4 | ¾ | 48 | 160 | 237 | 329 | 404 | 478 | 552 | 625 | 697 | 769 | 854 | 1048 | 1103 | 1150 | | | | | | | | | |
| 4½ | ¾ | 54 | 192 | 275 | 377 | 458 | 557 | 636 | 734 | 812 | 890 | 1100 | 1327 | 1402 | 1463 | 1517 | | | | | | | | |
| 5 | 1 | 60 | 313 | 407 | 498 | 589 | 679 | 769 | 858 | 968 | 1187 | 1403 | 1561 | 1627 | 1693 | 1747 | | | | | | | | |
| 5½ | 1 | 66 | 337 | 455 | 572 | 659 | 774 | 888 | 973 | 1086 | 1337 | 1612 | 1857 | 1984 | 2060 | 2136 | 2198 | | | | | | | |
| 6 | 1 | 72 | 489 | 634 | 742 | 849 | 991 | 1095 | 1201 | 1513 | 1787 | 2058 | 2359 | 2461 | 2544 | 2628 | 2698 | | | | | | | |
| 6½ | 1 | 78 | 547 | 678 | 811 | 941 | 1071 | 1199 | 1327 | 1664 | 1937 | 2286 | 2612 | 2882 | 2980 | 3078 | 3169 | 3253 | | | | | | |
| 7 | 1 | 84 | 756 | 913 | 1017 | 1172 | 1326 | 1478 | 1831 | 2179 | 2524 | 2866 | 3157 | 3463 | 3574 | 3663 | 3759 | 3848 | 3931 | | | | | |
| 7½ | 1½ | 90 | 764 | 934 | 1103 | 1216 | 1383 | 1548 | 1877 | 2257 | 2632 | 2951 | 3320 | 3686 | 3810 | 3927 | 4034 | 4120 | 4215 | | | | | |
| 8 | 1½ | 96 | 1023 | 1156 | 1352 | 1483 | 1678 | 2002 | 2443 | 2820 | 3257 | 3627 | 3985 | 4341 | 4465 | 4581 | 4689 | 4806 | 4900 | 5075 | 5232 | | | |
| 8½ | 1½ | 102 | 1104 | 1257 | 1409 | 1636 | 1786 | 2232 | 2673 | 3037 | 3470 | 3900 | 4256 | 4679 | 5032 | 5174 | 5284 | 5409 | 5526 | 5724 | 5917 | | | |
| 9 | 1½ | 108 | 1346 | 1508 | 1670 | 1831 | 2309 | 2703 | 3172 | 3560 | 4021 | 4479 | 4857 | 5308 | 5462 | 5609 | 5723 | 5852 | 6009 | 6266 | | | | |
| 9½ | 1½ | 114 | 1437 | 1623 | 1807 | 1992 | 2447 | 2897 | 3343 | 3874 | 4313 | 4749 | 5182 | 5612 | 6069 | 6243 | 6381 | 6511 | 6773 | 6989 | | | | |
| 10 | 1½ | 120 | 1728 | 1936 | 2144 | 2680 | 3088 | 3573 | 4075 | 4572 | 5086 | 5557 | 6044 | 6529 | 6917 | 7048 | 7234 | 7490 | 7747 | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor.

$$M = \frac{wl^2}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{wl^2}{20} = \text{Bending Moment for square slab supported on four sides.}$$

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 3 Maximum Stresses: Steel = 16,000 pounds, Concrete = 650 pounds Conc. { 1:2, 4
1:2 1/2, 5 carefully graded

| Total Thickness of Slab in Inches | Center of Steel to Bottom of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|-----------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 |
| 2 1/2 | 3/4 | 30 | 86 | 130 | 168 | 210 | 248 | 289 | 325 | 341 | 353 | 377 | | | | | | | | | | | | |
| 3 | 3/4 | 36 | 114 | 165 | 222 | 271 | 327 | 375 | 423 | 478 | 525 | 578 | 611 | | | | | | | | | | | |
| 3 1/2 | 3/4 | 42 | 137 | 203 | 268 | 332 | 395 | 458 | 520 | 592 | 653 | 804 | 858 | 900 | | | | | | | | | | |
| 4 | 3/4 | 48 | 160 | 237 | 329 | 404 | 478 | 552 | 625 | 697 | 769 | 954 | 1136 | 1194 | 1246 | | | | | | | | | |
| 4 1/2 | 3/4 | 54 | 192 | 275 | 377 | 458 | 557 | 636 | 734 | 812 | 890 | 1100 | 1327 | 1519 | 1585 | 1644 | | | | | | | | |
| 5 | 1 | 60 | 313 | 407 | 498 | 589 | 679 | 769 | 858 | 968 | 1187 | 1403 | 1637 | 1764 | 1835 | 1893 | | | | | | | | |
| 5 1/2 | 1 | 66 | 337 | 455 | 572 | 659 | 774 | 888 | 973 | 1086 | 1337 | 1612 | 1857 | 2064 | 2232 | 2314 | 2381 | | | | | | | |
| 6 | 1 | 72 | 489 | 634 | 742 | 849 | 991 | 1095 | 1201 | 1513 | 1787 | 2058 | 2359 | 2625 | 2756 | 2848 | 2922 | | | | | | | |
| 6 1/2 | 1 | 78 | 547 | 678 | 811 | 941 | 1071 | 1199 | 1327 | 1664 | 1957 | 2286 | 2612 | 2895 | 3216 | 3534 | 3431 | 3525 | | | | | | |
| 7 | 1 | 84 | 756 | 913 | 1017 | 1172 | 1326 | 1478 | 1831 | 2179 | 2524 | 2866 | 3157 | 3541 | 3872 | 3968 | 4072 | 4169 | 4259 | | | | | |
| 7 1/2 | 1 1/4 | 90 | 764 | 934 | 1103 | 1216 | 1383 | 1548 | 1877 | 2257 | 2632 | 2951 | 3320 | 3686 | 3998 | 4255 | 4371 | 4464 | 4566 | | | | | |
| 8 | 1 1/4 | 96 | 1023 | 1156 | 1352 | 1483 | 1678 | 2062 | 2443 | 2820 | 3257 | 3695 | 4300 | 4723 | 4963 | 5080 | 5207 | 5309 | 5498 | 5668 | | | | |
| 8 1/2 | 1 1/4 | 102 | 1104 | 1257 | 1409 | 1636 | 1786 | 2232 | 2673 | 3037 | 3470 | 3900 | 4256 | 4679 | 5100 | 5519 | 5725 | 5860 | 5987 | 6201 | 6410 | | | |
| 9 | 1 1/2 | 108 | 1346 | 1508 | 1670 | 1831 | 2309 | 2763 | 3172 | 3560 | 4021 | 4479 | 4837 | 5308 | 5683 | 6077 | 6200 | 6340 | 6576 | 6788 | | | | |
| 9 1/2 | 1 1/2 | 114 | 1437 | 1623 | 1807 | 1992 | 2447 | 2897 | 3343 | 3874 | 4313 | 4749 | 5182 | 5612 | 6125 | 6354 | 6514 | 7055 | 7338 | 7571 | | | | |
| 10 | 1 1/2 | 120 | 1728 | 1936 | 2144 | 2660 | 3068 | 3573 | 4075 | 4572 | 5066 | 5537 | 6044 | 6529 | 7011 | 7395 | 7836 | 8114 | 8393 | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wL^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides}$$

$$M = \frac{wL^2}{20} = \text{Bending Moment for square slab supported on four sides.}$$

** The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 4 Maximum Stresses: Steel = 16,000 pounds, Concrete = 700 pounds

| Total Thickness of Slab Inches | Center of Steel to Top of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|--------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|----|------|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | 10 | .12 | .14 | .16 | 18 | 20 | 25 | 30 | .35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 90 | 1:00 |
| 2½ | ¾ | 30 | 86 | 130 | 168 | 210 | 248 | 289 | 325 | 366 | 379 | 406 | | | | | | | | | | | | | |
| 3 | ¾ | 36 | 114 | 167 | 222 | 271 | 327 | 375 | 423 | 478 | 525 | 623 | 658 | | | | | | | | | | | | |
| 3½ | ¾ | 42 | 137 | 203 | 268 | 332 | 395 | 458 | 520 | 592 | 653 | 804 | 924 | 969 | | | | | | | | | | | |
| 4 | ¾ | 48 | 160 | 237 | 329 | 404 | 478 | 552 | 625 | 697 | 769 | 954 | 1137 | 1286 | 1342 | | | | | | | | | | |
| 4½ | ¾ | 54 | 192 | 275 | 377 | 458 | 557 | 636 | 734 | 812 | 890 | 1100 | 1327 | 1532 | 1707 | 1770 | | | | | | | | | |
| 5 | 1 | 60 | 313 | 407 | 498 | 589 | 679 | 769 | 858 | 968 | 1187 | 1403 | 1637 | 1849 | 1976 | 2038 | | | | | | | | | |
| 5½ | 1 | 66 | 337 | 455 | 572 | 659 | 774 | 888 | 973 | 1086 | 1337 | 1612 | 1857 | 2089 | 2314 | 2492 | 2565 | | | | | | | | |
| 6 | 1 | 72 | 489 | 634 | 742 | 849 | 991 | 1095 | 1201 | 1313 | 1787 | 2058 | 2359 | 2625 | 2889 | 3086 | 3147 | | | | | | | | |
| 6½ | 1 | 78 | 547 | 678 | 811 | 941 | 1071 | 1196 | 1327 | 1664 | 1957 | 2296 | 2612 | 2895 | 3216 | 3495 | 3698 | 3796 | | | | | | | |
| 7 | 1 | 84 | 756 | 913 | 1017 | 1172 | 1326 | 1478 | 1831 | 2179 | 2524 | 2866 | 3157 | 3541 | 3875 | 4160 | 4286 | 4496 | 4586 | | | | | | |
| 7½ | 1½ | 90 | 764 | 934 | 1103 | 1216 | 1383 | 1548 | 1877 | 2257 | 2632 | 2951 | 3320 | 3686 | 3998 | 4359 | 4704 | 4902 | 4913 | | | | | | |
| 8 | 1½ | 96 | 1023 | 1156 | 1352 | 1483 | 1678 | 2062 | 2443 | 2830 | 3237 | 3627 | 3995 | 4300 | 4723 | 5084 | 5444 | 5607 | 5717 | 5920 | 6104 | | | | |
| 8½ | 1½ | 102 | 1104 | 1257 | 1409 | 1636 | 1786 | 2232 | 2673 | 3037 | 3470 | 3900 | 4256 | 4679 | 5100 | 5519 | 5866 | 6280 | 6447 | 6678 | 6903 | | | | |
| 9 | 1½ | 108 | 1346 | 1568 | 1670 | 1831 | 2309 | 2703 | 3172 | 3560 | 4034 | 4479 | 4857 | 5308 | 5683 | 6129 | 6500 | 6828 | 7081 | 7310 | | | | | |
| 9½ | 1½ | 114 | 1437 | 1623 | 1807 | 1992 | 2447 | 2897 | 3343 | 3874 | 4313 | 4749 | 5182 | 5612 | 6125 | 6550 | 6973 | 7393 | 7902 | 8154 | | | | | |
| 10 | 1½ | 120 | 1728 | 1936 | 2144 | 2660 | 3068 | 3573 | 4075 | 4572 | 5066 | 5557 | 6044 | 6529 | 7011 | 7395 | 7968 | 8739 | 9038 | | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wL^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M_s = \frac{wL^2}{20} = \text{Bending Moment for square slab supported on four sides.}$$

*For a slab that is not square supported on four sides see page 71

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

For example showing use of tables see page 69

Table No. 5

Maximum Stresses: Steel = 18,000 pounds, Concrete = 500 pounds

| Total Thickness of Slab Inches | Center of Slab to Bottom of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|----------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 |
| 2½ | ¾ | 30 | 97 | 146 | 189 | 215 | 229 | 242 | 252 | 262 | 271 | 280 | | | | | | | | | | | | |
| 3 | ¾ | 36 | 128 | 185 | 250 | 303 | 348 | 386 | 383 | 400 | 413 | 445 | 470 | | | | | | | | | | | |
| 3½ | ¾ | 42 | 154 | 228 | 301 | 373 | 444 | 506 | 532 | 538 | 578 | 623 | 660 | 692 | | | | | | | | | | |
| 4 | ¾ | 48 | 180 | 267 | 370 | 454 | 538 | 621 | 702 | 731 | 759 | 821 | 874 | 919 | 958 | | | | | | | | | |
| 4½ | ¾ | 54 | 216 | 309 | 424 | 515 | 627 | 716 | 826 | 914 | 958 | 1038 | 1111 | 1168 | 1219 | 1264 | | | | | | | | |
| 5 | 1 | 60 | 352 | 456 | 560 | 663 | 764 | 865 | 965 | 1072 | 1158 | 1231 | 1301 | 1371 | 1411 | 1456 | | | | | | | | |
| 5½ | 1 | 66 | 379 | 512 | 644 | 741 | 871 | 999 | 1095 | 1222 | 1402 | 1504 | 1583 | 1654 | 1717 | 1780 | 1832 | | | | | | | |
| 6 | 1 | 72 | 550 | 714 | 835 | 956 | 1115 | 1234 | 1352 | 1675 | 1784 | 1880 | 1975 | 2031 | 2120 | 2190 | 2248 | | | | | | | |
| 6½ | 1 | 78 | 616 | 765 | 913 | 1059 | 1206 | 1349 | 1493 | 1872 | 2079 | 2204 | 2314 | 2402 | 2492 | 2565 | 2641 | 2711 | | | | | | |
| 7 | 1 | 84 | 851 | 1027 | 1144 | 1318 | 1491 | 1663 | 2059 | 2412 | 2551 | 2674 | 2770 | 2886 | 2979 | 3052 | 3132 | 3206 | 3276 | | | | | |
| 7½ | 1½ | 90 | 859 | 1050 | 1240 | 1366 | 1534 | 1741 | 2110 | 2537 | 2727 | 2846 | 2972 | 3086 | 3176 | 3273 | 3362 | 3434 | 3512 | | | | | |
| 8 | 1½ | 96 | 1152 | 1300 | 1522 | 1668 | 1887 | 2220 | 2748 | 3079 | 3252 | 3385 | 3506 | 3617 | 3721 | 3817 | 3906 | 4005 | 4084 | 4229 | 4360 | | | |
| 8½ | 1½ | 102 | 1243 | 1414 | 1586 | 1840 | 2008 | 2511 | 3006 | 3416 | 3640 | 3804 | 3929 | 4067 | 4194 | 4311 | 4404 | 4508 | 4603 | 4770 | 4931 | | | |
| 9 | 1½ | 108 | 1514 | 1697 | 1879 | 2053 | 2598 | 3041 | 3569 | 3834 | 4015 | 4179 | 4303 | 4444 | 4552 | 4674 | 4769 | 4877 | 5039 | 5221 | | | | |
| 9½ | 1½ | 114 | 1618 | 1827 | 2034 | 2240 | 2753 | 3259 | 3761 | 4288 | 4468 | 4622 | 4784 | 4925 | 5082 | 5203 | 5318 | 5427 | 5644 | 5824 | | | | |
| 10 | 1½ | 120 | 1944 | 2180 | 2413 | 2693 | 3451 | 4020 | 4584 | 4925 | 5120 | 5300 | 5465 | 5620 | 5765 | 5874 | 6028 | 6242 | 6456 | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued) :

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{w l^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{w l^2}{20} = \text{Bending Moment for square slab supported on four sides}$$

*For a slab that is not square supported on four sides see page 71
 The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.
 For examples showing use of tables see page 69

Table No. 6
Maximum Stresses: Steel = 18,000 pounds, Concrete = 600 pounds
Conc. 1 1/2 x 1/2

| Total Thickness of Slab in Inches | Center of Steel to Bot. of Slab | Weight of Slab per sq. Ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|---------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|------|--|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 | |
| 2 1/4 | 3/4 | 30 | 97 | 146 | 189 | 237 | 275 | 290 | 302 | 315 | 325 | 348 | | | | | | | | | | | | | | |
| 3 | 3/4 | 36 | 128 | 185 | 250 | 305 | 368 | 422 | 459 | 480 | 496 | 534 | 564 | | | | | | | | | | | | | |
| 3 1/2 | 3/4 | 42 | 154 | 228 | 301 | 373 | 444 | 515 | 585 | 636 | 694 | 747 | 792 | 830 | | | | | | | | | | | | |
| 4 | 3/4 | 48 | 180 | 267 | 370 | 454 | 538 | 621 | 703 | 784 | 863 | 986 | 1048 | 1103 | 1150 | | | | | | | | | | | |
| 4 1/2 | 3/4 | 54 | 216 | 309 | 424 | 515 | 627 | 716 | 826 | 914 | 1001 | 1238 | 1333 | 1402 | 1463 | 1517 | | | | | | | | | | |
| 5 | 1 | 60 | 352 | 456 | 560 | 663 | 764 | 865 | 965 | 1065 | 1222 | 1504 | 1805 | 1900 | 1984 | 2060 | 2134 | 2198 | | | | | | | | |
| 5 1/2 | 1 | 66 | 379 | 512 | 644 | 741 | 871 | 999 | 1095 | 1222 | 1504 | 1805 | 2256 | 2370 | 2461 | 2544 | 2628 | 2698 | | | | | | | | |
| 6 | 1 | 72 | 550 | 714 | 835 | 956 | 1115 | 1234 | 1352 | 1524 | 1805 | 2256 | 2370 | 2461 | 2544 | 2628 | 2698 | | | | | | | | | |
| 6 1/2 | 1 | 78 | 616 | 765 | 913 | 1059 | 1206 | 1349 | 1493 | 1637 | 1872 | 2200 | 2571 | 2775 | 2882 | 2994 | 3078 | 3169 | 3253 | | | | | | | |
| 7 | 1 | 84 | 851 | 1027 | 1144 | 1318 | 1491 | 1663 | 2059 | 2452 | 2840 | 3209 | 3324 | 3463 | 3574 | 3663 | 3759 | 3848 | 3931 | | | | | | | |
| 7 1/2 | 1 1/4 | 90 | 859 | 1050 | 1240 | 1366 | 1554 | 1741 | 2110 | 2537 | 2959 | 3318 | 3566 | 3703 | 3810 | 3927 | 4034 | 4120 | 4215 | | | | | | | |
| 8 | 1 1/4 | 96 | 1152 | 1300 | 1522 | 1688 | 1887 | 2320 | 2749 | 3173 | 3664 | 4061 | 4207 | 4341 | 4465 | 4581 | 4689 | 4806 | 4900 | 5075 | 5232 | | | | | |
| 8 1/2 | 1 1/4 | 102 | 1243 | 1414 | 1586 | 1840 | 2009 | 2511 | 3006 | 3416 | 3906 | 4386 | 4715 | 4880 | 5032 | 5174 | 5284 | 5409 | 5526 | 5724 | 5917 | | | | | |
| 9 | 1 1/2 | 108 | 1514 | 1697 | 1879 | 2059 | 2598 | 3041 | 3569 | 4004 | 4524 | 5014 | 5164 | 5333 | 5462 | 5609 | 5723 | 5852 | 6069 | 6266 | | | | | | |
| 9 1/2 | 1 1/2 | 114 | 1618 | 1827 | 2034 | 2240 | 2753 | 3259 | 3761 | 4358 | 4852 | 5342 | 5741 | 5910 | 6099 | 6243 | 6381 | 6511 | 6773 | 6989 | | | | | | |
| 10 | 1 1/2 | 120 | 1944 | 2180 | 2413 | 2693 | 3451 | 4020 | 4584 | 5144 | 5700 | 6252 | 6557 | 6745 | 6917 | 7048 | 7234 | 7400 | 7547 | | | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wL^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{wL^2}{30} = \text{Bending Moment for square slab supported on four sides.}$$

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 7 Maximum Stresses: Steel = 18,000 pounds, Concrete = 650 pounds

Cone. } 1:2, 1
1:2 1/2, 1
1:2 1/4, 5
carefully graded

| Total Thickness of Slab in Inches | Center of Steel to Top of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|--------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|------|--|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 | |
| 2 1/2 | 3/4 | 30 | 97 | 146 | 189 | 237 | 279 | 314 | 328 | 341 | 353 | 377 | | | | | | | | | | | | | | |
| 3 | 3/4 | 36 | 128 | 185 | 250 | 305 | 368 | 422 | 476 | 520 | 537 | 578 | 611 | | | | | | | | | | | | | |
| 3 1/2 | 3/4 | 42 | 154 | 228 | 301 | 373 | 444 | 515 | 585 | 666 | 734 | 810 | 858 | 900 | | | | | | | | | | | | |
| 4 | 3/4 | 48 | 180 | 267 | 370 | 454 | 538 | 621 | 703 | 784 | 865 | 1068 | 1136 | 1194 | 1246 | | | | | | | | | | | |
| 4 1/2 | 3/4 | 54 | 216 | 309 | 424 | 515 | 627 | 716 | 826 | 914 | 1001 | 1238 | 1444 | 1519 | 1585 | 1644 | | | | | | | | | | |
| 5 | 1 | 60 | 352 | 456 | 560 | 663 | 764 | 865 | 965 | 1090 | 1336 | 1578 | 1691 | 1764 | 1835 | 1893 | | | | | | | | | | |
| 5 1/2 | 1 | 66 | 379 | 512 | 644 | 741 | 871 | 999 | 1095 | 1222 | 1504 | 1814 | 2058 | 2150 | 2232 | 2314 | 2381 | | | | | | | | | |
| 6 | 1 | 72 | 550 | 714 | 835 | 956 | 1115 | 1234 | 1352 | 1702 | 2010 | 2315 | 2568 | 2666 | 2756 | 2848 | 2922 | | | | | | | | | |
| 6 1/2 | 1 | 78 | 616 | 765 | 913 | 1059 | 1206 | 1349 | 1493 | 1872 | 2200 | 2571 | 2938 | 3123 | 3240 | 3334 | 3431 | 3525 | | | | | | | | |
| 7 | 1 | 84 | 851 | 1027 | 1144 | 1319 | 1491 | 1663 | 2059 | 2452 | 2840 | 3225 | 3551 | 3752 | 3872 | 3968 | 4072 | 4169 | 4259 | | | | | | | |
| 7 1/2 | 1 1/4 | 90 | 859 | 1030 | 1240 | 1366 | 1554 | 1741 | 2110 | 2537 | 2959 | 3318 | 3735 | 4012 | 4128 | 4255 | 4371 | 4464 | 4566 | | | | | | | |
| 8 | 1 1/4 | 96 | 1152 | 1300 | 1522 | 1668 | 1887 | 2230 | 2749 | 3173 | 3664 | 4081 | 4494 | 4703 | 4837 | 4963 | 5080 | 5207 | 5309 | 5498 | 5668 | | | | | |
| 8 1/2 | 1 1/4 | 102 | 1243 | 1414 | 1586 | 1840 | 2009 | 2511 | 3006 | 3416 | 3906 | 4386 | 4789 | 5264 | 5452 | 5605 | 5725 | 5860 | 5987 | 6201 | 6410 | | | | | |
| 9 | 1 1/2 | 108 | 1514 | 1697 | 1879 | 2059 | 2598 | 3041 | 3569 | 4004 | 4524 | 5038 | 5464 | 5777 | 5918 | 6077 | 6200 | 6340 | 6576 | 6788 | | | | | | |
| 9 1/2 | 1 1/2 | 114 | 1618 | 1827 | 2034 | 2240 | 2753 | 3259 | 3761 | 4358 | 4852 | 5342 | 5830 | 6313 | 6607 | 6764 | 6914 | 7055 | 7338 | 7571 | | | | | | |
| 10 | 1 1/2 | 120 | 1944 | 2180 | 2413 | 2693 | 3451 | 4020 | 4584 | 5144 | 5700 | 6252 | 6810 | 7307 | 7494 | 7636 | 7836 | 8114 | 8393 | | | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wl^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{wl^2}{30} = \text{Bending Moment for square slab supported on four sides.}$$

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line: the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 8 Maximum Stresses: Steel = 18,000 pounds, Concrete = 700 pounds Conc. 1:2:4

| Total Thickness of Slab Inches | Center of Slab to Bot. of Steel | Weight of Slab Pounds per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|---------------------------------|-----------------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|------|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 |
| 2 1/2 | 3/4 | 30 | 97 | 146 | 189 | 237 | 279 | 325 | 353 | 367 | 379 | 406 | | | | | | | | | | | | | |
| 3 | 3/4 | 36 | 128 | 185 | 250 | 305 | 368 | 422 | 476 | 537 | 573 | 623 | 658 | | | | | | | | | | | | |
| 3 1/2 | 3/4 | 42 | 154 | 228 | 301 | 373 | 444 | 515 | 585 | 666 | 734 | 872 | 924 | 969 | | | | | | | | | | | |
| 4 | 3/4 | 48 | 180 | 267 | 370 | 454 | 538 | 621 | 703 | 784 | 865 | 1074 | 1223 | 1286 | 1342 | | | | | | | | | | |
| 4 1/2 | 3/4 | 54 | 216 | 309 | 424 | 515 | 627 | 716 | 826 | 914 | 1001 | 1238 | 1483 | 1636 | 1707 | 1770 | | | | | | | | | |
| 5 | 1 | 60 | 352 | 456 | 560 | 663 | 764 | 865 | 965 | 1060 | 1336 | 1578 | 1821 | 1899 | 1976 | 2038 | | | | | | | | | |
| 5 1/2 | 1 | 66 | 379 | 512 | 644 | 741 | 871 | 999 | 1095 | 1222 | 1504 | 1814 | 2089 | 2316 | 2404 | 2492 | 2565 | | | | | | | | |
| 6 | 1 | 72 | 550 | 714 | 835 | 956 | 1115 | 1234 | 1352 | 1702 | 2010 | 2315 | 2654 | 2871 | 2968 | 3066 | 3147 | | | | | | | | |
| 6 1/2 | 1 | 78 | 616 | 765 | 913 | 1059 | 1206 | 1349 | 1493 | 1872 | 2200 | 2571 | 2938 | 3257 | 3489 | 3591 | 3698 | 3796 | | | | | | | |
| 7 | 1 | 84 | 851 | 1027 | 1144 | 1318 | 1491 | 1663 | 2059 | 2452 | 2840 | 3225 | 3551 | 3984 | 4170 | 4274 | 4386 | 4490 | 4586 | | | | | | |
| 7 1/2 | 1 1/4 | 90 | 859 | 1050 | 1240 | 1366 | 1554 | 1741 | 2110 | 2537 | 2959 | 3318 | 3735 | 4143 | 4442 | 4579 | 4704 | 4802 | 4913 | | | | | | |
| 8 | 1 1/4 | 96 | 1152 | 1300 | 1522 | 1668 | 1887 | 2320 | 2749 | 3173 | 3664 | 4081 | 4494 | 4905 | 5210 | 5345 | 5470 | 5607 | 5717 | 5920 | 6104 | | | | |
| 8 1/2 | 1 1/4 | 102 | 1243 | 1414 | 1586 | 1840 | 2009 | 2511 | 3006 | 3416 | 3906 | 4386 | 4789 | 5264 | 5738 | 6035 | 6166 | 6311 | 6447 | 6678 | 6903 | | | | |
| 9 | 1 1/2 | 108 | 1514 | 1697 | 1879 | 2059 | 2508 | 3041 | 3569 | 4004 | 4524 | 5038 | 5464 | 5972 | 6373 | 6544 | 6677 | 6828 | 7081 | 7310 | | | | | |
| 9 1/2 | 1 1/2 | 114 | 1618 | 1827 | 2034 | 2240 | 2733 | 3259 | 3761 | 4358 | 4852 | 5342 | 5830 | 6313 | 6890 | 7284 | 7446 | 7597 | 7902 | 8154 | | | | | |
| 10 | 1 1/2 | 120 | 1944 | 2180 | 2413 | 2638 | 3451 | 4020 | 4584 | 5144 | 5700 | 6252 | 6810 | 7345 | 7889 | 8224 | 8440 | 8738 | 9038 | | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{w_1 l^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{w_2 l^2}{20} = \text{Bending Moment for square slab supported on four sides.}$$

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 9 Maximum Stresses: Steel = 20,000 pounds, Concrete = 600 pounds Conc. 1:2½:5

| Total Thickness of Slab in Inches | Center of Steel to Bot. of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|---------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 |
| 2½ | | 30 | 108 | 162 | 210 | 258 | 275 | 290 | 302 | 315 | 325 | 348 | | | | | | | | | | | |
| 3 | ¾ | 36 | 142 | 206 | 277 | 339 | 406 | 479 | 459 | 480 | 496 | 534 | 564 | | | | | | | | | | |
| 3½ | ¾ | 42 | 171 | 253 | 324 | 415 | 494 | 572 | 638 | 670 | 694 | 747 | 792 | 830 | | | | | | | | | |
| 4 | ¾ | 48 | 200 | 297 | 411 | 505 | 597 | 690 | 781 | 872 | 911 | 986 | 1048 | 1103 | 1150 | | | | | | | | |
| 4½ | ¾ | 54 | 240 | 344 | 471 | 572 | 697 | 795 | 918 | 1015 | 1112 | 1245 | 1333 | 1402 | 1463 | 1517 | | | | | | | |
| 5 | 1 | 60 | 377 | 508 | 622 | 736 | 849 | 961 | 1073 | 1211 | 1389 | 1477 | 1561 | 1627 | 1693 | 1747 | | | | | | | |
| 5½ | 1 | 66 | 421 | 569 | 715 | 824 | 968 | 1110 | 1216 | 1358 | 1671 | 1805 | 1900 | 1984 | 2040 | 2136 | 2198 | | | | | | |
| 6 | 1 | 72 | 611 | 793 | 928 | 1063 | 1239 | 1371 | 1502 | 1692 | 2141 | 2236 | 2370 | 2461 | 2544 | 2628 | 2698 | | | | | | |
| 6½ | 1 | 78 | 684 | 850 | 1014 | 1177 | 1338 | 1499 | 1659 | 2080 | 2445 | 2645 | 2775 | 2882 | 2990 | 3078 | 3169 | 3253 | | | | | |
| 7 | 1 | 84 | 946 | 1142 | 1271 | 1464 | 1657 | 1848 | 2289 | 2724 | 3061 | 3206 | 3324 | 3463 | 3574 | 3663 | 3759 | 3848 | 3931 | | | | |
| 7½ | 1½ | 90 | 955 | 1168 | 1379 | 1519 | 1728 | 1935 | 2316 | 2821 | 3272 | 3415 | 3566 | 3703 | 3810 | 3927 | 4034 | 4120 | 4215 | | | | |
| 8 | 1½ | 96 | 1290 | 1445 | 1690 | 1853 | 2097 | 2577 | 3034 | 3525 | 3902 | 4061 | 4207 | 4341 | 4465 | 4581 | 4689 | 4806 | 4900 | 5075 | 5232 | | |
| 8½ | 1½ | 102 | 1383 | 1571 | 1762 | 2045 | 2232 | 2789 | 3341 | 3796 | 4338 | 4564 | 4715 | 4880 | 5032 | 5174 | 5284 | 5409 | 5526 | 5724 | 5917 | | |
| 9 | 1½ | 108 | 1682 | 1886 | 2087 | 2288 | 2588 | 2987 | 3378 | 3966 | 4449 | 4817 | 5014 | 5164 | 5333 | 5462 | 5609 | 5723 | 5852 | 6069 | 6266 | | |
| 9½ | 1½ | 114 | 1798 | 2030 | 2260 | 2490 | 3058 | 3620 | 4179 | 4842 | 5362 | 5558 | 5741 | 5910 | 6099 | 6243 | 6381 | 6511 | 6773 | 6989 | | | |
| 10 | 1½ | 120 | 2160 | 2422 | 2680 | 3225 | 3834 | 4467 | 5094 | 5715 | 6143 | 6359 | 6557 | 6745 | 6917 | 7048 | 7234 | 7490 | 7747 | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wL^2}{12} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M \rightarrow 20 = \text{Bending Moment for square slab supported on four sides.}$$

*For a slab that is not square supported on four sides see page 71

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 10 Maximum Stresses: Steel = 20,000 pounds, Concrete = 650 pounds Conc. } 1.2, 1.4 } 1.2, 1.5 } carefully graded

| Total Thickness of Slab, Inches | Center of Steel to Bot. of Slab, Inches | Weight of Slab, Pounds | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|---|------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|------|--|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 | |
| 2½ | ¾ | 30 | 108 | 162 | 210 | 263 | 297 | 314 | 328 | 341 | 353 | 377 | | | | | | | | | | | | | | |
| 3 | ¾ | 36 | 142 | 206 | 277 | 339 | 409 | 469 | 498 | 520 | 537 | 578 | 611 | | | | | | | | | | | | | |
| 3½ | ¾ | 42 | 171 | 253 | 334 | 415 | 494 | 572 | 650 | 726 | 792 | 810 | 858 | 900 | | | | | | | | | | | | |
| 4 | ¾ | 48 | 200 | 297 | 411 | 505 | 597 | 690 | 781 | 872 | 961 | 1068 | 1136 | 1194 | 1246 | | | | | | | | | | | |
| 4½ | ¾ | 54 | 240 | 344 | 471 | 572 | 697 | 795 | 918 | 1015 | 1112 | 1349 | 1444 | 1519 | 1585 | 1644 | | | | | | | | | | |
| 5 | 1 | 60 | 377 | 508 | 622 | 736 | 849 | 961 | 1073 | 1211 | 1484 | 1601 | 1691 | 1764 | 1835 | 1893 | | | | | | | | | | |
| 5½ | 1 | 66 | 421 | 569 | 715 | 824 | 968 | 1110 | 1216 | 1358 | 1671 | 1956 | 2058 | 2150 | 2232 | 2314 | 2381 | | | | | | | | | |
| 6 | 1 | 72 | 611 | 793 | 928 | 1063 | 1239 | 1371 | 1502 | 1692 | 1892 | 2234 | 2444 | 2568 | 2666 | 2756 | 2848 | 2922 | | | | | | | | |
| 6½ | 1 | 78 | 684 | 850 | 1014 | 1177 | 1338 | 1499 | 1659 | 1859 | 2080 | 2445 | 2857 | 3008 | 3123 | 3240 | 3334 | 3431 | 3525 | | | | | | | |
| 7 | 1 | 84 | 946 | 1142 | 1271 | 1464 | 1657 | 1848 | 2029 | 2224 | 2424 | 2724 | 3156 | 3476 | 3601 | 3752 | 3872 | 3968 | 4072 | 4169 | 4259 | | | | | |
| 7½ | 1½ | 90 | 855 | 1108 | 1379 | 1519 | 1728 | 1835 | 2046 | 2251 | 2461 | 2821 | 3290 | 3688 | 3863 | 4012 | 4128 | 4255 | 4371 | 4464 | 4566 | | | | | |
| 8 | 1½ | 96 | 1280 | 1445 | 1690 | 1853 | 2097 | 2577 | 3054 | 3525 | 4071 | 4400 | 4558 | 4703 | 4837 | 4963 | 5080 | 5207 | 5309 | 5498 | 5668 | | | | | |
| 8½ | 1½ | 102 | 1383 | 1571 | 1762 | 2045 | 2232 | 2789 | 3341 | 3796 | 4338 | 4874 | 5108 | 5286 | 5452 | 5605 | 5725 | 5860 | 5987 | 6201 | 6410 | | | | | |
| 9 | 1½ | 108 | 1682 | 1986 | 2087 | 2298 | 2887 | 3378 | 3966 | 4449 | 5026 | 5432 | 5594 | 5777 | 5918 | 6077 | 6200 | 6340 | 6576 | 6788 | | | | | | |
| 9½ | 1½ | 114 | 1798 | 2030 | 2260 | 2490 | 3058 | 3620 | 4179 | 4842 | 5391 | 5936 | 6220 | 6403 | 6607 | 6764 | 6914 | 7055 | 7338 | 7571 | | | | | | |
| 10 | 1½ | 120 | 2160 | 2422 | 2680 | 3225 | 3834 | 4467 | 5094 | 5715 | 6333 | 6890 | 7104 | 7307 | 7494 | 7636 | 7836 | 8114 | 8393 | | | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:
 $M = \frac{wL^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$
 $M = \frac{wL^2}{20} = \text{Bending Moment for square slab supported on four sides.}$
 *For a slab that is not square supported on four sides see page 11.
 The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.
 For examples showing use of tables see page 69
Maximum Stresses: Steel = 20,000 pounds, Concrete = 700 pounds
Table No. 11
Concrete: 1:2:4

| Total Thickness of Slab, Inches | Center of Slab to Top of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|------|--|--|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 | | |
| 2½ | ¾ | 30 | 108 | 162 | 210 | 263 | 310 | 358 | 367 | 379 | 406 | | | | | | | | | | | | | | | | |
| 3 | ¾ | 36 | 142 | 206 | 277 | 339 | 409 | 469 | 529 | 560 | 579 | 623 | 658 | | | | | | | | | | | | | | |
| 3½ | ¾ | 42 | 171 | 253 | 334 | 415 | 494 | 572 | 650 | 740 | 810 | 872 | 924 | 969 | | | | | | | | | | | | | |
| 4 | ¾ | 48 | 200 | 297 | 411 | 505 | 597 | 690 | 781 | 872 | 961 | 1150 | 1223 | 1286 | 1342 | | | | | | | | | | | | |
| 4½ | ¾ | 54 | 240 | 344 | 471 | 572 | 697 | 795 | 918 | 1015 | 1112 | 1376 | 1555 | 1636 | 1707 | 1770 | | | | | | | | | | | |
| 5 | 1 | 60 | 377 | 508 | 622 | 736 | 849 | 961 | 1073 | 1211 | 1484 | 1724 | 1821 | 1899 | 1976 | 2038 | | | | | | | | | | | |
| 5½ | 1 | 66 | 421 | 569 | 715 | 824 | 968 | 1110 | 1216 | 1358 | 1671 | 2015 | 2217 | 2316 | 2404 | 2492 | 2565 | | | | | | | | | | |
| 6 | 1 | 72 | 611 | 793 | 928 | 1063 | 1239 | 1371 | 1502 | 1692 | 2234 | 2572 | 2765 | 2871 | 2968 | 3066 | 3147 | | | | | | | | | | |
| 6½ | 1 | 78 | 684 | 850 | 1014 | 1177 | 1338 | 1499 | 1659 | 2080 | 2445 | 2857 | 3240 | 3363 | 3489 | 3591 | 3698 | 3796 | | | | | | | | | |
| 7 | 1 | 84 | 946 | 1142 | 1271 | 1464 | 1657 | 1848 | 2289 | 2724 | 3156 | 3583 | 3878 | 4040 | 4170 | 4274 | 4386 | 4490 | 4586 | | | | | | | | |
| 7½ | 1½ | 90 | 955 | 1168 | 1379 | 1519 | 1728 | 1935 | 2346 | 2821 | 3290 | 3688 | 4150 | 4320 | 4442 | 4573 | 4704 | 4802 | 4913 | | | | | | | | |
| 8 | 1½ | 96 | 1280 | 1445 | 1690 | 1853 | 2097 | 2577 | 3034 | 3525 | 4071 | 4534 | 4908 | 5065 | 5210 | 5345 | 5470 | 5607 | 5717 | 5820 | 6104 | | | | | | |
| 8½ | 1½ | 102 | 1383 | 1571 | 1762 | 2045 | 2232 | 2789 | 3341 | 3796 | 4338 | 4874 | 5320 | 5693 | 5871 | 6035 | 6166 | 6311 | 6447 | 6678 | 6903 | | | | | | |
| 9 | 1½ | 108 | 1682 | 1886 | 2087 | 2288 | 2887 | 3378 | 3966 | 4449 | 5026 | 5598 | 6024 | 6222 | 6373 | 6544 | 6677 | 6828 | 7081 | 7310 | | | | | | | |
| 9½ | 1½ | 114 | 1798 | 2030 | 2260 | 2490 | 3058 | 3630 | 4179 | 4842 | 5391 | 5936 | 6477 | 6895 | 7115 | 7284 | 7446 | 7597 | 7902 | 8154 | | | | | | | |
| 10 | 1½ | 120 | 2160 | 2422 | 2680 | 3325 | 3834 | 4467 | 5094 | 5715 | 6333 | 6946 | 7555 | 7869 | 8071 | 8224 | 8440 | 8739 | 9038 | | | | | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

Area of Steel Required per Foot of Width for a Maximum Resisting Moment of Slab of Given Thickness

Corresponding SAFE BENDING MOMENT due to applied load and weight of floor:

$$M = \frac{wL^2}{10} = \frac{1}{10} \times \text{Load per sq. ft.} \times (\text{length of span})^2 = \text{Bending Moment for slab supported on two sides.}$$

$$M = \frac{wL^2}{20} = \frac{1}{20} \times \text{Bending Moment for square slab supported on four sides.}$$

The Maximum Allowable Fiber Stress in the steel governs the values of Resisting Moments given below and to the left of the heavy zigzag line; the Maximum Allowable Fiber Stress in the concrete governs the values above and to the right of this line.

Table No. 12 Maximum Stresses: Steel = 20,000 pounds, Concrete = 750 pounds Carefully graded 1,2,4 Conc.

| Total Thickness of Slab, Inches | Center of Slab to Bot. of Slab | Weight of Slab per sq. ft. | MOMENTS OF RESISTANCE IN FOOT POUNDS PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|--------------------------------|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|
| | | | CROSS SECTIONAL AREA IN SQUARE INCHES OF STEEL REINFORCEMENT PER FOOT OF WIDTH | | | | | | | | | | | | | | | | | | | | |
| | | | .04 | .06 | .08 | .10 | .12 | .14 | .16 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .55 | .60 | .65 | .70 | .75 | .80 | .90 | 1.00 |
| 2½ | ¾ | 30 | 108 | 162 | 210 | 263 | 310 | 361 | 378 | 394 | 406 | 435 | | | | | | | | | | | |
| 3 | ¾ | 36 | 142 | 206 | 277 | 339 | 409 | 469 | 529 | 597 | 620 | 667 | 704 | | | | | | | | | | |
| 3½ | ¾ | 42 | 171 | 253 | 334 | 415 | 494 | 572 | 650 | 740 | 816 | 934 | 990 | 1038 | | | | | | | | | |
| 4 | ¾ | 48 | 200 | 297 | 411 | 505 | 597 | 690 | 781 | 872 | 961 | 1193 | 1311 | 1378 | 1438 | | | | | | | | |
| 4½ | ¾ | 54 | 240 | 344 | 471 | 572 | 697 | 795 | 918 | 1015 | 1112 | 1376 | 1658 | 1753 | 1829 | 1896 | | | | | | | |
| 5 | ¾ | 60 | 377 | 508 | 622 | 736 | 849 | 961 | 1073 | 1211 | 1484 | 1754 | 1951 | 2035 | 2117 | 2184 | | | | | | | |
| 5½ | ¾ | 66 | 421 | 569 | 715 | 824 | 968 | 1110 | 1216 | 1358 | 1671 | 2015 | 2321 | 2481 | 2576 | 2672 | 2748 | | | | | | |
| 6 | ¾ | 72 | 611 | 793 | 928 | 1063 | 1239 | 1371 | 1502 | 1692 | 2234 | 2572 | 2949 | 3076 | 3180 | 3286 | 3372 | | | | | | |
| 6½ | ¾ | 78 | 684 | 850 | 1014 | 1177 | 1338 | 1496 | 1659 | 2080 | 2445 | 2857 | 3265 | 3603 | 3739 | 3845 | 3962 | 4067 | | | | | |
| 7 | ¾ | 84 | 946 | 1142 | 1271 | 1464 | 1657 | 1848 | 2289 | 2724 | 3156 | 3583 | 3946 | 4329 | 4468 | 4579 | 4699 | 4810 | 4914 | | | | |
| 7½ | ¾ | 90 | 955 | 1168 | 1379 | 1519 | 1728 | 1935 | 2346 | 2821 | 3290 | 3688 | 4150 | 4608 | 4763 | 4909 | 5043 | 5149 | 5368 | | | | |
| 8 | ¾ | 96 | 1280 | 1445 | 1690 | 1853 | 2097 | 2577 | 3054 | 3525 | 4071 | 4534 | 4994 | 5427 | 5582 | 5726 | 5860 | 6006 | 6126 | 6343 | 6540 | | |
| 8½ | ¾ | 102 | 1383 | 1571 | 1762 | 2045 | 2322 | 2789 | 3341 | 3796 | 4338 | 4874 | 5320 | 5849 | 6291 | 6468 | 6606 | 6762 | 6907 | 7155 | 7396 | | |
| 9 | ¾ | 108 | 1682 | 1986 | 2087 | 2288 | 2687 | 3378 | 3966 | 4449 | 5026 | 5598 | 6071 | 6635 | 6828 | 7014 | 7154 | 7318 | 7587 | 7832 | | | |
| 9½ | ¾ | 114 | 1798 | 2030 | 2260 | 2490 | 3058 | 3620 | 4179 | 4842 | 5391 | 5936 | 6477 | 7011 | 7623 | 7805 | 7980 | 8140 | 8467 | 8738 | | | |
| 10 | ¾ | 120 | 2160 | 2422 | 2680 | 3325 | 3834 | 4467 | 5094 | 5715 | 6333 | 6946 | 7555 | 8161 | 8648 | 8811 | 9042 | 9363 | 9684 | | | | |

Note:—For sectional areas, weights, etc., of Triangle Mesh Wire Reinforcement see pp. 110-111.

EXHIBIT C-163 (continued):

TABLE No. 13.
RECOMMENDED MINIMUM DEPTH OF SLABS IN INCHES.
SPAN IN FEET. MIXTURE 1:2:4.

| Live load in lbs. per sq.ft. | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 50 | 2.5 | 2.5 | 3.0 | 3.0 | 3.5 | 3.5 | 4.0 | 4.0 | 4.5 | 5.0 | 5.0 | 5.5 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 |
| 100 | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 4.0 | 4.5 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 |
| 150 | 3.0 | 3.0 | 3.5 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | 10.0 |
| 200 | 3.5 | 3.5 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | 10.5 | 11.0 |
| 250 | 3.5 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.5 | 10.0 | 10.5 | 11.0 | 12.0 |
| 300 | 4.0 | 4.0 | 4.0 | 4.5 | 5.0 | 5.5 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.5 | 10.0 | 10.5 | 11.5 | 12.0 | |
| 350 | 4.0 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.5 | 8.0 | 8.5 | 9.0 | 10.0 | 10.5 | 11.5 | 12.0 | | |
| 400 | 4.5 | 4.5 | 4.5 | 5.0 | 5.5 | 6.5 | 7.0 | 7.5 | 8.5 | 9.0 | 9.5 | 10.5 | 11.0 | 12.0 | | | |
| 450 | 4.5 | 4.5 | 4.5 | 5.5 | 6.0 | 6.5 | 7.5 | 8.0 | 8.5 | 9.5 | 10.0 | 11.0 | 11.5 | 12.0 | | | |
| 500 | 4.5 | 4.5 | 5.0 | 5.5 | 6.0 | 7.0 | 7.5 | 8.5 | 9.0 | 10.0 | 10.5 | 11.5 | 12.0 | | | | |

The depths given are the total thickness of the slab, assuming the center of the reinforcement to be $\frac{1}{2}$ inch above bottom. More covering than this may be used by increasing the depth, the extra weight of this concrete being added to the live load.

It is always allowable to use depths greater than those here specified, thereby decreasing the amount of reinforcement and increasing the amount of concrete. It is also possible to use somewhat less depths, but not economical. For depths greater than 12 inches, it is more economical to use reinforced concrete beams with thinner slabs between. These depths may also be used for a carefully graded mixture of 1:2:5 concrete.

EXHIBIT C-163 (continued):

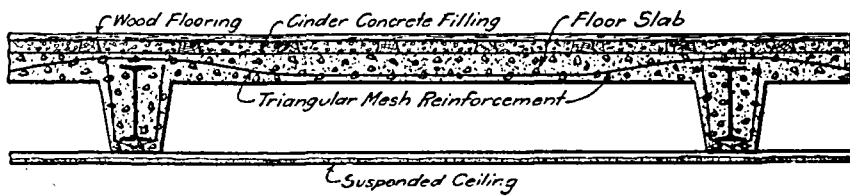
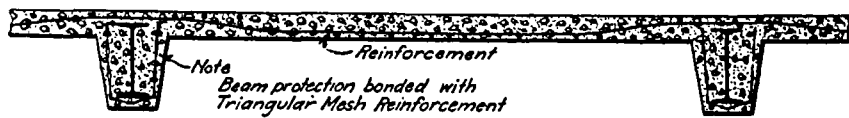
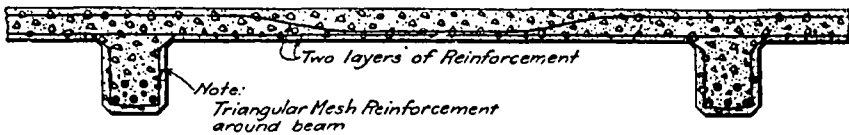
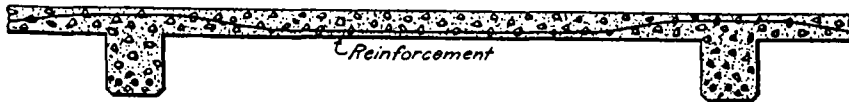


EXHIBIT C-163 (continued):

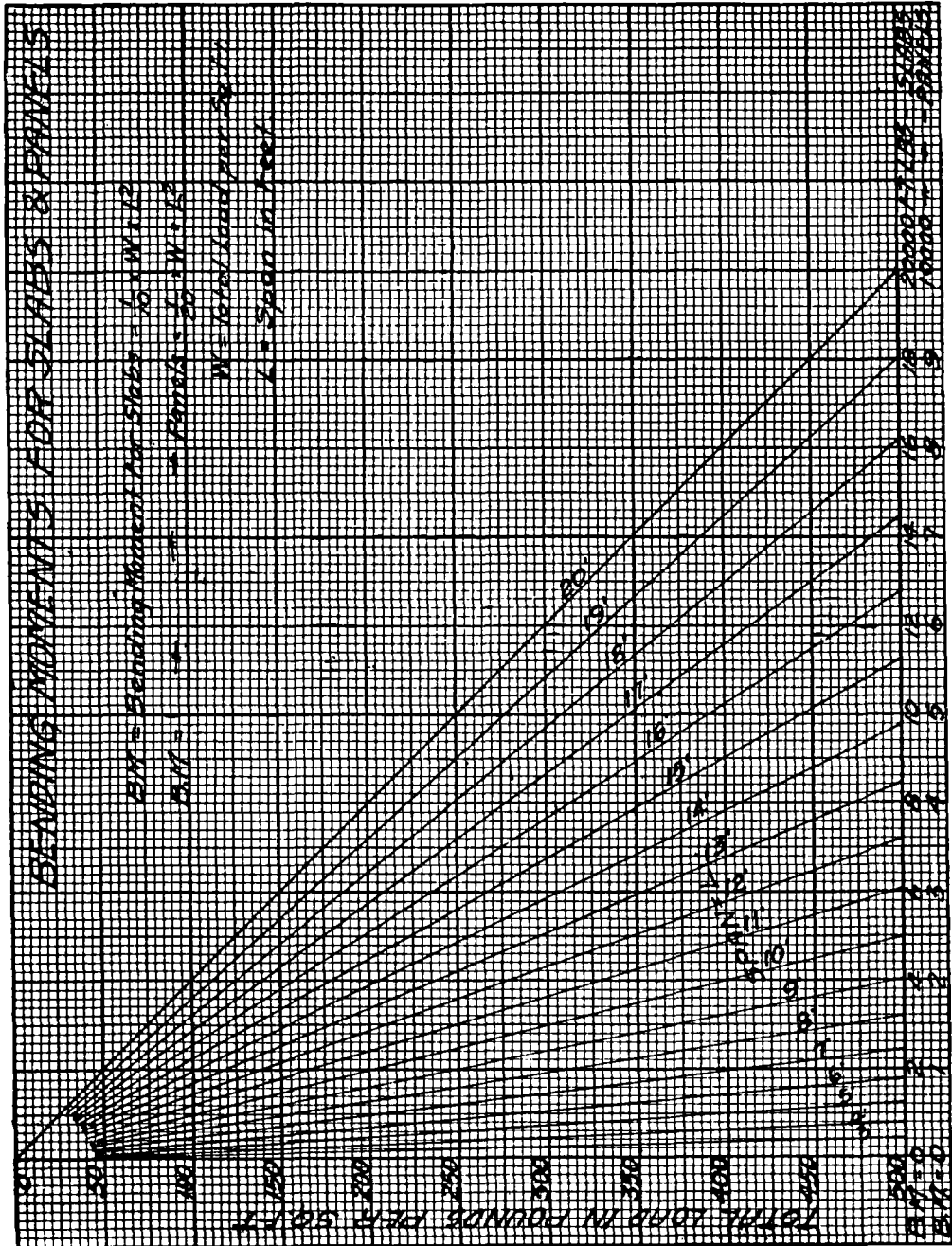


Diagram No. 1. Bending Moments for Slabs and Panels.

EXHIBIT C-163 (continued):

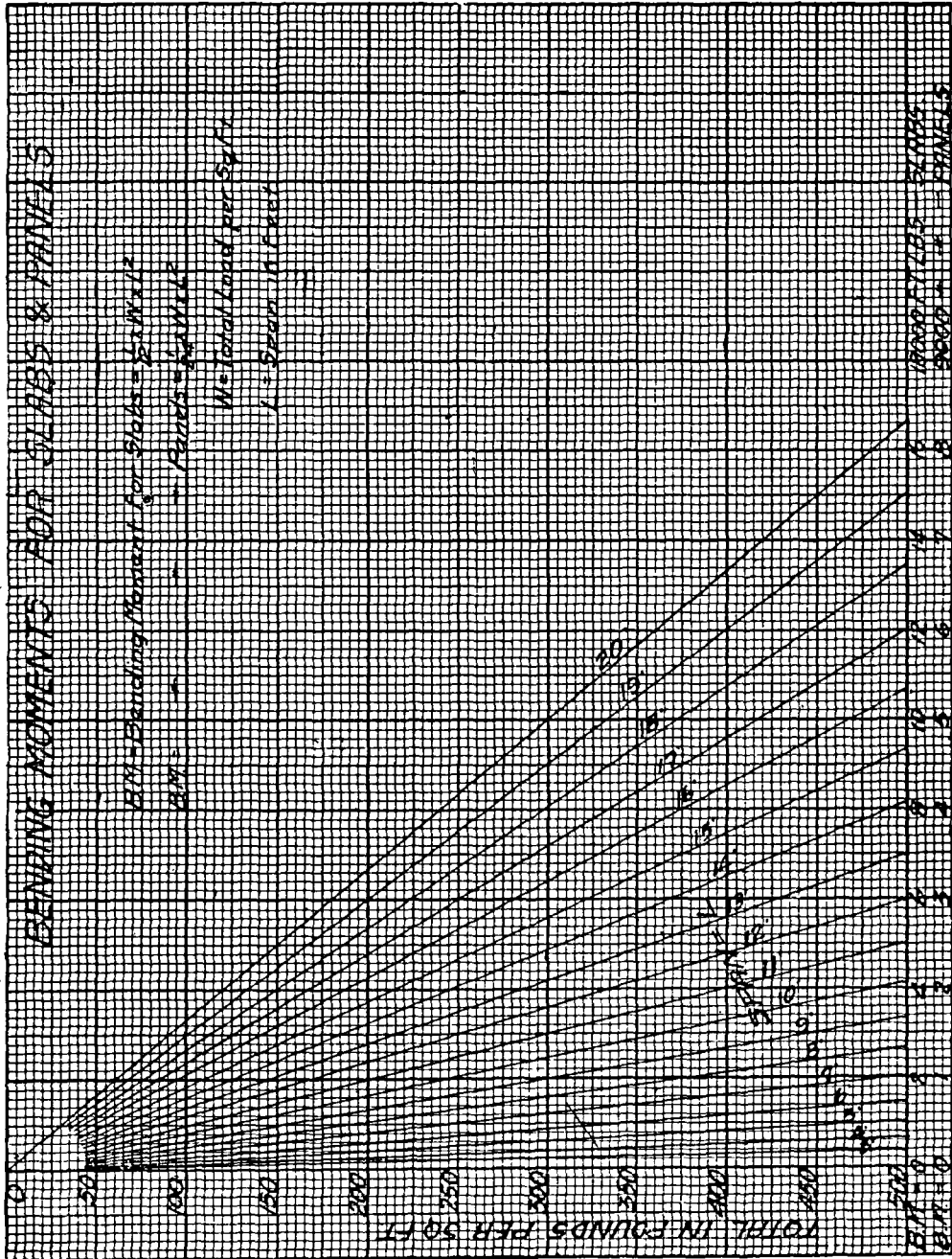


EXHIBIT C-163 (continued):

REINFORCED CONCRETE COLUMNS.

Vertical reinforcement is used in concrete columns in order to carry a portion of the direct compressive stresses and also to take care of bending stresses due to eccentric loading on the columns.

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If bars are used, it is necessary to band or tie them together. These bands should be so spaced that the unsupported length of the rods between bands is not too great to permit of column action.

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The column sketches on page 91 show how *Triangle Mesh Wire Fabric* is used in column construction. The fabric is constructed with a joint at each longitudinal so that the column cages may be formed without bending the wires. The cross wires act as bands holding the longitudinal members in place and also add a factor of safety to the construction by reason of their "hoop" action. If it is necessary to have a greater section of vertical steel, place bars inside of the wire fabric.

The size of column and amount of reinforcement necessary to carry a given load may be determined by means of the formula:—

$$P = A_c f_c + n f_s A_s$$

30 Where $P =$ Load on column in pounds.

$A_c =$ Cross sectional area of concrete, square inches.

$A_s =$ Cross sectional area of steel, square inches.

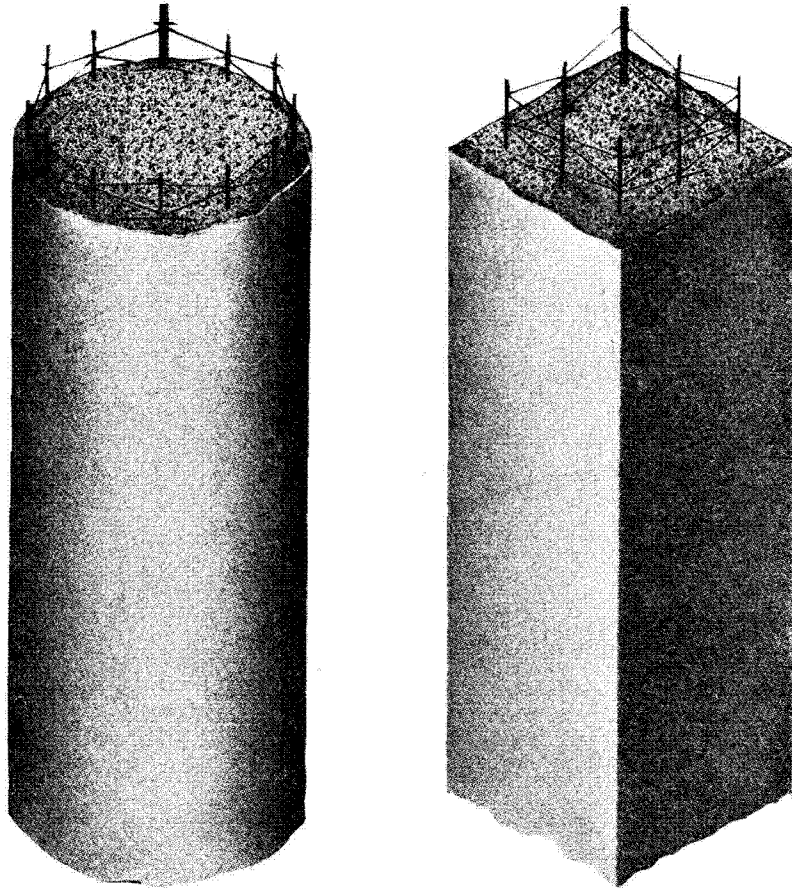
$f_c =$ Allowable stress in concrete in compression, pounds per square inch.

$$n = \text{ratio, } \frac{\text{Modulus of Elasticity of Steel}}{\text{Modulus of Elasticity of Concrete}}$$

40

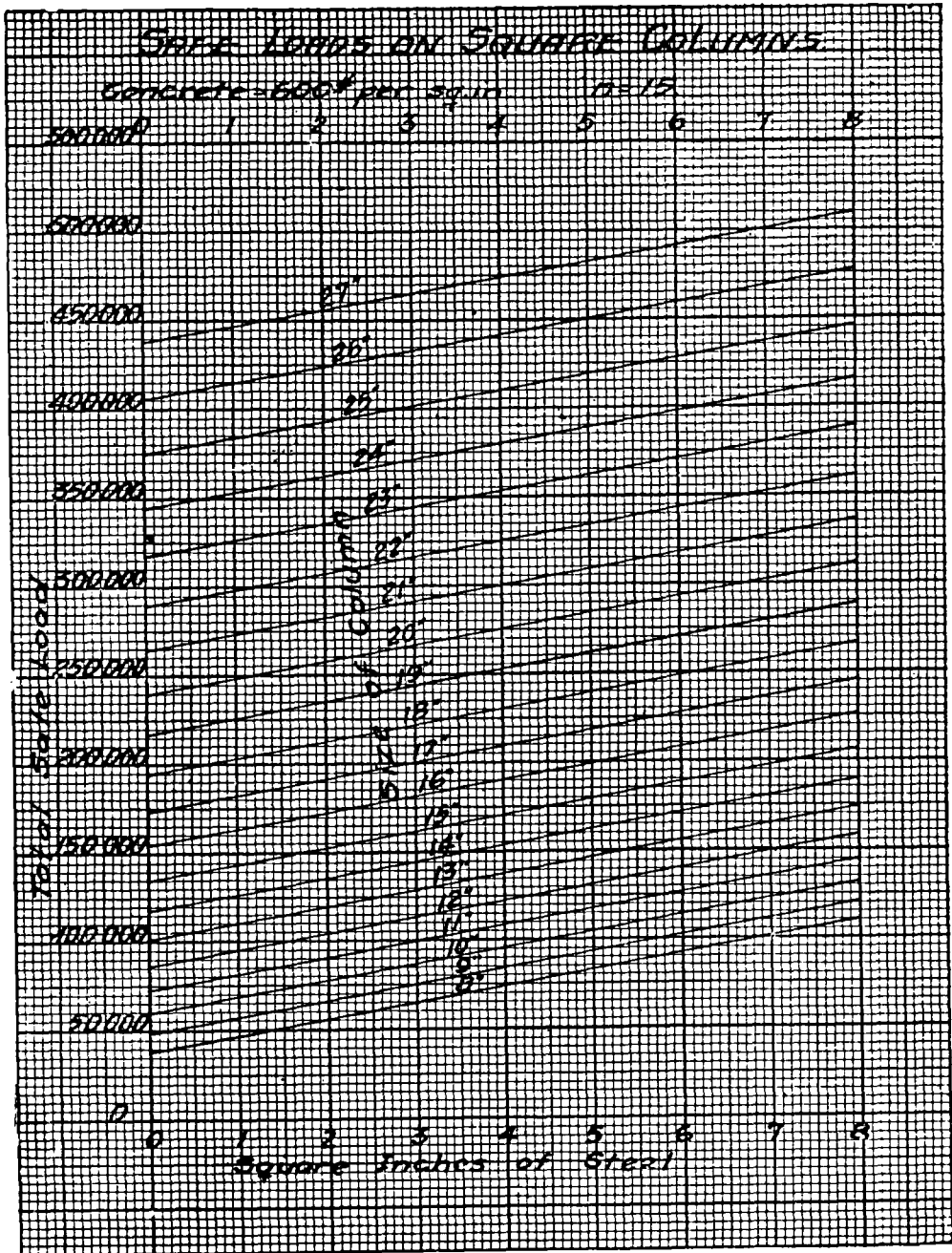
The following diagrams, pages 92 and 93, for Safe Loads on Square and Round Columns are based on a value of 15 for n and 600 pounds per square inch for f_c . They show the amount of vertical reinforcement required in order that a column of given size will carry the given load. An examination of these diagrams shows that with a given load, the size of column may be varied by varying the amount of vertical reinforcement.

EXHIBIT C-163 (continued):



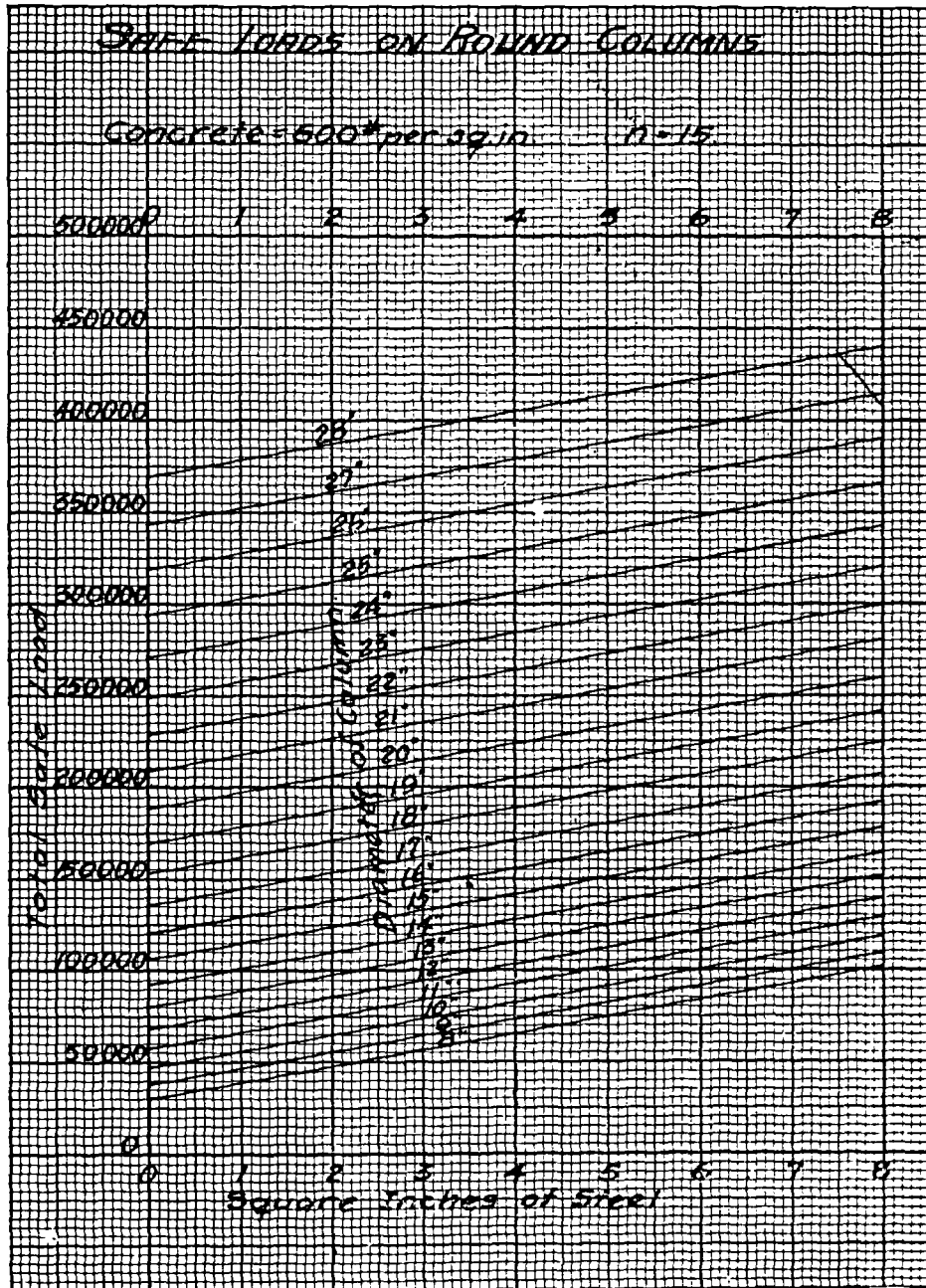
Triangle Mesh Reinforcement is most applicable to columns for hoop reinforcement, due to the hinge joint provided at each longitudinal member thus, allowing the material to be readily folded without bending the wires. It may be used for either round or square columns of various diameters, due to the number of different widths in which *Triangle Mesh Reinforcement* is made. The accompanying illustrations demonstrate its adaptability for column work. Additional bars may be included for vertical reinforcement if so desired.

EXHIBIT C-163 (continued):



Safe Loads and Area in Square Inches of Steel
for Square Columns.

EXHIBIT C-163 (continued):



Safe Loads and Area in Square Inches of Steel
for Round Columns.

EXHIBIT C-163 (*continued*):

MECHANICS OF PIPES AND RINGS SUBJECT TO
EXTERNAL PRESSURE.

Note—Through the courtesy extended by Arthur N. Talbot, University of Illinois, we reprint the following extracts from their Bulletin No. 22, dated April 29th, 1908, on reinforced concrete culvert pipe, sewer pipe, etc.

10

Bending Moment and Conditions of Loading.

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The stresses developed in rings subject to external earth pressure, as in sewers and railroad culvert pipes, are of course dependent upon the bending moments developed, and, as the exact load coming upon the ring and its distribution over the surface are difficult to determine, the bending moment is in general quite uncertain. The amount of the load and its distribution, and therefore the bending moments on different parts of the ring, depend upon a number of conditions, among them the nature of the earth used in the filling, the method of bedding the pipe, the way of tamping the earth at the sides, the amount of the lateral restraint or pressure of the earth horizontally, the method of filling and packing the earth above, the condition of moisture in the earth, etc. Evidently in such earth as saturated quick-sand, the conditions may approach those of external hydrostatic pressure, and on the other hand, in deep sewer trenches, the earth filling may act in such a way that much of its weight is carried against the sides of the trench. In discussing the stresses in rings, it may be well first to find the bending moment for certain assumed conditions of loading, then to make tests under various conditions of loading, and finally to compare these results with a view of determining the probable range of bending moments under the actual conditions of construction. The assumed loadings may include (1) a concentrated load at the crown of the ring, (2) a vertical load distributed uniformly over the horizontal section, (3) a distributed vertical load together with a horizontal load distributed vertically over the sides of the ring, and (4) an oblique loading. In these calculations, since much uncertainty is involved, the difference in the intensity of the load at the crown and at the extremities of the horizontal diameter, due to the different depths of earth, need not be considered. In general the pressures and distribution on the lower half of the ring will be considered to be the same as on the upper half. It is apparent that in a ring of considerable thickness in comparison with its diameter there is a different distribution of stresses from that found in thin rings, but for the rings under consideration the simplicity of analysis for thin rings will outweigh the small loss

EXHIBIT C-163 (continued):

in accuracy. The possible modifications and complications in the analysis of thick rings may also be considered. As refinements are not essential and approximations are permissible, the analysis will assume a thin ring of homogeneous material having a constant modulus of elasticity and it will also be assumed that the changes from a circular form will have little effect upon the dimensions of the ring.

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Concentrated Vertical Load on Thin Elastic Ring.

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Consider that a concentrated load Q is applied along the top element of a cylindrical ring and that the ring is supported along an element at the bottom, as indicated in Fig. 1 (a). Since the ring is a continuous curved beam, the analysis will require a slight modification of the convention commonly used for simple straight beams. However, in any segment of the ring, the external forces acting on the ring will be held in equilibrium by the internal or resisting forces acting upon this segment at its two ends. The moment of the internal forces acting at right angles to a section of the ring at an end of the segment is the resisting moment developed, and the bending moment may be considered to be an equal moment having the opposite sign. If we take a quadrant of the ring, as shown in Fig. 1 (b), it is evident from a consideration of the external and internal forces acting upon this ring that this quadrant will be in equilibrium under the action of $\frac{1}{2}Q$ at B, a reaction or thrust of $\frac{1}{2}Q$ at A, a resisting moment in the section of the ring at A which we will call M_A , and a resisting moment in the section of the ring at B which we will call M_B . The amounts of the two resisting moments so developed and thus of the two bending moments it is important to determine. Similarly, if we consider a portion of the ring shown in Fig. 1 (c), the forces which hold it in equi-

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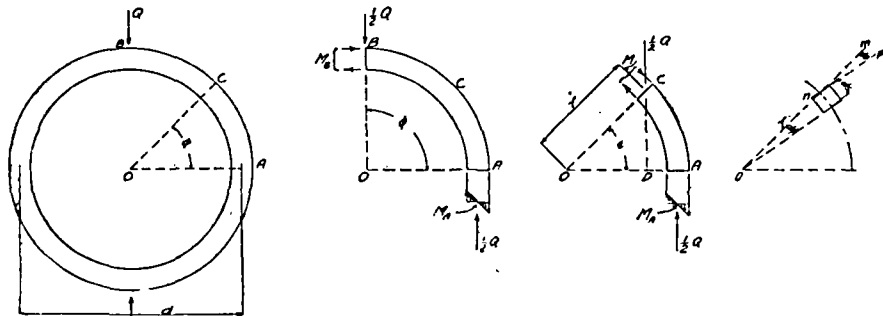


Fig. 1.—Ring under Concentrated Load.

EXHIBIT C-163 (continued):

rium may be shown to be $\frac{1}{2}Q$ at A, $\frac{1}{2}Q$ at C, the moment M_A at the section A, and a variable moment M at C, the value of which will change with a change in the angle φ . Taking moments about A, the following equation for the value of the bending moment at any point on the ring results:

10
$$M = \frac{1}{2}Qr (1 - \cos \varphi) - M_A \dots \dots \dots (1)$$

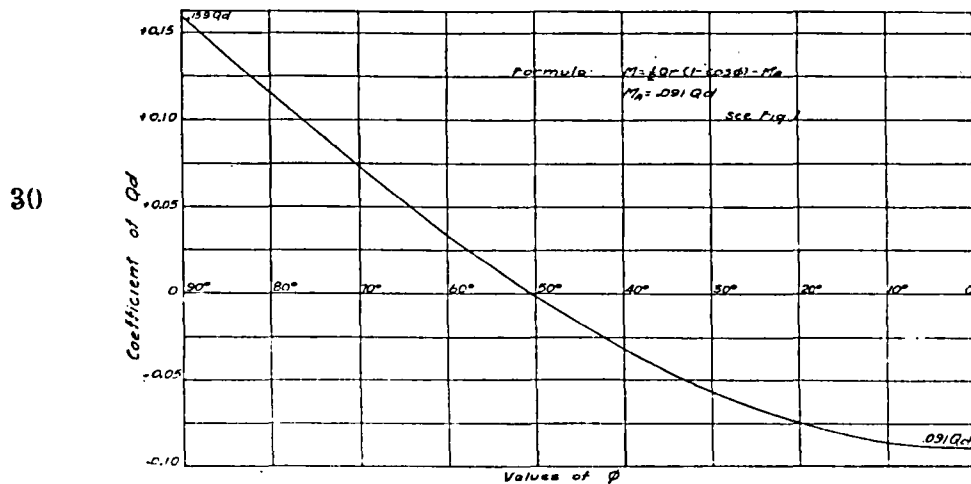
*but,
$$M_A = \frac{Qr}{2} \left(1 - \frac{1}{\frac{1}{2}\pi}\right) = .091 Qd \dots \dots \dots (4)$$

where d is the mean diameter of the ring.

Substituting this value of M_A in equation (1) and making $\varphi = 90^\circ$, we have

20
$$M_B = \frac{Qd}{4} - .091 Qd = .159 Qd \dots \dots \dots (5)$$

It will be seen that the bending moment at B is about sixteen-ninths times that at A.



40 Fig. 2.—Variation in Bending Moment for Concentrated Load.

To determine the point of zero bending moment place equation (1) equal to zero. $\cos \varphi = .636$ and $\varphi = 50^\circ 30'$. At this point

* See Bulletin No. 22, University of Illinois, for full mathematical proof.

EXHIBIT C-163 (continued):

the algebraic sign of the bending moment changes from negative to positive.

Fig. 2 gives the variation of the bending moment from A to B.

It may be shown that if the load be applied equally at two points on either side of the crown (and similarly supported below) the bending moment at the crown will be decreased and that if these points are immediately above the quarter points of the diameter the value of the bending moment at the crown becomes 0.054 Qd and that at the extremities of the horizontal diameter 0.071 Qd. This has a bearing upon the effect of the methods of bedding a pipe.

Distributed Vertical Load on Thin Elastic Ring.

Consider that the vertical load is distributed uniformly over the horizontal projection of the ring, as shown in Fig. 3 (a), and call w the load per lineal unit of horizontal width for a ring one unit long and r the means radius of the ring.

The expression for the bending moment M at any point C on the ring is found by taking moments about C.

$$\begin{aligned}
 M &= wr^2 (1 - \cos \varphi) - \frac{1}{2} wr^2 (1 - \cos \varphi)^2 - M_A \\
 &= \frac{1}{2} wr^2 (1 - \cos^2 \varphi) - M_A \dots\dots\dots (6)
 \end{aligned}$$

30

40

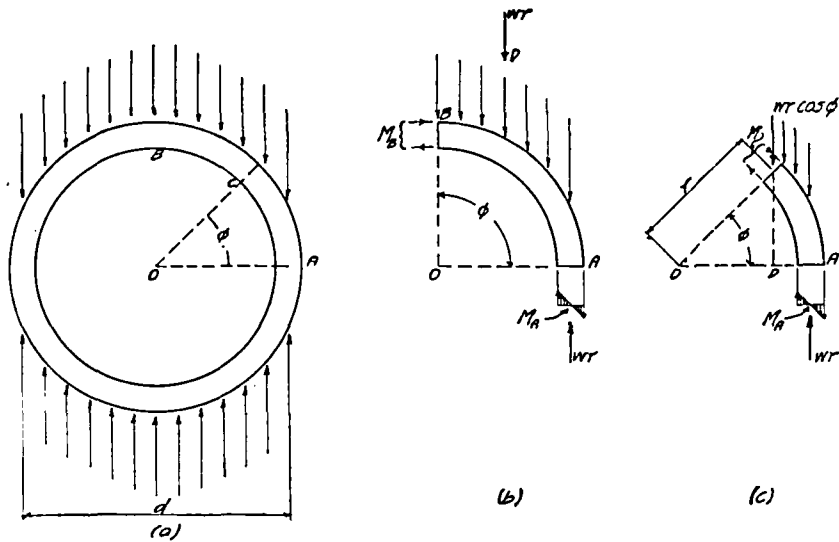
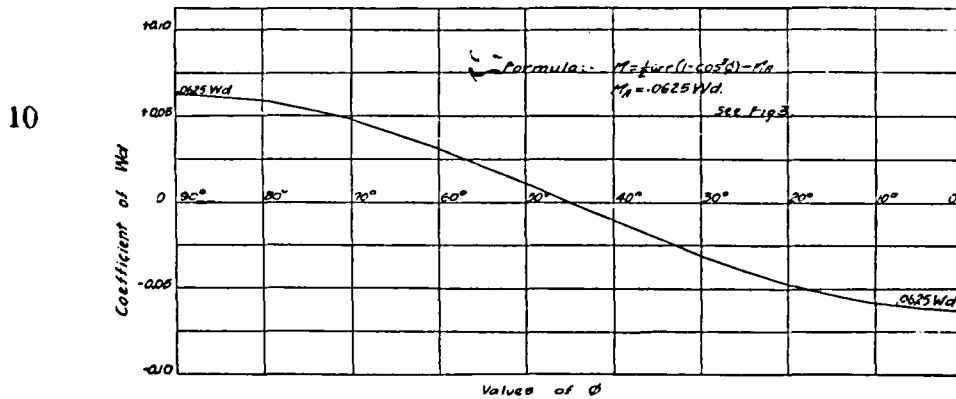


Fig 3 Ring Under Distributed Vertical Load.

EXHIBIT C-163 (continued):

*But, — $M_A = M_B = 1/16 wd^2 = 1/16 Wd \dots (7)$
 where d is the mean diameter of the ring and W is the total load on a ring of unit length.



20 Fig. 4.—Variation in Bending Moment For Distributed Load.

Distributed Vertical and Horizontal Loads on Thin Elastic Ring.

Let us consider that the vertical load is distributed over the horizontal section of the pipe as before (w per lineal unit of width of pipe) and that there is a horizontal pressure uniformly distributed vertically against the pipe, the amount of this horizontal pressure per lineal unit of vertical distance being qw , where q is the ratio of the horizontal to the vertical intensity of pressure. The conditions are indicated in Fig. 5 (a). We may consider that the effect of these loads is the combined effect of the two loads. Call M' , M'_A , and M'_B the bending moments produced by the vertical load and M'' , M''_A and M''_B , the bending moments produced by the horizontal load. The bending moment at any section C (Fig. 5 (b)) produced by the vertical load is

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* See Bulletin No. 22, University of Illinois, for full mathematical proof.

EXHIBIT C-163 (continued):

$$M' = wr^2 (1 - \cos \varphi) - \frac{1}{2} wr^2 (1 - \cos \varphi)^2 - M'_A.$$

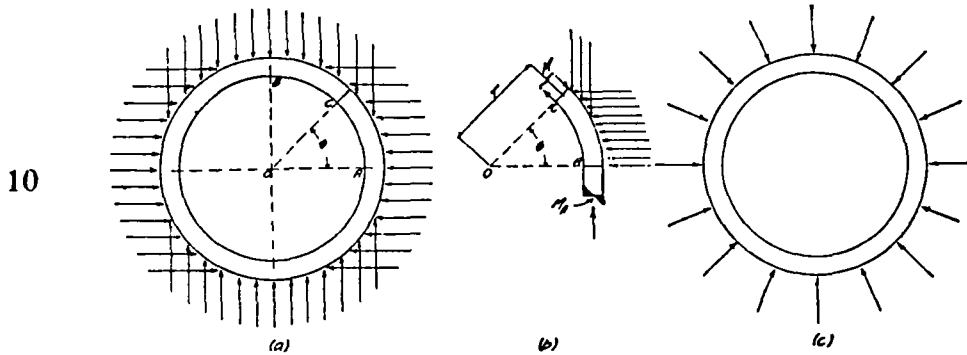


Fig. 5.—Ring under Distributed Vertical and Horizontal Load.

It may be shown that the bending moment produced at any section C by the horizontal load is

$$M'' = -\frac{1}{2} qwr^2 \sin^2 \varphi + M''_A$$

and that the value of M''_A is $\frac{1}{4} qwr^2$. The resulting moment therefore is

$$M = M' + M'' = \frac{1}{4} wr^2 [1 + q - 2 \cos^2 \varphi - 2q \sin^2 \varphi] \dots (8)$$

The moment at B and A will therefore be

$$M_B = -M_A = \frac{1}{4} (1 - q) wr^2 = \frac{1}{16} (1 - q) Wd \dots (9)$$

where W is the total vertical load on the ring. The bending moment becomes zero at $\varphi = 45^\circ$ as in the other case.

If the intensity of the horizontal pressure is the same as that of the vertical pressure, $q = 1$ and M becomes zero at all points. This corresponds to uniform external pressure as shown in Fig. 5 (c) and produces equal compression in all parts of the ring.

Resisting Moment and Calculation of Stresses.

For a ring whose thickness is small in comparison with the diameter the difference in the length of the inner fiber and outer fiber is small and the expression for the resisting moment given for ordinary straight beams may be applied with a close degree of approximation.

For a ring made of reinforced concrete the conditions differ somewhat from those of a homogeneous elastic material. For ordinary cases it will be not far from the truth to equate the bending moment determined as above and the resisting moment of the reinforced concrete section. As the amount of reinforce-

EXHIBIT C-163 (*continued*):

ment is usually lower than that in which the circular beam would fail by compression in the concrete, we may, without material error, take for the resisting moment of the reinforced concrete section the value $.8 Aft$, where (t) is the distance from the compression face to the center of the steel reinforcement, A is the area of the cross-section of the reinforcement for a unit of length of ring, and f is the tensile unit-stress in the steel due to the bending moment. To equate the bending moment determined as before to this resisting moment is not exactly correct, since among other reasons the neutral axis does not come at the center of the thickness of the ring (which is the point about which the bending moments were taken), and since the elastic curve is not the same as in a ring of homogeneous material, and hence the distribution and amounts of the bending moments will not be exactly the same. However, the use of the bending moments determined for homogeneous rings is the nearest approximation we have, and is not seriously in error. At sections where thrust occurs, as at A , (Fig. 3), the tension in the steel determined as above will be reduced by the resisting compressive stresses there set up. The amount of the tension in the steel at the point A may be calculated by the formula

$$f' = f - \frac{1/2 nT}{t (1 + np)} \dots \dots \dots (19)$$

which is applicable for both concentrated and distributed loads. In this formula f is the tensile stress in the steel due to the bending moment (as calculated by equating $.87 Aft$ to the bending moment at the section considered), p is the ratio of the area of reinforcement for a unit length of beam or ring to the distance between the center of the steel and the compression face of the concrete, T is the thrust, or pressure against the face of the section, and n is the ratio of the moduli of elasticity of steel and concrete, which, for purposes of this calculation, may be taken as 15. At the extremity of the horizontal diameter the thrust is $1/2 W$. At the crown it is zero for vertical loading, and for both concentrated and distributed load the greatest tensile stress is found at this section.

Conditions of Bedding and Loading Found in Practice.

The foregoing discussion assumes certain definite conditions of loading. These are useful in establishing definite formulas which may be used as a basis for calculations. It is not to be expected that these conditions represent accurately the con-

EXHIBIT C-163 (*continued*):

dition of bedding and loading to be found in practice. It is then desirable that the nature and extent of possible or probable variations from these assumed conditions be discussed and the effects of such a divergence considered. The following are suggestions of variations; the engineer will easily extend the discussion by numerous examples taken from his own experience.

- 10 If the layer of earth immediately under the pipe is hard or uneven, or if the bedding of the pipe at either side is soft material or not well tamped, the main bearing of the pipe may be along an element at the bottom and the result is in effect concentrated loading. The result is to greatly increase the bending moment developed and hence the tendency of the pipe to fail. This condition may be aggravated in the case of a pipe with a stiff hub or bell where settlement may bring an unusual proportion of the bearing at the bell and the distribution of the pressure be far from the assumed condition. In bedding the pipe in
20 hard ground is it much better to form the trench so that the pipe will surely be free along the bottom element, even settlement occurs, and so that the bearing pressures may tend to concentrate at points say under the one-third points of the horizontal diameter (or even the outer quarter points). This will reduce the bending moments developed in the ring.

- In case the pipe is bedded in loose material, the effect of the settlement will be to compress the earth immediately under the bottom of the pipe more completely than will be the effect
30 at one side, with the result that the pressure will not be uniformly distributed horizontally. Similarly, in a sewer trench, if loose material is left at the sides and the material at the extremity of the horizontal diameter is loose and offers little restraint, the pressure on the earth will not be distributed horizontally and the amount of bending moment will be materially different from that where careful bedding and tamping give an even distribution of bearing pressure over the bottom of the sewer.

- In case of a small sewer in a deep trench, the load upon
40 the sewer may be materially less than the weight of the earth above, where the earth forms a hard compact mass and is held by pressure and friction against the sides of the trench.

 In case a culvert pipe is laid in an ordinary embankment by cutting down the sides slopingly, it is evident that the load which comes upon the pipe will be materially less than the weight of the earth immediately above it. If a culvert pipe replaces a

EXHIBIT C-163 (*continued*):

10 trestle and the filling is allowed to run down the slope, the direction and amount of the pressure against the pipe will differ considerably from that which obtains in a trench or in the case of a level filling. It is possible in the latter case that the smaller amount of settlement of the earth directly over the culvert pipe, due to the greater depth of earth on the adjacent sections, may allow a greater proportion of the load to rest upon the culvert pipe than would ordinarily be assumed.

20 Attention should be called to the fact that the distribution of the pressure by means of earth under and over a ring assumes that the earth is compressed in somewhat the same way as when other material of construction is given compression. Unless the earth has elasticity, the distribution of pressure cannot occur. To secure the uniform distribution assumed the ring itself must give enough to allow for the movement of the earth which takes place under pressure. This is especially true with reference to the presence and utilization of lateral restraint, and a ring which
30 does not give laterally, as for example a plain concrete ring will not develop lateral pressure in the adjoining earth under ordinary conditions of moisture and filling to any great extent. As the conditions of earth and moisture produce mobility and approach hydrostatic conditions, the necessity for this elasticity and movement do not exist, but here the lateral pressure approaches the vertical pressure in amount and the bending moments become relatively smaller.

30 The discussion is sufficiently extended to indicate the importance of care in bedding culvert pipe and sewers and in filling over them, and to indicate the great difference in the amount of bending moment developed with different conditions of bedding and filling. Where there is any question of needed strength, it will be money well expended to use care and precaution in bedding the pipe and in filling around and over it. I am convinced that a little extra expense will add considerable stability, life, strength, and safety to such structures, far out of proportion to the added cost. It is possible that under careful conditions of laying, lighter structures may be used with a saving in the cost
40 of construction.

Summary.

From the tests and the discussions it would seem evident that among the facts brought out are the following:

The reinforced concrete rings in the concentrated load tests held their maximum loads or about their maximum loads through a considerable deflection, thus showing a quality which is of value when changes in earth conditions permit a gradual yielding

EXHIBIT C-163 (*continued*):

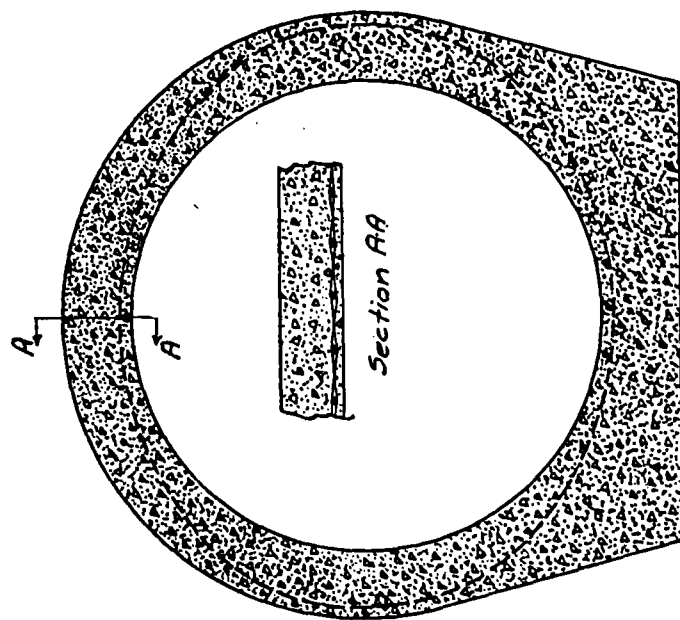
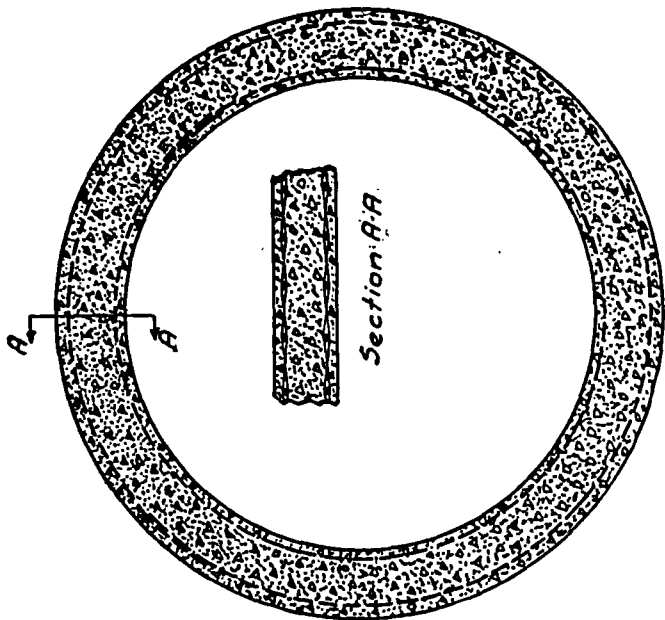
of the surrounding earth. The calculated restraining moment agrees fairly well with the calculated bending moment.

10 The reinforced concrete rings and pipes tested under distributed load made a satisfactory showing. The so-called critical failure may occur by either tension failure in the steel or a diagonal tension failure (ordinarily called shearing failures) in the concrete. A flattened arc for the reinforcement where it approaches the inner face is of assistance and stirrups may be of some value. Beyond the critical load the reinforcement is of service in distributing the cracks and in holding the concrete together. Final failure is by crushing of the concrete in much the same way as was obtained with the plain concrete rings. The additional strength beyond the critical load may be taken into consideration in selecting the factor of safety or working strength.

20 The restraint of the sand in the tests is very important, and the effect is to reduce the bending moment developed by a given vertical load, or, as it would be commonly stated, to add strength to the pipe. The degree of permanency of this side restraint is uncertain. It seems evident in these tests that the distribution of the pressure, both horizontal and vertical, was not uniform, and that with the usual method of placing a pipe in an embankment, and especially when other materials than sand are used, the distribution would be even less uniform than here found. In view of this it will be well in making calculations and designs to use the formula $1/16 Wd$ for the bending moment, thus considering that the side of restraint is offset by the uneven
30 distribution of the load, any surplus from this being considered merely an additional margin of safety. For pipes poorly bedded and filled a larger bending moment than $1/16 Wd$ should be used.

The method of bedding and laying pipes and the nature of the bed and the surrounding earth have a great effect upon the bending moment developed and upon the resistance of the pipe to failure. If the method of laying, or the hardness of the soil below, or the condition of the settlement of the pipe is such that the pipe is supported only or mainly along an element of the cylinder at the bottom the bending moment developed will
40 be greatly increased over that of a uniformly distributed support. If the greatest supported pressure comes at points well to the side of this bottom element, as may be obtained by careful bedding, the bending moment is reduced. It is also plain that the bell should be left free from pressure at the bottom. It is possible that the presence of the bell detracts from the strength of the pipe. Any action in filling which increases the lateral restraint against the pipe will add to the security of the structure.

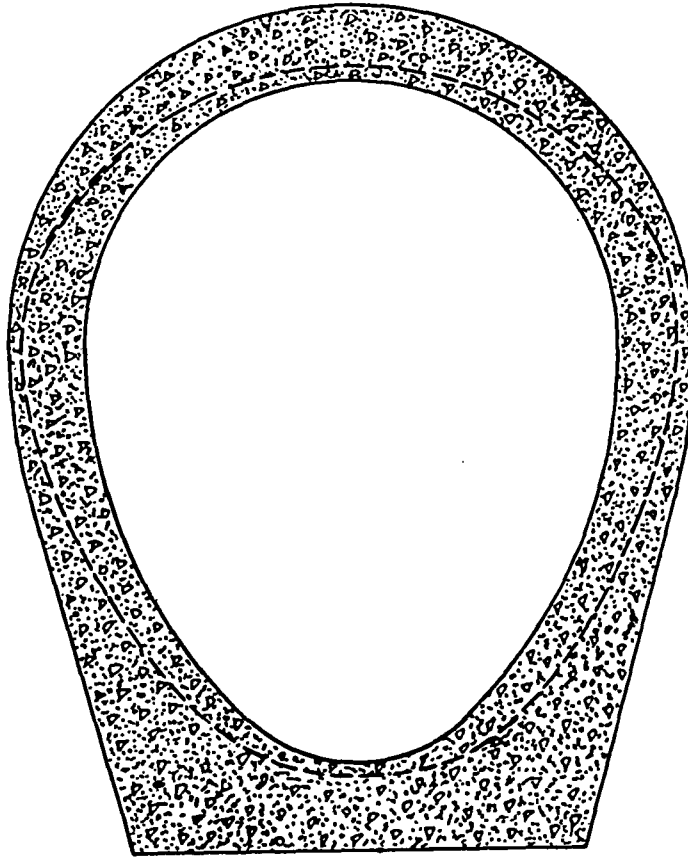
EXHIBIT C-163 (continued):



Typical Sewer Section Reinforced with One Layer of Triangle Mesh Reinforcement. Note Continuous Reinforcement.

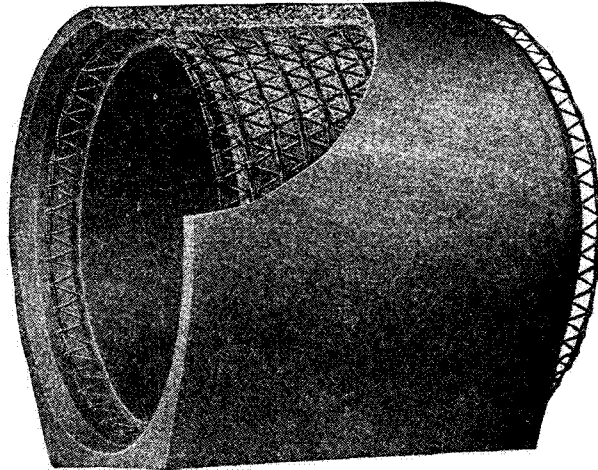
Typical Sewer Section Reinforced with Two Layers of Triangle Mesh Reinforcement.

EXHIBIT C-163 (*continued*):

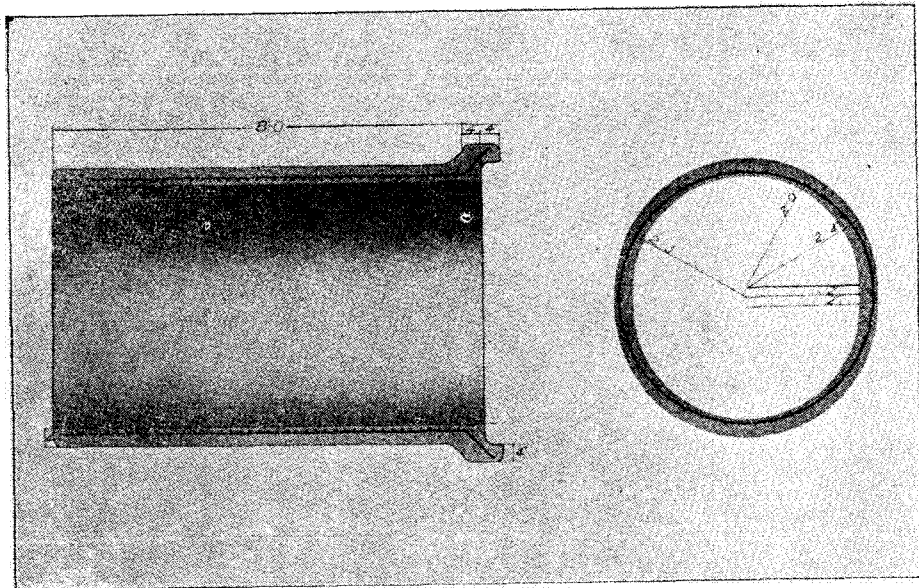


Typical Sewer Section Reinforced with One Layer Triangle Mesh Reinforcement. Not Continuous Reinforcement.

EXHIBIT C-163 (*continued*):

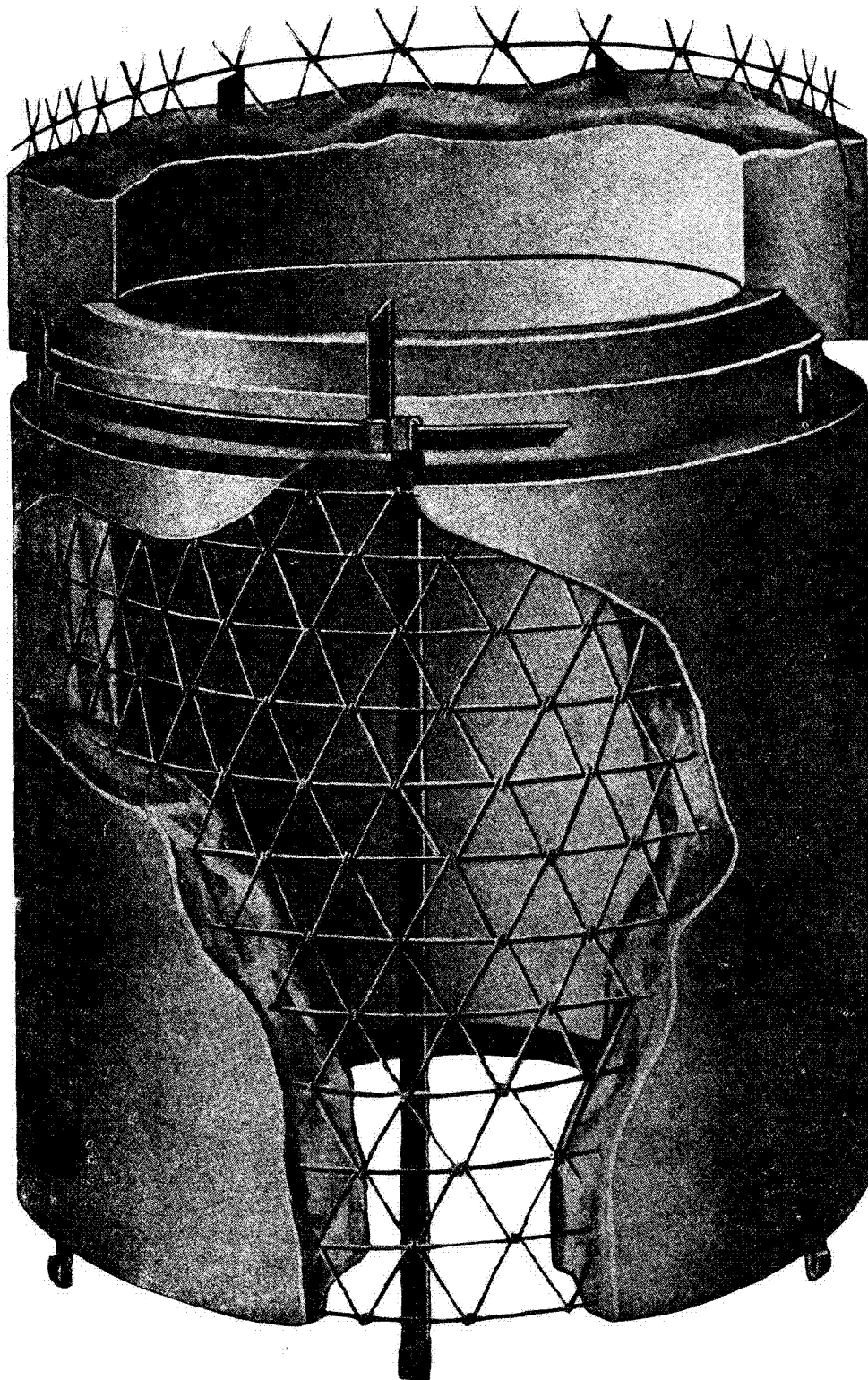


Triangle Mesh Concrete Sewer Pipe as Made by the Lock Joint Pipe Company.



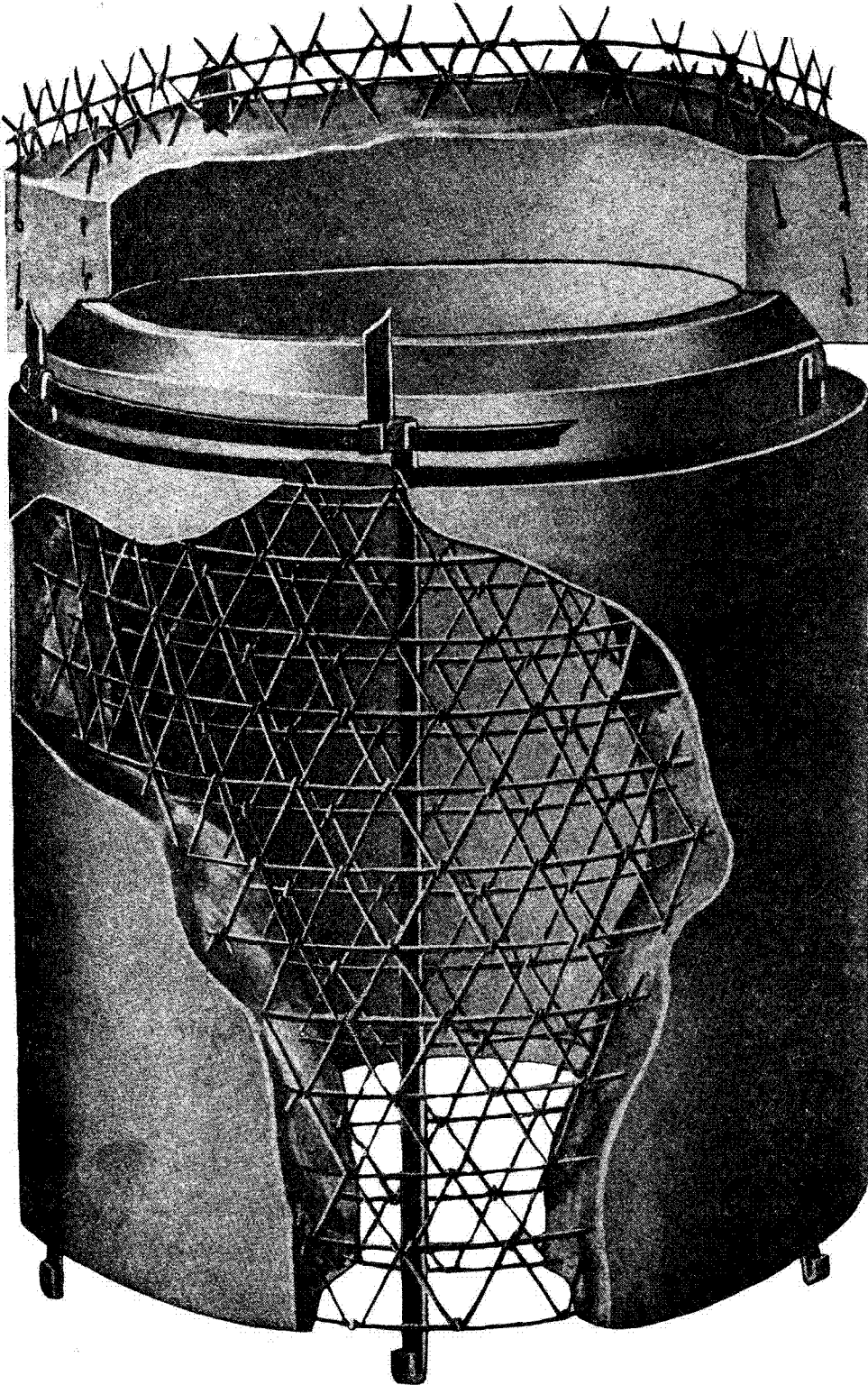
Triangle Mesh Wire Reinforced Concrete Pipe.
As made by the American Concrete Company.

EXHIBIT C-163 (continued):



Triangle Mesh Wire Reinforced Concrete Pipe.
As Made by Reinforced Concrete Pipe Co.

EXHIBIT C-163 (continued) :



Double Triangle Wire Mesh Reinforced Concrete Pipe.
As Made by Reinforced Concrete Pipe Co.

EXHIBIT C-163 (continued):

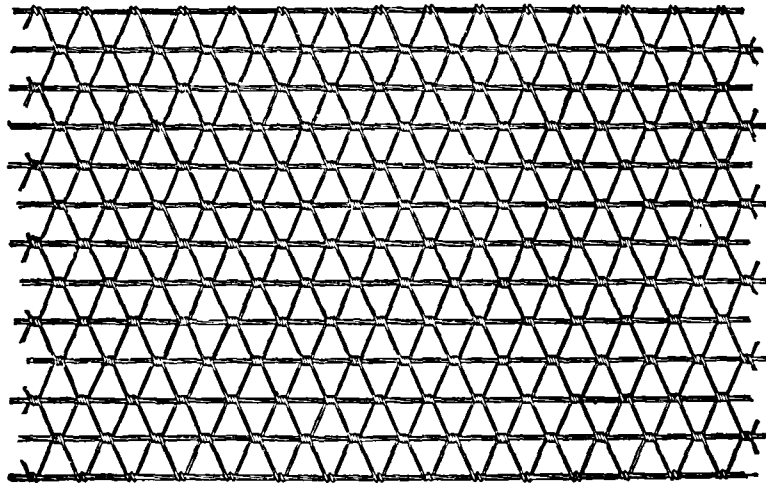
TRIANGLE MESH STEEL WIRE REINFORCEMENT.

10 *Triangle Mesh Steel Woven Wire Reinforcement* is made with both single and stranded longitudinal, or tension members. That with the single wire longitudinal is made with one wire varying in size from a No. 12 gauge up to and including a 1/2-inch diameter, and that with the stranded longitudinal is composed of two or three wires varying from No. 12 gauge up to and including No. 4 wires stranded or twisted together with a long lay. These longitudinals either solid or stranded are invariably spaced 4-inch centers, the sizes being varied in order to obtain the desired cross sectional area of steel per foot of width.

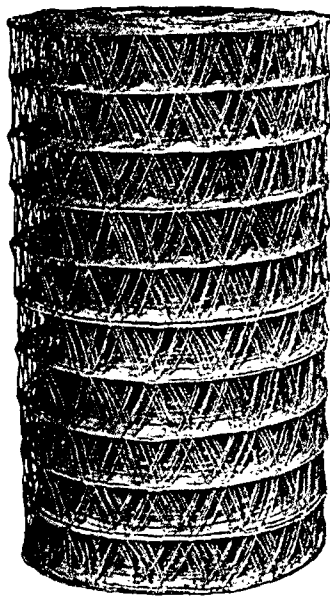
20 The transverse or diagonal cross wires are so woven between the longitudinals that perfect triangles are formed by their arrangement thereby not only lending additional carrying strength to the longitudinal or tension members, but positively spacing them and providing a most perfect distribution of the steel. These diagonal cross or transverse wires are woven either 2 or 4 inches apart, as is desired. It is the most perfect reinforcement for concentrated loads, distributing the stress imposed by the load throughout the floor slab. A hinge joint is provided on each longitudinal, which enables this reinforcement to be folded longitudinally in any desired shape, making it adaptable to all kinds of concrete construction. Its design provides a most perfect mechanical bond between the steel and the concrete, and
30 from the fact that it is not galvanized (unless specifically ordered) the maximum adhesive bond is developed.

A sufficient area of steel is provided in the cross wires of *Triangle Mesh Reinforcement* to prevent temperature cracks, thereby eliminating the necessity of laying additional reinforcement at right angles to the longitudinal or tension members.

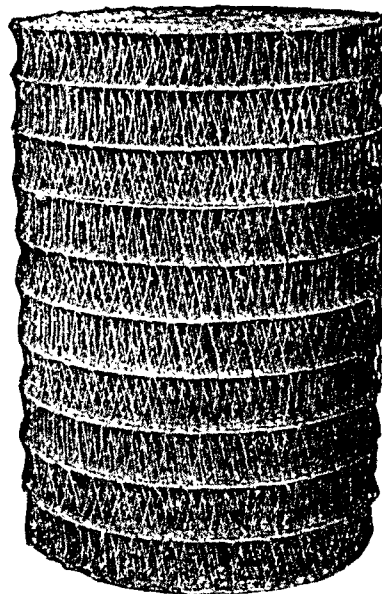
EXHIBIT C-163 (continued):



4-inch Triangle Mesh. Patents Applied for.
Concrete Reinforcement.



4-inch Mesh.



2-inch Mesh.

Triangle Mesh Wire Reinforcement. Made in 150, 300 and 600-ft.
lengths. and in 18", 22", 26", 30", 34", 38", 42", 46", 50", 54"
and 58" widths.

EXHIBIT C-163 (continued):

LONGITUDINALS SPACED 4-INCH CENTERS.

CROSS WIRES SPACED 4-INCH CENTERS.

Number and Gauge of Wires, Areas Per Foot Width and Weights
Per 100 Square Feet.

Styles Marked * Usually Carried in Stock.

| Style Number | No. of Wires Each Long | Gauge of Wire Each Long | Gauge of Cross Wires | Sectional Area Long. Sq. In. | Sectional Area Cross Wires | Cross Sectional Area per Ft. Width | Approximate Weight per 100 Sq. Ft. |
|--------------|------------------------|-------------------------|----------------------|------------------------------|----------------------------|------------------------------------|------------------------------------|
| * 4..... | 1 | 6 | 14 | .087 | .025 | .102 | 43 |
| 5..... | 1 | 8 | 14 | .062 | .025 | .077 | 34 |
| 6..... | 1 | 10 | 14 | .043 | .025 | .058 | 27 |
| * 7..... | 1 | 12 | 14 | .026 | .025 | .041 | 21 |
| *23..... | 1 | 4" | 12½ | .147 | .038 | .170 | 72 |
| 24..... | 1 | 4 | 12½ | .119 | .038 | .142 | 62 |
| 25..... | 1 | 5 | 12½ | .101 | .038 | .124 | 55 |
| *26..... | 1 | 6 | 12½ | .087 | .038 | .110 | 50 |
| *27..... | 1 | 8 | 12½ | .062 | .038 | .085 | 41 |
| 28..... | 1 | 10 | 12½ | .043 | .038 | .066 | 34 |
| 29..... | 1 | 12 | 12½ | .026 | .038 | .049 | 28 |
| 31..... | 2 | 4 | 12½ | .238 | .038 | .261 | 106 |
| 32..... | 2 | 5 | 12½ | .202 | .038 | .225 | 92 |
| 33..... | 2 | 6 | 12½ | .174 | .038 | .196 | 82 |
| 34..... | 2 | 8 | 12½ | .124 | .038 | .146 | 63 |
| 35..... | 2 | 10 | 12½ | .086 | .038 | .109 | 50 |
| 36..... | 2 | 12 | 12½ | .052 | .038 | .075 | 37 |
| *38..... | 3 | 4 | 12½ | .358 | .038 | .380 | 151 |
| 39..... | 3 | 5 | 12½ | .303 | .038 | .325 | 130 |
| 40..... | 3 | 6 | 12½ | .260 | .038 | .282 | 114 |
| 41..... | 3 | 8 | 12½ | .185 | .038 | .208 | 87 |
| *42..... | 3 | 10 | 12½ | .129 | .038 | .151 | 66 |
| 43..... | 3 | 12 | 12½ | .078 | .038 | .101 | 47 |

Special Sizes on Application.

LENGTH OF ROLLS: 150-ft., 300-ft. and 600-ft.

WIDTHS: 18-in., 22-in., 26-in., 30-in., 34-in., 38-in., 42-in.,
46-in., 50-in., 54-in. and 58-in.

EXHIBIT C-163 (continued):

LONGITUDINAL SPACED 4-INCH CENTERS.

CROSS WIRES SPACED 2-INCH CENTERS.

Number and Gauge of Wires, Areas Per Foot Width and Weights
Per 100 Square Feet.

Styles Marked * Usually Carried in Stock.

| Style Number | No. of Wires Each Long. | Gauge of Wire Each Long. | Gauge of Cross Wires. | Sectional Area Long. Sq. In. | Sectional Area Cross Wires. Sq. In. | Cross Sec- tional Area Per Width. | Approximate Weight per 100 Sq. Ft. |
|--------------|----------------------------|-------------------------------|--------------------------------|---------------------------------|---|--|--|
| 4-A.... | 1 | 6 | 14 | .087 | .050 | .102 | 53 |
| 5-A.... | 1 | 8 | 14 | .062 | .050 | .077 | 44 |
| 6-A.... | 1 | 10 | 14 | .043 | .050 | .058 | 37 |
| * 7-A.... | 1 | 12 | 14 | .026 | .050 | .041 | 31 |
| 23-A.... | 1 | 4 ¹ / ₂ | 12 ¹ / ₂ | .147 | .076 | .170 | 86 |
| 24-A.... | 1 | 4 | 12 ¹ / ₂ | .119 | .076 | .142 | 76 |
| 25-A.... | 1 | 5 | 12 ¹ / ₂ | .101 | .076 | .124 | 70 |
| 26-A.... | 1 | 6 | 12 ¹ / ₂ | .087 | .076 | .110 | 64 |
| 27-A.... | 1 | 8 | 12 ¹ / ₂ | .062 | .076 | .085 | 55 |
| * 28-A.... | 1 | 10 | 12 ¹ / ₂ | .043 | .076 | .066 | 48 |
| 29-A.... | 1 | 12 | 12 ¹ / ₂ | .026 | .076 | .049 | 42 |
| 31-A.... | 2 | 4 | 12 ¹ / ₂ | .238 | .076 | .261 | 120 |
| 32-A.... | 2 | 5 | 12 ¹ / ₂ | .202 | .076 | .225 | 107 |
| 33-A.... | 2 | 6 | 12 ¹ / ₂ | .174 | .076 | .196 | 97 |
| 34-A.... | 2 | 8 | 12 ¹ / ₂ | .124 | .076 | .146 | 78 |
| 35-A.... | 2 | 10 | 12 ¹ / ₂ | .086 | .076 | .109 | 64 |
| 36-A.... | 2 | 12 | 12 ¹ / ₂ | .052 | .076 | .075 | 52 |
| 38-A.... | 3 | 4 | 12 ¹ / ₂ | .358 | .076 | .380 | 165 |
| 39-A.... | 3 | 5 | 12 ¹ / ₂ | .303 | .076 | .325 | 145 |
| 40-A.... | 3 | 6 | 12 ¹ / ₂ | .260 | .076 | .283 | 129 |
| 41-A.... | 3 | 8 | 12 ¹ / ₂ | .185 | .076 | .208 | 101 |
| 42-A.... | 3 | 10 | 12 ¹ / ₂ | .129 | .076 | .151 | 81 |
| 43-A.... | 3 | 12 | 12 ¹ / ₂ | .078 | .076 | .101 | 62 |

Special Sizes on Application.

LENGTH OF ROLLS: 150-ft., 300-ft. and 600-ft.

WIDTHS: 18-in., 22-in., 26-in., 30-in., 34-in., 38-in., 42-in.,
46-in., 50-in., 54-in. and 58-in.

EXHIBIT C-163 (continued):

**Table Giving Areas in Square Feet Per Roll of
TRIANGLE MESH REINFORCEMENT.**

| Width of Roll in Inches. | Square Feet of Reinforcement in Roll. | | |
|-----------------------------|---------------------------------------|---------------|---------------|
| | 150 ft. roll. | 300 ft. roll. | 600 ft. roll. |
| 18 | 225 | 450 | 900 |
| 22 | 275 | 550 | 1100 |
| 26 | 325 | 650 | 1300 |
| 30 | 375 | 750 | 1500 |
| 34 | 425 | 850 | 1700 |
| 38 | 475 | 950 | 1900 |
| 42 | 525 | 1050 | 2100 |
| 46 | 575 | 1150 | 2300 |
| 50 | 625 | 1250 | 2500 |
| 54 | 675 | 1350 | 2700 |
| 58 | 725 | 1450 | 2900 |

As indicated in the above table, Triangle Mesh Reinforcement is made up in the following widths: 18, 22, 26, 30, 34, 38, 42, 46, 50, 54 and 58 inches, and in standards lengths of rolls of 150, 300 and 600 feet.

For the lighter styles, rolls of any of the above lengths may be used. Material of medium weights are recommended to be used in 150 or 300 foot lengths, while with the heaviest styles it is more conveniently handled in rolls containing 150 foot lengths.

EXHIBIT C-163 (continued):

**AMERICAN STEEL & WIRE CO.'S STEEL AND IRON WIRE
GAUGE AND DIFFERENT SIZES OF WIRE.**

| Diameter Inches. | A. S. & W. Gauge | Diameter Inches. | Area, Sq. Inches. | Pounds per Foot. | Pounds per Mile | Feet per Pound. | Feet per 2,000 Lbs. |
|---------------------|---------------------|---------------------|----------------------|---------------------|--------------------|--------------------|------------------------|
| 1/2 | 4 | .500 | .19635 | .6625 | 3498.00 | 1.50 | 3018 |
| 1/2 | | .490 | .18857 | .6363 | 3359.66 | 1.51 | 3023 |
| 1/2 | 3 | .468 | .17202 | .5804 | 3064.51 | 1.72 | 3445 |
| 1/2 | | .460 | .16619 | .5608 | 2961.02 | 1.78 | 3566 |
| 1/2 | 2 | .437 | .14998 | .5061 | 2672.21 | 1.97 | 3952 |
| 1/2 | | .430 | .14532 | .4901 | 2587.72 | 2.04 | 4081 |
| 1/2 | 1 | .406 | .12946 | .4368 | 2306.30 | 2.28 | 4578 |
| 1/2 | | .393 | .12130 | .4094 | 2161.63 | 2.44 | 4885 |
| 1/2 | 3/4 | .375 | .11044 | .3726 | 1967.33 | 2.68 | 5367 |
| 1/2 | | .362 | .10292 | .3473 | 1833.74 | 2.87 | 5758 |
| 1/2 | 1/2 | .343 | .09240 | .3117 | 1645.78 | 3.20 | 6412 |
| 1/2 | | .331 | .08604 | .2904 | 1533.31 | 3.44 | 6887 |
| 1/2 | 1/4 | .312 | .07645 | .2579 | 1361.71 | 3.87 | 7755 |
| 1/2 | | .307 | .07402 | .2497 | 1318.41 | 4.00 | 8011 |
| 1/2 | 1/8 | .283 | .06290 | .2123 | 1120.94 | 4.71 | 9420 |
| 1/2 | | .281 | .06210 | .2092 | 1104.57 | 4.78 | 9560 |
| 1/2 | 1/16 | .263 | .05432 | .1834 | 968.35 | 5.45 | 10905 |
| 1/2 | | .250 | .04908 | .1656 | 874.36 | 6.03 | 12077 |
| 1/2 | 1/32 | .244 | .04675 | .1578 | 733.18 | 6.33 | 12674 |
| 1/2 | | .225 | .03976 | .1342 | 708.57 | 7.45 | 14903 |
| 1/2 | 1/64 | .218 | .03732 | .1259 | 664.75 | 7.94 | 15885 |
| 1/2 | | .207 | .03365 | .1135 | 559.28 | 8.81 | 17621 |
| 1/2 | 1/128 | .192 | .02895 | .0977 | 515.85 | 10.23 | 20471 |
| 1/2 | | .187 | .02746 | .0926 | 488.92 | 10.79 | 21598 |
| 1/2 | 1/256 | .177 | .02460 | .0830 | 438.24 | 12.04 | 24096 |
| 1/2 | | .162 | .02061 | .0696 | 367.48 | 14.36 | 28735 |
| 1/2 | 1/512 | .156 | .01911 | .0644 | 340.03 | 15.52 | 31056 |
| 1/2 | | .148 | .01720 | .0580 | 306.24 | 17.24 | 34482 |
| 1/2 | 1/1024 | .135 | .01431 | .0483 | 255.02 | 20.70 | 41408 |
| 1/2 | | .125 | .01227 | .0414 | 218.59 | 24.15 | 48309 |
| 1/2 | 1/2048 | .120 | .01130 | .0382 | 201.69 | 26.17 | 52356 |
| 1/2 | | .105 | .00865 | .0292 | 154.17 | 34.24 | 68493 |
| 1/2 | 1/4096 | .093 | .00679 | .0229 | 120.91 | 43.66 | 87336 |
| 1/2 | | .092 | .00664 | .0224 | 118.27 | 44.64 | 89286 |
| 1/2 | 1/8192 | .080 | .00502 | .0169 | 89.23 | 59.17 | 118343 |
| 1/2 | | .072 | .00407 | .0137 | 72.33 | 72.99 | 145985 |
| 1/2 | 1/16384 | .063 | .00311 | .0105 | 55.44 | 95.23 | 190476 |

EXHIBIT C-163 (continued):

COMPARATIVE SIZES WIRE GAUGE IN DECIMALS OF AN INCH.

| No. of Wire Gauge. | American Steel & Wire Co. | American Standard (B. & S.) | Birmingham or Stub's. | British Imperial Standard.* | Old English or London. | French. |
|--------------------|---------------------------|-----------------------------|-----------------------|-----------------------------|------------------------|---------|
| 0000000 | .4900 | ..... | .... | .500 | ..... | .... |
| 000000 | .4615 | .58000 | .... | .464 | ..... | .... |
| 00000 | .4305 | .51650 | .500 | .432 | ..... | .... |
| 0000 | .3938 | .46000 | .454 | .400 | .4540 | .... |
| 000 | .3625 | .40664 | .425 | .372 | .4250 | .... |
| 00 | .3310 | .36480 | .380 | .348 | .3800 | .... |
| 0 | .3065 | .32486 | .340 | .324 | .3400 | .... |
| 1 | .2830 | .28930 | .300 | .300 | .3000 | .0325 |
| 2 | .2625 | .25763 | .284 | .276 | .2840 | .040 |
| 3 | .2437 | .22942 | .259 | .252 | .2590 | .050 |
| 4 | .2253 | .20431 | .238 | .232 | .2380 | .0625 |
| 5 | .2070 | .18194 | .220 | .212 | .2200 | .068 |
| 6 | .1920 | .16202 | .203 | .192 | .2030 | .083 |
| 7 | .1770 | .14428 | .180 | .176 | .1800 | .097 |
| 8 | .1620 | .12849 | .165 | .160 | .1650 | .110 |
| 9 | .1483 | .11443 | .148 | .144 | .1480 | .120 |
| 10 | .1350 | .10189 | .134 | .128 | .1340 | .135 |
| 11 | .1205 | .09074 | .120 | .116 | .1200 | .149 |
| 12 | .1055 | .08081 | .109 | .104 | .1090 | .162 |
| 13 | .0915 | .07196 | .095 | .092 | .0950 | .172 |
| 14 | .0800 | .06408 | .083 | .080 | .0830 | .185 |
| 15 | .0720 | .05706 | .072 | .072 | .0720 | .197 |
| 16 | .0625 | .05082 | .065 | .064 | .0650 | .212 |
| 17 | .0540 | .04525 | .058 | .056 | .0580 | .225 |
| 18 | .0475 | .04030 | .049 | .048 | .0490 | .238 |
| 19 | .0410 | .03539 | .042 | .040 | .0400 | .250 |
| 20 | .0348 | .03196 | .035 | .036 | .0350 | .263 |
| 21 | .0317 | .02846 | .032 | .032 | .0315 | .279 |
| 22 | .0286 | .02535 | .028 | .028 | .0295 | .290 |
| 23 | .0258 | .02257 | .025 | .024 | .0270 | .303 |
| 24 | .0230 | .02010 | .022 | .022 | .0250 | .316 |
| 25 | .0204 | .01790 | .020 | .020 | .0230 | .331 |
| 26 | .0181 | .01694 | .018 | .018 | .0205 | .342 |
| 27 | .0173 | .01420 | .016 | .0164 | .01875 | .356 |
| 28 | .0162 | .01264 | .014 | .0148 | .01650 | .371 |
| 29 | .0150 | .01126 | .013 | .0136 | .01550 | .383 |
| 30 | .0140 | .01003 | .012 | .0124 | .01375 | .394 |
| 31 | .0132 | .00893 | .010 | .0116 | .01225 | .408 |
| 32 | .0128 | .00795 | .009 | .0108 | .01125 | .419 |
| 33 | .0118 | .00708 | .008 | .0100 | .01025 | .431 |
| 34 | .0104 | .00630 | .007 | .0092 | .00950 | .448 |
| 35 | .0095 | .00561 | .005 | .0084 | .00900 | .458 |
| 36 | .0090 | .00500 | .004 | .0076 | .00750 | .472 |
| 37 | .0085 | .00445 | .... | .0068 | .00650 | .485 |
| 38 | .0080 | .00396 | .... | .0060 | .00575 | .499 |
| 39 | .0075 | .00353 | .... | .0052 | .00500 | .509 |
| 40 | .0070 | .00314 | .... | .0048 | .00450 | .524 |

* Also called New British or English Legal Standard.

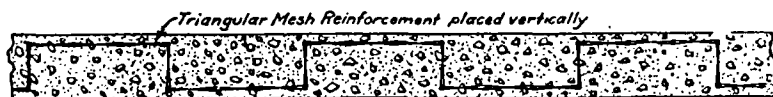
EXHIBIT C-163 (continued):

**WEIGHTS AND AREAS OF SQUARE AND ROUND BARS
AND CIRCUMFERENCES OF ROUND BARS.**

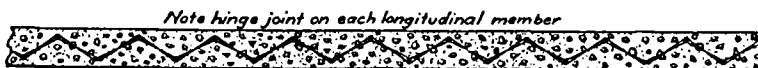
One Cubic Foot of Steel Weighing 489.6 Lbs.

| Thickness or Diameter in Inches. | Weight of Square Bar, 1 ft. Long. | Weight of Round Bar, 1 ft. Long. | Area of Square Bar in Square Inches. | Area of Round Bar in Square Inches. | Circumference of Round Bar in Inches. |
|--|---|--|--|---|---|
| 0 | | | | | |
| $\frac{1}{16}$ | .013 | .010 | .0039 | .0031 | .1963 |
| $\frac{1}{8}$ | .053 | .042 | .0156 | .0123 | .3927 |
| $\frac{3}{16}$ | .119 | .094 | .0352 | .0276 | .5890 |
| $\frac{1}{4}$ | .212 | .167 | .0625 | .0491 | .7854 |
| $\frac{5}{16}$ | .333 | .261 | .0977 | .0767 | .9817 |
| $\frac{3}{8}$ | .478 | .375 | .1406 | .1104 | 1.1781 |
| $\frac{7}{16}$ | .651 | .511 | .1914 | .1503 | 1.3744 |
| $\frac{1}{2}$ | .850 | .667 | .2500 | .1963 | 1.5708 |
| $\frac{9}{16}$ | 1.076 | .845 | .3164 | .2485 | 1.7671 |
| $\frac{5}{8}$ | 1.328 | 1.043 | .3906 | .3068 | 1.9635 |
| $\frac{11}{16}$ | 1.608 | 1.262 | .4727 | .3712 | 2.1598 |
| $\frac{3}{4}$ | 1.913 | 1.502 | .5625 | .4418 | 2.3562 |
| $\frac{13}{16}$ | 2.245 | 1.763 | .6602 | .5185 | 2.5525 |
| $\frac{7}{8}$ | 2.603 | 2.044 | .7656 | .6013 | 2.7489 |
| $\frac{15}{16}$ | 2.989 | 2.347 | .8789 | .6903 | 2.9452 |
| 1 | 3.400 | 2.670 | 1.0000 | .7854 | 3.1416 |
| $1\frac{1}{16}$ | 3.838 | 3.014 | 1.1289 | .8866 | 3.3379 |
| $1\frac{1}{8}$ | 4.303 | 3.379 | 1.2656 | .9940 | 3.5343 |
| $1\frac{3}{16}$ | 4.795 | 3.766 | 1.4102 | 1.1075 | 3.7306 |
| $1\frac{1}{4}$ | 5.312 | 4.173 | 1.5625 | 1.2272 | 3.9270 |
| $1\frac{5}{16}$ | 5.857 | 4.600 | 1.7227 | 1.3530 | 4.1233 |
| $1\frac{3}{8}$ | 6.428 | 5.049 | 1.8906 | 1.4849 | 4.3197 |
| $1\frac{7}{16}$ | 7.026 | 5.518 | 2.0664 | 1.6230 | 4.5160 |
| $1\frac{1}{2}$ | 7.650 | 6.008 | 2.2500 | 1.7671 | 4.7124 |
| $1\frac{9}{16}$ | 8.301 | 6.520 | 2.4414 | 1.9175 | 4.9087 |
| $1\frac{5}{8}$ | 8.978 | 7.051 | 2.6406 | 2.0739 | 5.1051 |
| $1\frac{11}{16}$ | 9.682 | 7.604 | 2.8477 | 2.2365 | 5.3014 |
| $1\frac{3}{4}$ | 10.41 | 8.178 | 3.0625 | 2.4053 | 5.4978 |
| $1\frac{13}{16}$ | 11.17 | 8.773 | 3.2852 | 2.5802 | 5.6941 |
| $1\frac{7}{8}$ | 11.95 | 9.388 | 3.5156 | 2.7612 | 5.8905 |
| $1\frac{15}{16}$ | 12.76 | 10.02 | 3.7539 | 2.9483 | 6.0868 |

EXHIBIT C-163 (continued):



Wall



Wall

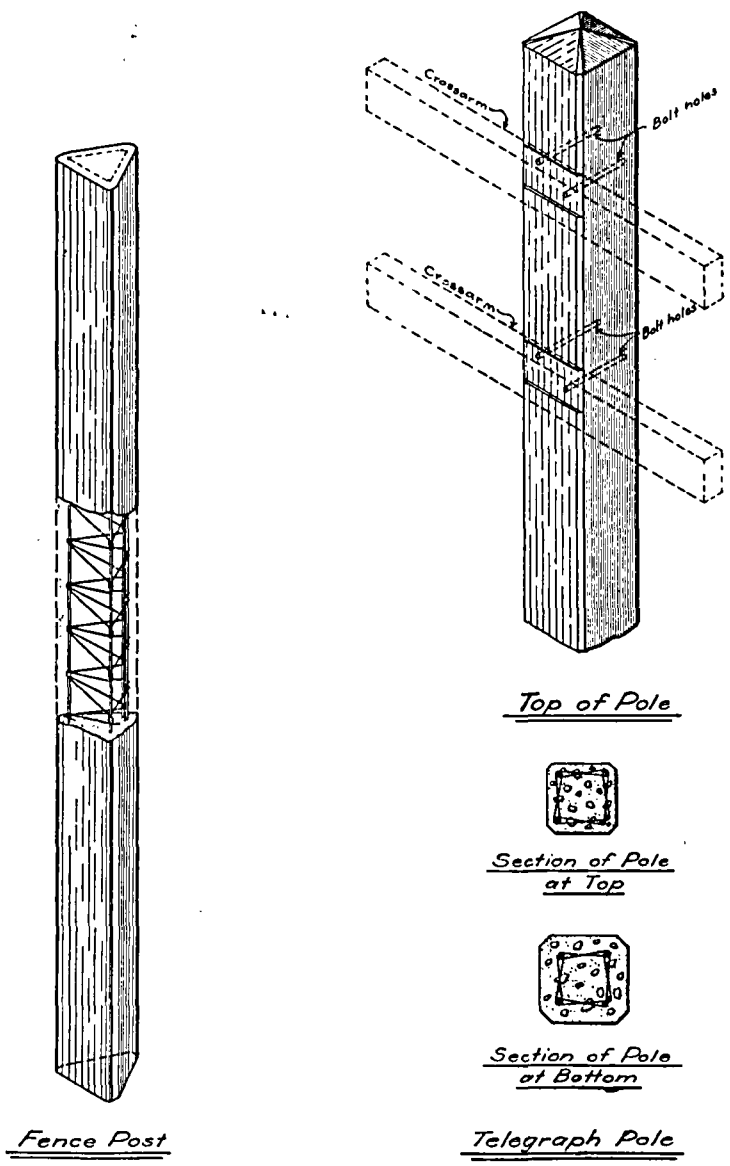


Wall with Pilaster



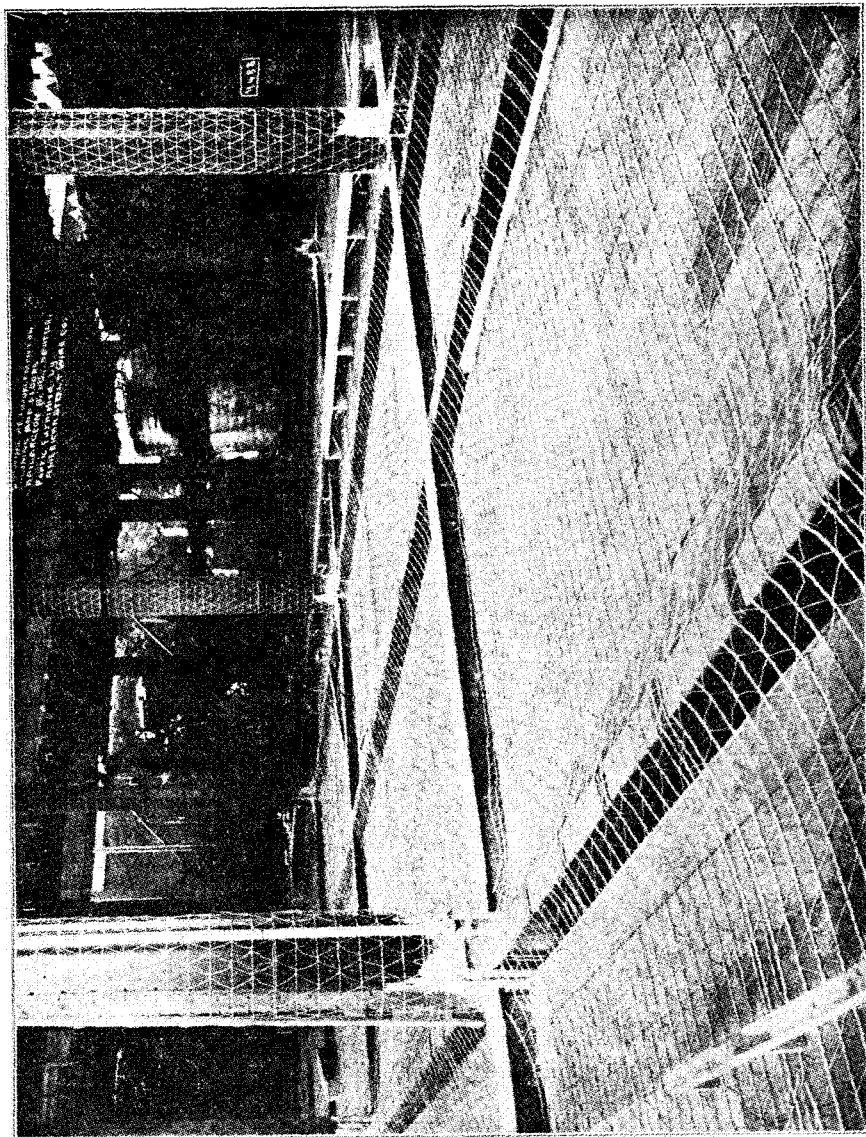
Plaster Partition Wall

EXHIBIT C-163 (continued):



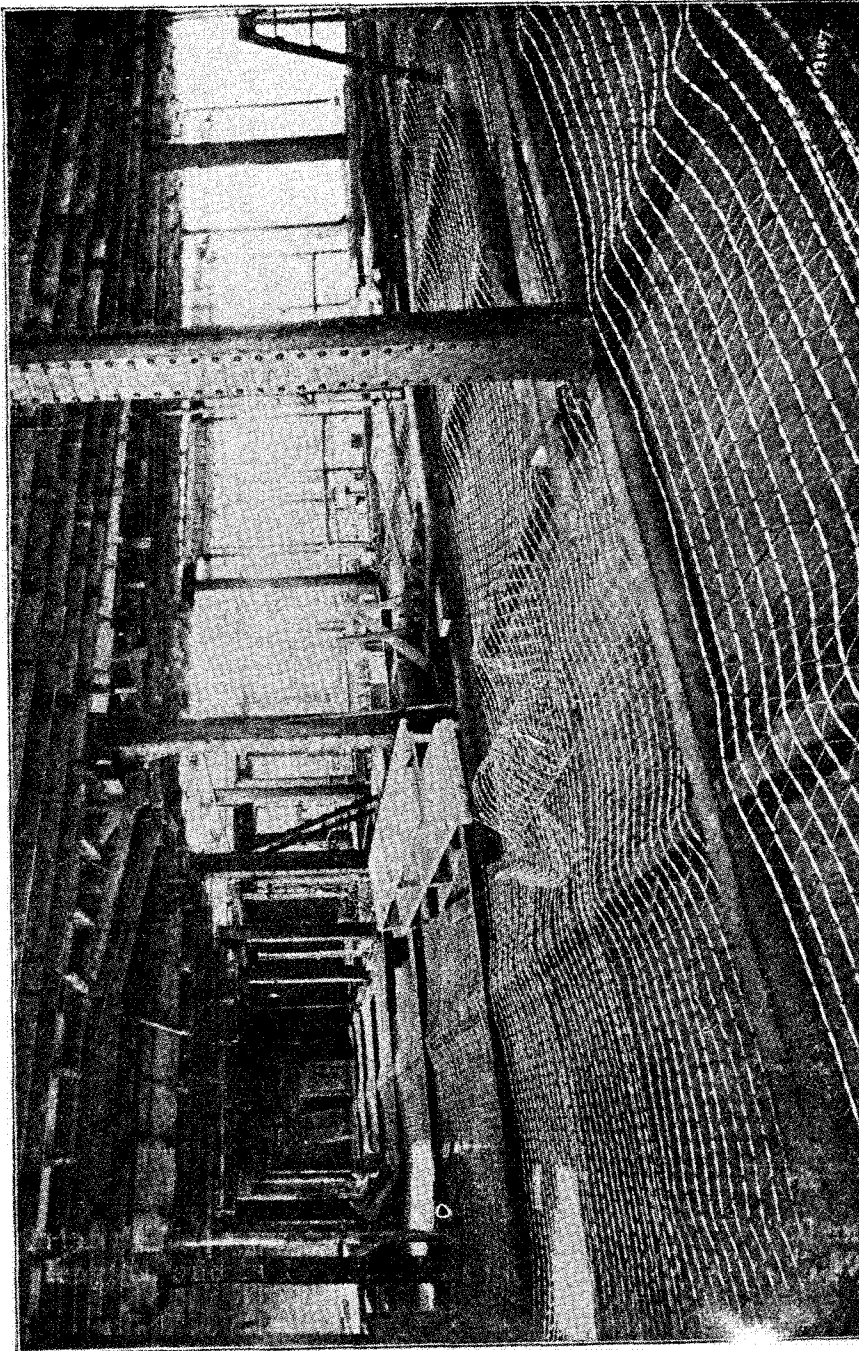
Reinforced with 2 inch Triangle Mesh Reinforcement

EXHIBIT C-163 (continued) :



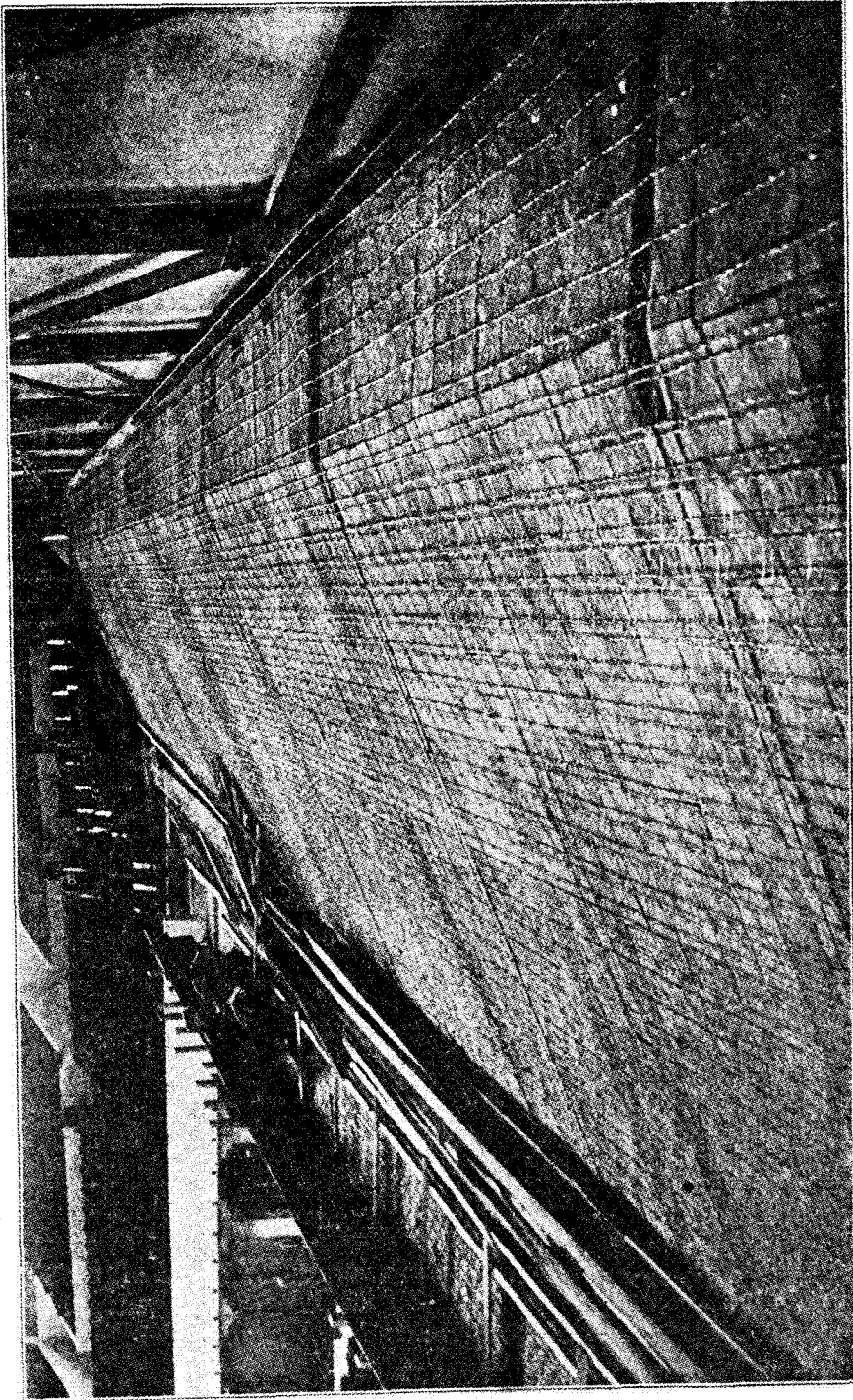
Showing Construction Used in Ballargeon Building, Seattle, Wash.
American Steel & Wire Co.'s Triangle Mesh Reinforcement.

EXHIBIT C-163 (continued):



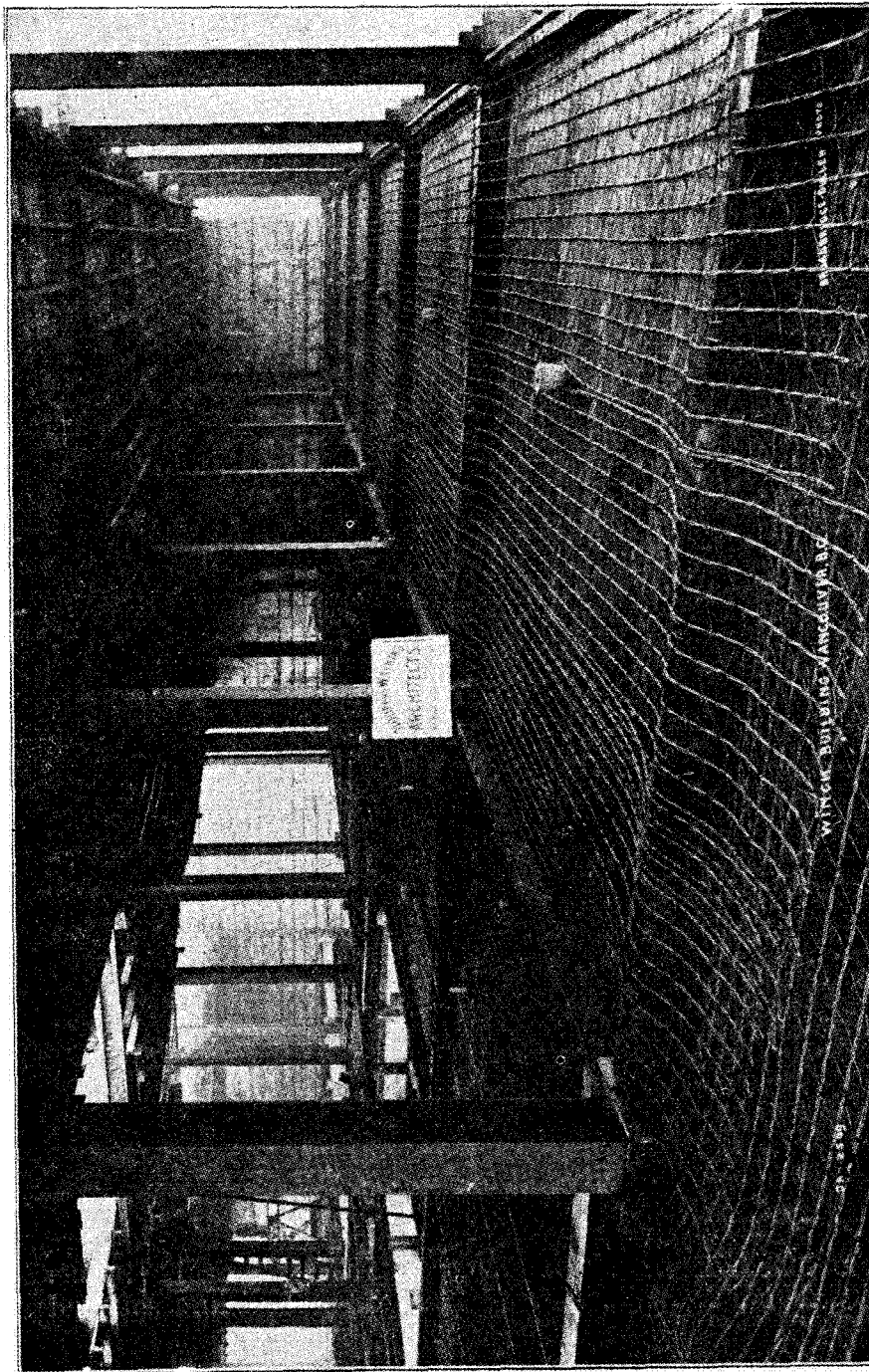
Henry Building, Seattle, Wash.
Erected for Metropolitan Bldg. Co. by Stone & Webster Engr. Corporation.
Howell & Stocks, Supervising Architects.

EXHIBIT C-163 (continued):



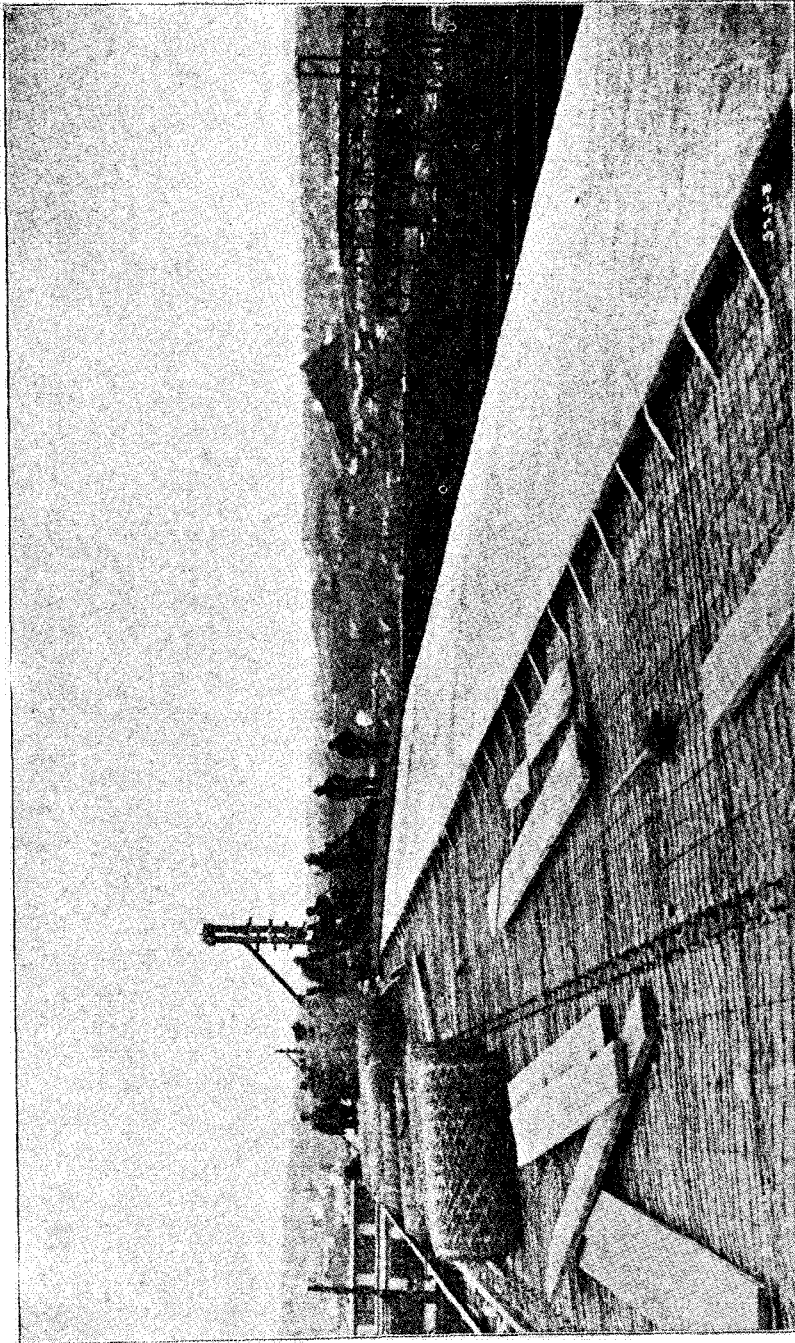
Denver Auditorium, Denver, Colo.
Showing American Steel & Wire Co.'s Triangle Mesh Reinforcement as Used in Balcony Floors.

EXHIBIT C-163 (continued):



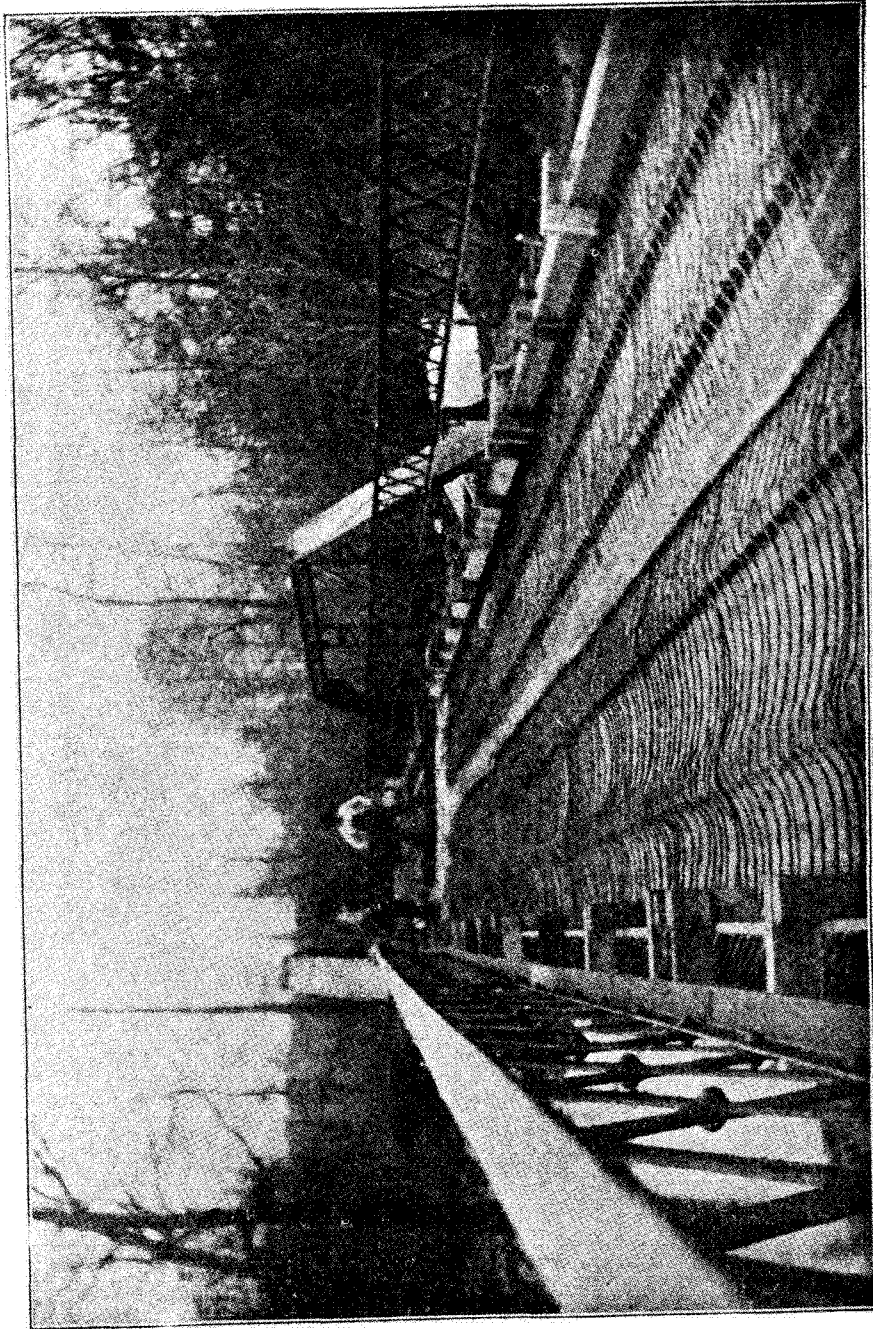
Winch Building, Vancouver, British Columbia.
Hooper & Watkins, Architects.

EXHIBIT C-163 (continued):



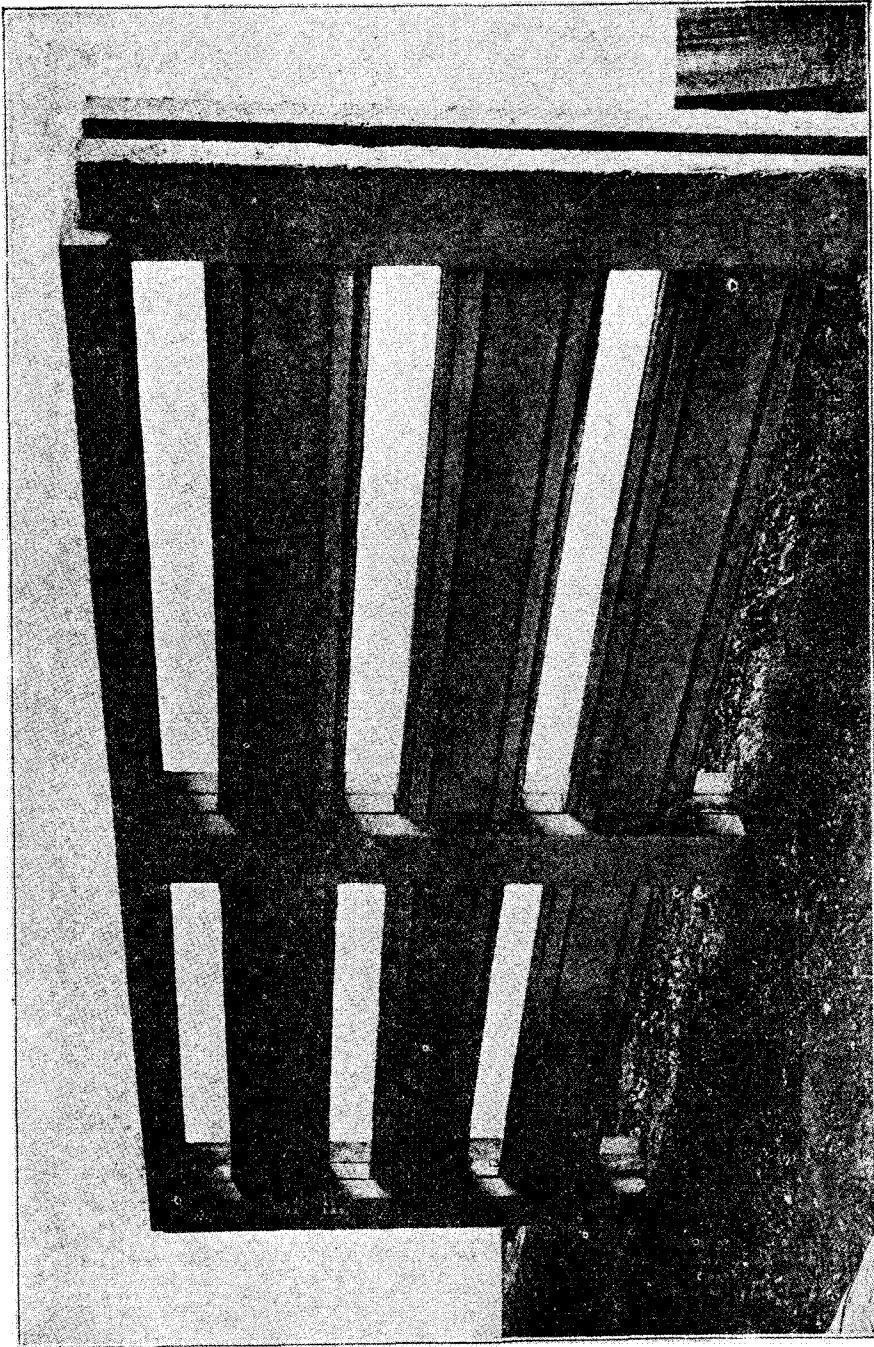
Showing Triangle Mesh Reinforcement as Used in the Roof of the
D. L. & W. Repair Shop, Scranton, Pa.

EXHIBIT C-163 (continued) :



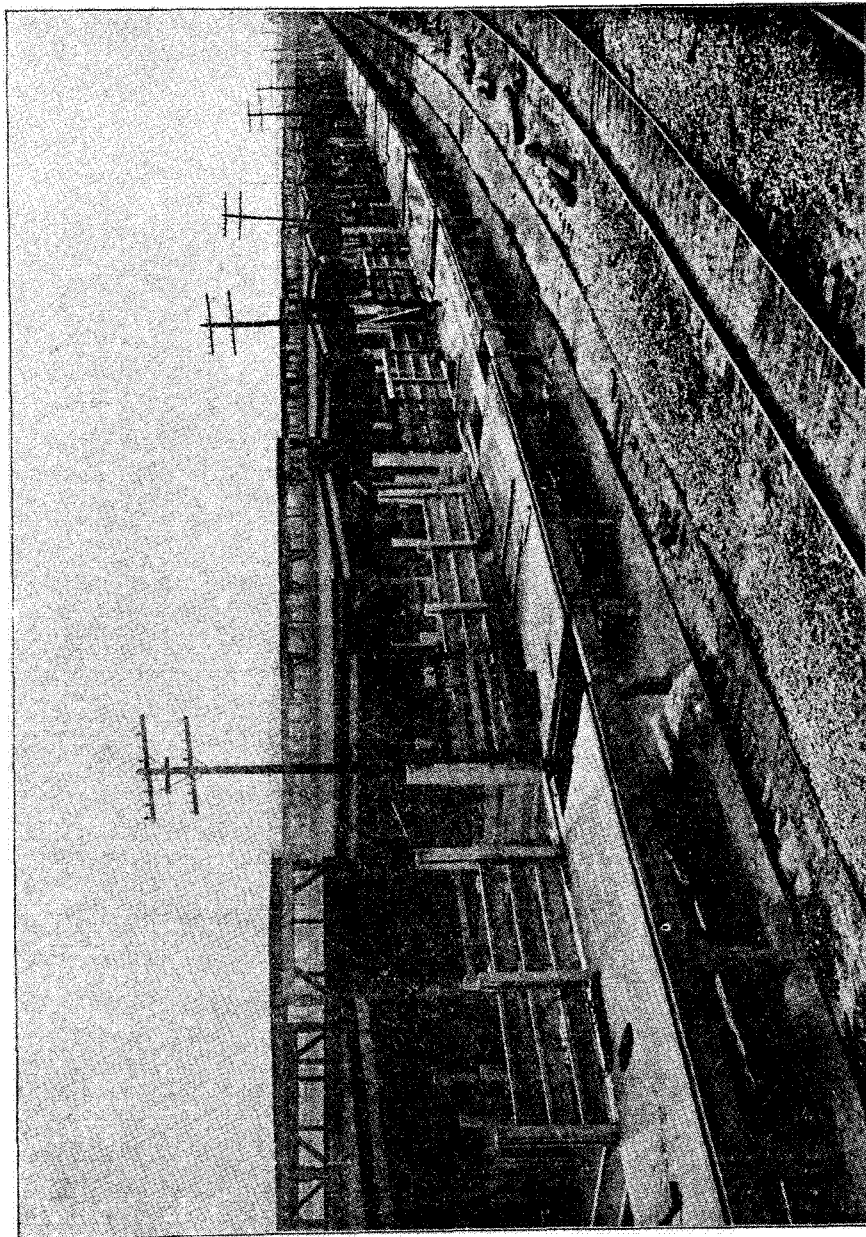
Showing Triangle Mesh Reinforcement as Used in Reinforced
Concrete Highway-Bridge Floors.

EXHIBIT C-163 (continued):



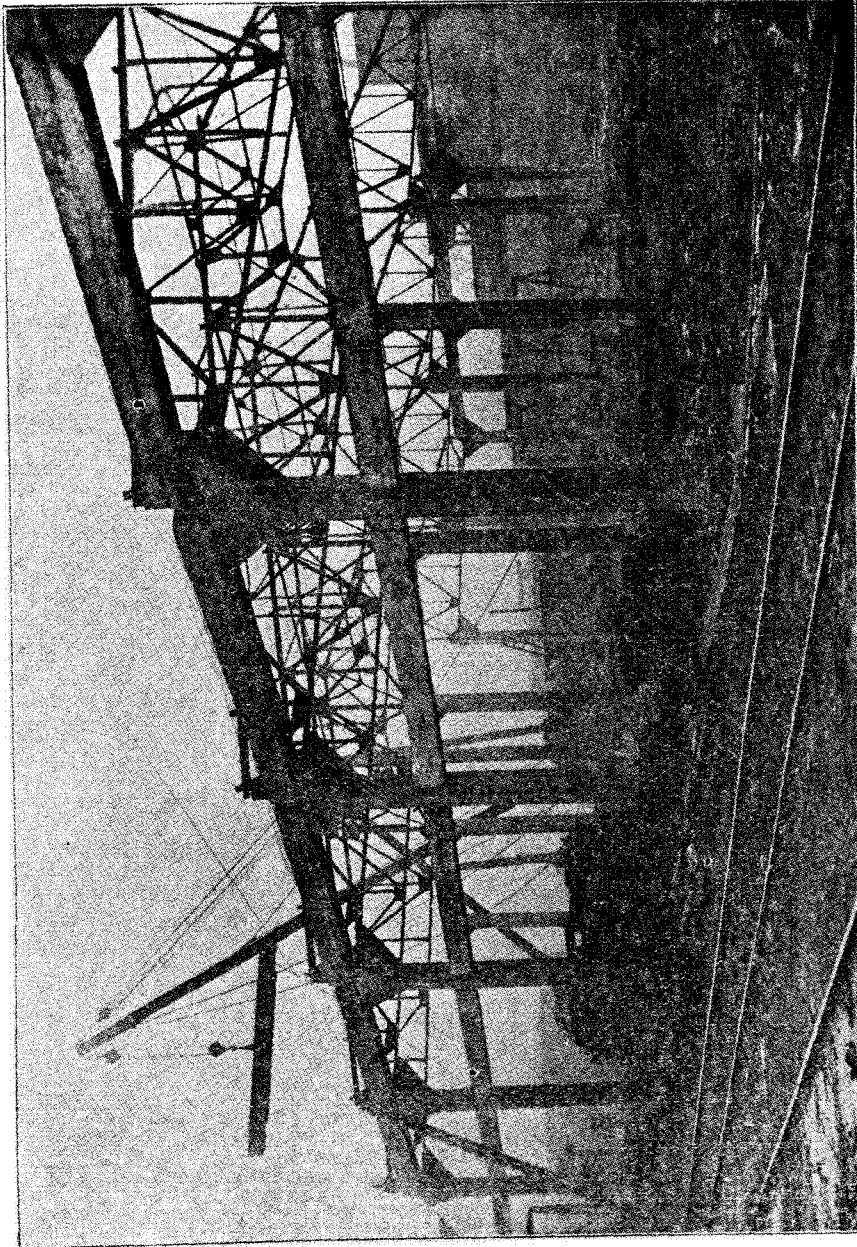
Reinforced Concrete Fences, Used by Union Stock Yard & Transit Co., Chicago.
Reinforced with American Steel & Wire Co.'s Triangle Mesh.

EXHIBIT C-163 (continued) :



Reinforced Concrete Unloading Platform at Union Stock Yard & Transit Co., Chicago.
Piece Construction Reinforced with American Steel & Wire Co.'s Triangle Mesh.

EXHIBIT C-163 (*continued*):



Showing Reinforced Concrete Piece Constructed Columns and Girders,
Being Erected in Place by Union Stock Yard & Transit Co., Chicago.
American Steel & Wire Co.'s Triangle Mesh Used.

EXHIBIT C-163 (*continued*):

TEST No. 60

PRINTED REPORT No. 9

REPORT

10

of a

FIRE, LOAD and WATER
TEST

Made upon a

20

TRIANGULAR REINFORCED CONCRETE
FLOOR SYSTEM

Constructed by

AMERICAN STEEL AND WIRE COMPANY

At the

30

FIRE TESTING STATION
Columbia University, New York City

Test conducted by

IRA H. WOOLSON, E. M.

Adjunct Professor of Civil Engineering

40

In co-operation with

THE CITY BUILDING BUREAUS

New York, March 5, 1908

EXHIBIT C-163 (continued):

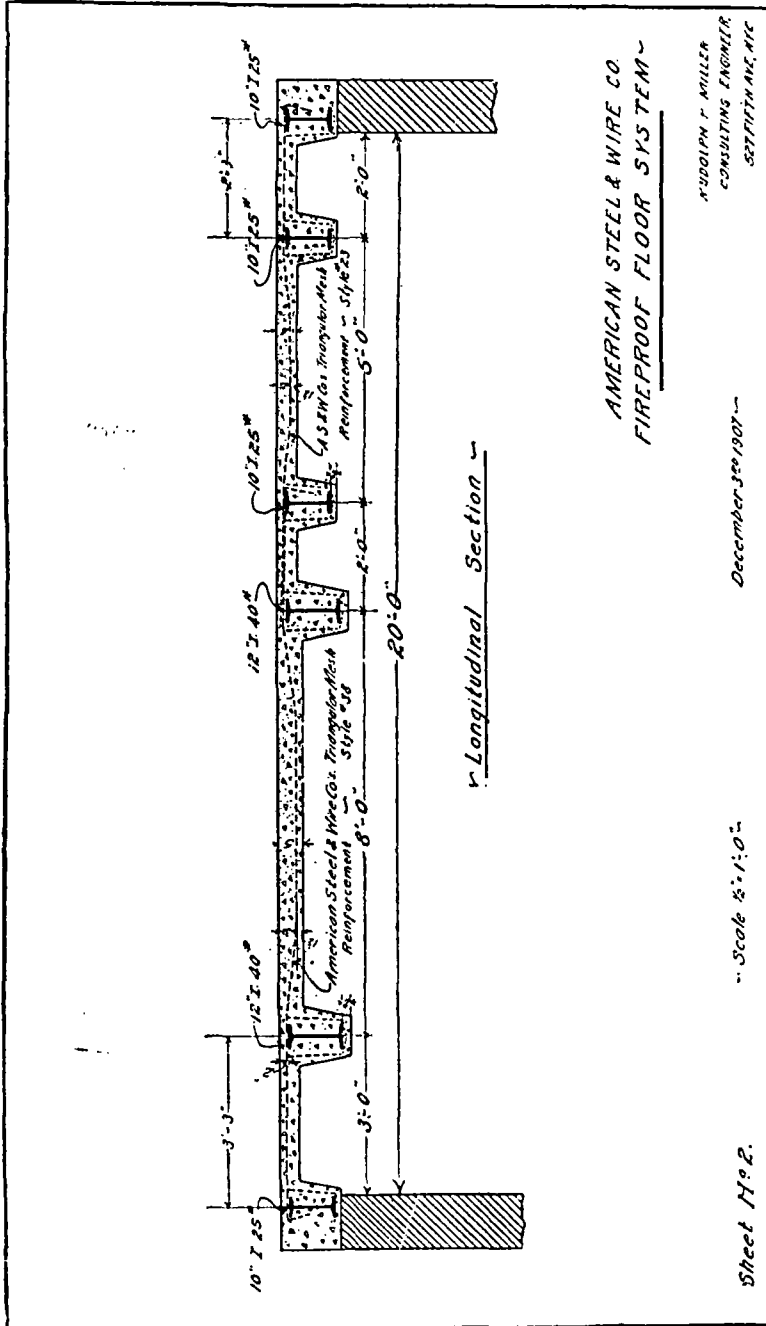


EXHIBIT C-163 (continued):

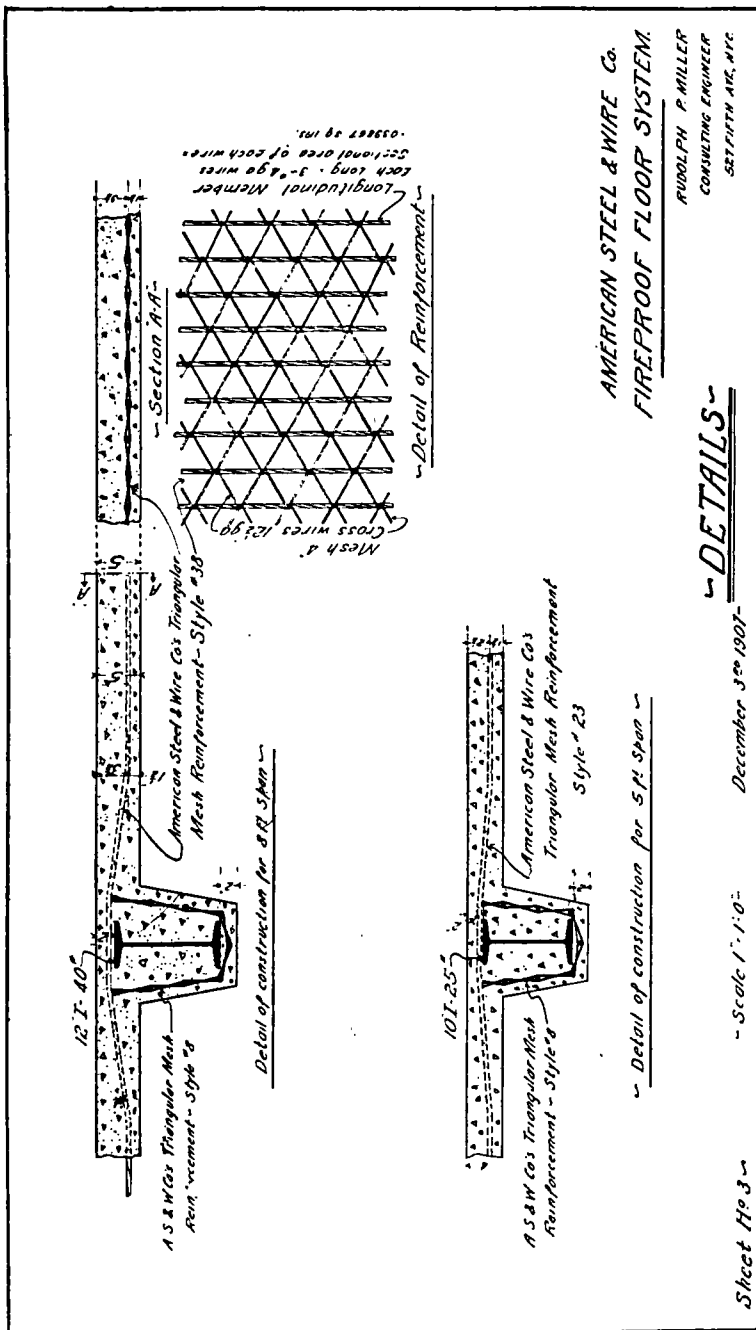


EXHIBIT C-163 (*continued*):

METHOD OF CONSTRUCTION.

The test was conducted in test house No. 2, which is a reinforced cinder concrete structure 14' x 20' on the inside. It is supplied with six suitable chimneys at the top and draft openings thru the wall at the bottom. The fire grate is located 2' — 6" above the ground level.

The floor construction under test formed the temporary roof of the test house. The under side or ceiling being 9' — 6" above the grate.

Two types of floor arches were tested, one with a span of eight feet and the other a span of five feet.

The eight foot span occupied the south side of the test chamber and was made of cinder concrete five inches thick, reinforced with the metal fabric of the American Steel & Wire Company, known as Style No. 38. The disposition of which is indicated in the attached blueprints and photograph No. 1. This metal fabric consisted of three twisted strands of No. 4 steel wire, spaced and secured every four inches by No. 12½ diagonal steel cross wire.

The five-foot span occupied the north side of the test chamber and was made of cinder concrete four inches thick, reinforced with American Steel & Wire Company's fabric, Style No. 23. The metal fabric in this span consisted of one strand of one-quarter-inch steel wire, spaced and secured every four inches by diagonal wires the same as in the fabric of the eight-foot span. The character of this fabric can be seen in the middle of photo No. 1, where it laps over the two central beams. The fabric in the spans was placed 1½ inches above the bottom surface of the concrete.

The eight-foot span was supported by 12" — 40# I beams, and the five-foot span by 10" — 25# I beams. These beams were protected by two inches of concrete below the bottom flange of the beams, and one and one-half inches of concrete at each side of the lower flanges.

The concrete was held in place by American Steel & Wire Company's fabric, Style No. 8, consisting of one strand of No. 12½ wire secured in every four inches by No. 14 diagonal cross wires.

EXHIBIT C-163 (*continued*):

The concrete used in the construction was a 1-2-5 mixture of Portland Cement, clean sharp sand, and boiler cinders.

Specimen blocks of this mixture were made at the time that the material was being placed, and were tested for strength when about eleven weeks old. They gave an average value of 1,000 lbs. per sq. inch.

10 Full details of the construction are given in the attached drawings and photographs.

The five-foot span was put in place December 18, 1907, and the eight-foot span on January 25, 1908. The former was therefore about eleven weeks old, and the latter six weeks at test.

Owing to the fact that it was stormy and freezing weather most of the period the concrete was setting, a salamander was kept burning in the test building the greater portion of the time.

20 *Purpose of the Test.*

The purpose of the test was to determine the effect of a continuous fire below the floor for four hours at an average temperature of 1700° F., the floor carrying at the same time a distributed load of 150 lbs. per sq. ft.; at the end of the four hours the under side of the floor (or ceiling) while still red hot to be subjected to a 1½" stream of cold water at short range, thru 100' of hose under 60 lbs. pressure at the nozzle for five minutes, then the upper side of the floor (which forms the roof of the test building) to be flooded at low pressure; afterwards the stream to be again applied at full pressure on the under side for five minutes longer.

30 Deflection of beams and floor to be measured continuously during the test. The load then to be removed and after the floor becomes cold, it shall be reloaded to 600 lbs. per sq. ft. and deflections noted.

Temperatures.

40 The temperatures of the fire were obtained by three electric pyrometer couples suspended thru the floor from above and hanging about 6" below the ceiling. The location of the couples is indicated on the temperature curve sheet.

Readings were made upon each couple every three minutes. The fuel used was dry cord wood, the frequency of firing being determined by the temperature of the test chamber. The "Log

EXHIBIT C-163 (*continued*):

of Temperature Readings," together with plotted curve for the middle couple, is herewith attached.

Deflections.

10 The deflections which occurred during the test were measured by a Y level, reading upon rods located upon the ends and middle of each beam, also upon the middle of the floor arches. The "Table of Deflections" gives full information regarding the variation in level of each point thruout the test, and the "Deflection Diagram" shows the relative position of the three members graphically at different times.

Water.

20 The water was applied by firemen with an engine detailed from 143rd Street and 8th Avenue fire station, under direction of Battalion Chief Edward S. Root. The pressure gauge was carefully watched, and 60 lbs. maintained at the nozzle.

In applying the water, the stream was thrown back and forth over the whole ceiling as much as possible, and not allowed to strike continuously on one spot. After five minutes' application the pressure was reduced to about 30 lbs. and the top of the floor flooded, then the stream was applied to the ceiling again at full pressure for five minutes longer. Total time of application at full pressure was 10 minutes.

30 Thru an error the firemen brought with them a 1 $\frac{1}{4}$ -inch nozzle instead of the regulation 1 $\frac{1}{8}$ -inch diameter. This larger nozzle was therefore used, which made the stream somewhat more severe than usual.

Results of the Test.

40 About one hour after starting the fire three cracks appeared on the top of the floor or roof of the building. Two of these cracks were parallel with and nearly over the two supporting beams of the eight-foot span, and the third was similarly located along the middle beam of the five-foot span. These cracks gradually opened during the test to a maximum width of about $\frac{3}{32}$ of an inch. Some water boiled out of the concrete and ran out upon the roof. During the latter part of the test, a few small diagonal cracks developed near the ends of the beams, and ran across the floor slabs towards the middle of the spans.

EXHIBIT C-163 (continued):

10 All of these cracks were evidently due to expansion. They appeared to be on the upper surface only. The underside of the floor or ceiling of the test chamber was in perfect condition so far as could be observed up to the application of water. The water scored the surface somewhat in front of the doors where its action was most severe, but only to a depth of about one inch as a maximum. Considerable of the concrete thus washed out where the cement had evidently been carried away by the escaping water at the time the floor was placed. This is a defect that could be easily avoided.

20 The wire mesh encasing the bottom of the middle I beam of the eight-foot span was exposed for about three feet near the middle of the beam, and the flange of the beam itself was bare for eighteen inches. This was the only metal exposed by the application of water.

There was one crack four feet long in the central portion of the eight-foot span about one foot from the middle beam and running parallel with it.

There were several small cracks across the bottom of the beams, but the concrete remained firm and secure.

As a whole the ceiling was in excellent condition at the completion of the test.

30 The maximum deflection at the middle of the eight and five-foot span during the fire was $1 \frac{1}{32}$ and $\frac{11}{16}$ inches, respectively. The larger part of this was recovered when the floor cooled, and the application of the final load of 600 lbs. per sq. foot increased the deflection on the larger span only $\frac{3}{16}$ inch, and on the smaller span $\frac{1}{16}$ inch.

No new cracks developed as a result of the loading, and there was no evidence that the floor was distressed.

40 The total permanent deflection of the two spans after entire removal of load was $\frac{3}{8}$ inch for the eight-foot span and $\frac{1}{4}$ inch for the five-foot span.

The test was conducted in co-operation with the Bureau of Buildings of this city, and the installation of the floor was observed by representatives from the bureaus in the various boroughs, also from Philadelphia.

EXHIBIT C-163 (*continued*):

The test was witnessed by the following Building Bureau Engineers:

- A. Schwartz, Borough of Manhattan.
- H. Vanatta, Borough of Bronx.
- Harry Brown, Borough of Richmond.
- 10 W G. Button, Bureau of Building Inspection, Philadelphia, Pa.
- Spencer B. Hopkins, bureau of Buildings, Providence, R. I.
- The American Steel & Wire Company were represented by:
 - T. H. Taylor, New York Office.
 - H. S. Doyle, Chicago Office.
 - L. A. Dietrich, New York Office.
 - R. H. Pratt, New York Office, and several others.

20 A large number of spectators were present, among them being the following:

- Rudolph P. Miller, Consulting Engineer, 527 5th Avenue, New York.
- Colonel Hodges, Chief Engineer, Isthmian Canal Commission, Washington, D. C.
- R. Allworth, Assistant Chief Engineer, Washington, D. C.
- Major Langfitt, U. S. Engineering Corps, Washington, D. C.
- 30 G. H. Stewart, Rep. "Ins. Engineer," 120 Liberty Street, New York.
- G. E. Stecher, Rep. "Ins. Press," 56 Cedar Street, New York.
- H. R. Leonard, Engineer, Penn. R. R., Philadelphia, Pa.
- J. F. Muray, Engineer, Penn. R. R., Philadelphia, Pa.
- B. H. Davis, Assist. Engineer, D. L. & W. R. R., Hoboken, N. J.
- J. B. French, Engineer, L. I. R. R., Jamaica, L. I., N. Y.
- B. W. How, Inspector, L. I. R. R., Jamaica, L. I., N. Y.
- 40 Geo. P. Enke, Inspector, German-American Insurance Co., New York.
- Frank B. Gilbreth, Cont. Eng., 34 West 26th Street, New York.
- P. H. Bevier, Engineer, National Fireproofing Co., New York.
- S. P. Waldron, American Bridge Co., 42 Broadway, New York.

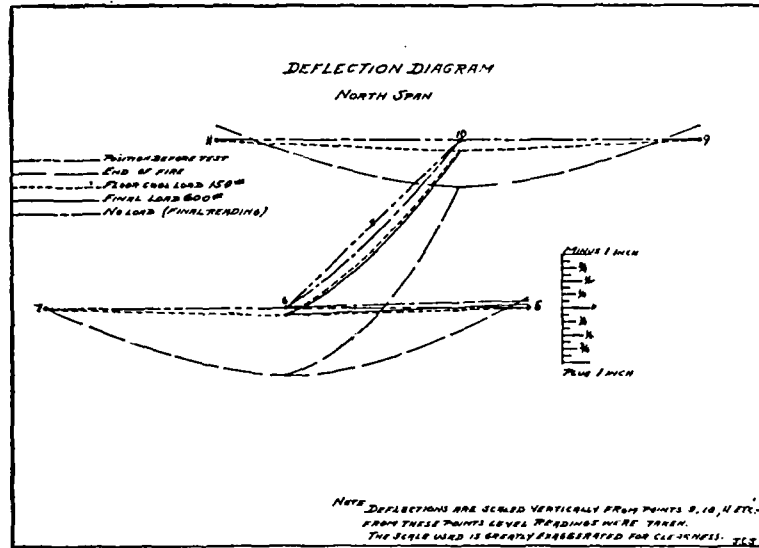
EXHIBIT C-163 (*continued*):

- W. H. Olthoff, U. S. Steel Prod. Exp. Co., 24 State Street,
New York.
- J. Traverse, Neuchatel Asphalt Co., 265 Broadway, New
York.
- E. Merrick, Merrick Fireproof Co., 11 Broadway, N. Y.
P. E. Bertin, 30 West 33rd Street, New York.
- 10 New York. W. B. Ruggles, Curtin-Ruggles Co., 39 Cortland Street,
New York.
- L. R. Christie, Curtin-Ruggles Co., 39 Cortlandt Street,
New York.
- Capt. J. F. Shea, Jerome Avenue and 183d Street, New
York.
- Fuler Claflin, Architect, 1440 Broadway, New York.
- J. P. H. Perry, Turner Construction Co., 11 Broadway,
New York.
- C. U. Carpenter, Pres. Herring-Hall-Marvin Safe Co., 400
20 Boardway, New York.
- J. G. Ellendt, J. G. Ellendt Co., 1 Madison Avenue, New
York.
- W. H. Wheelock, Douglass Robinson Co., 146 Broadway,
New York.
- G. E. Walsh, 555 West 183d Street, New York

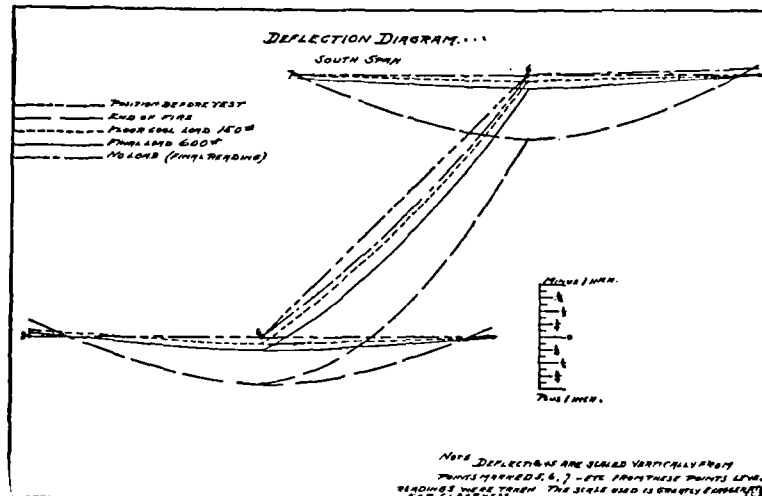
Respectfully submitted,

IRA H. WOOLSON.

EXHIBIT C-163 (continued):



Deflection Diagram for 5-Foot Span.



Deflection Diagram for 8-Foot Span.

EXHIBIT C-163 (continued):

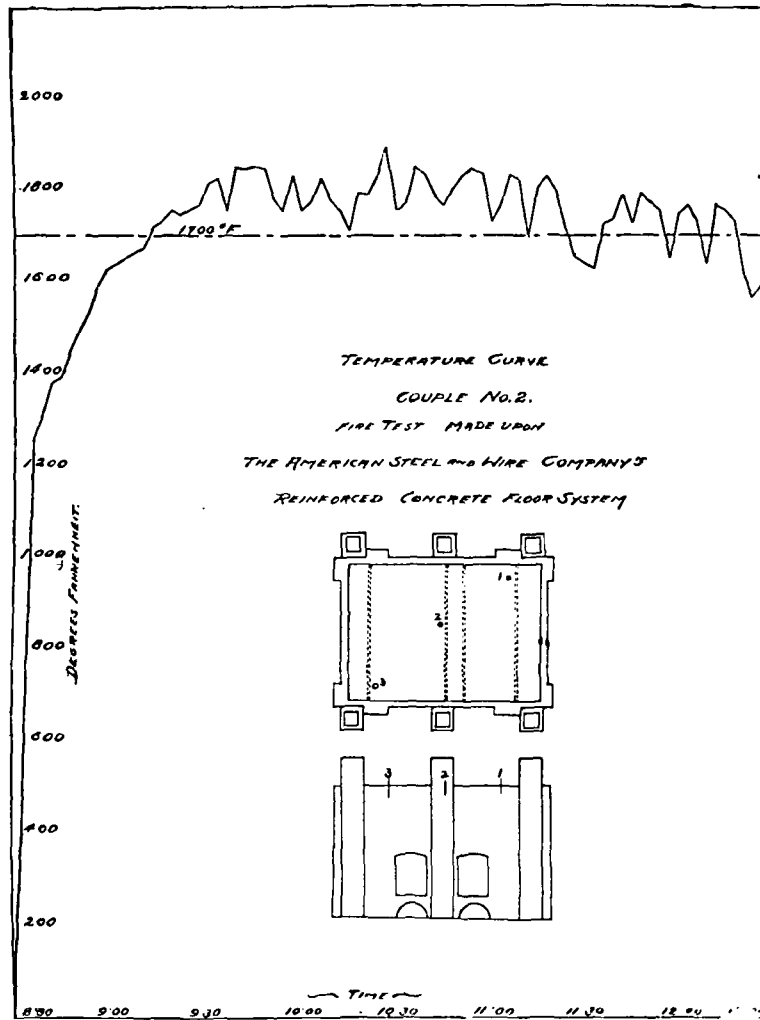


EXHIBIT C-163 (continued):

DEFLECTION READINGS.

NOTE—For location of rods see "Deflection Diagrams." Deflections are given in sixteenths of an inch; those preceded by a minus sign are rises, those by no sign are falls.

Deflections read by J. C. Jenkins.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|--|----|----|----|----|----|----|----|----|----|----|----|
| March 3, 1908. | | | | | | | | | | | |
| No Load. | | | | | | | | | | | |
| 10.00 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| March 4. Load, 150 lbs. per sq. ft. Start of fire. | | | | | | | | | | | |
| 8.30 a. m. | 0 | 0 | -1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 50 " | 0 | 2 | -3 | 4 | -2 | 2 | 0 | 3 | -1 | 0 | 0 |
| 9.20 " | -1 | 3 | -3 | 7 | -3 | 2 | -1 | 4 | -2 | 2 | -1 |
| 50 " | -1 | 3 | -4 | 10 | -3 | 2 | -2 | 7 | -2 | 3 | -1 |
| 10.20 " | -1 | 4 | -4 | 15 | -3 | 6 | -2 | 12 | -2 | 4 | -2 |
| 50 " | -2 | 7 | -4 | 19 | -3 | 9 | -2 | 16 | -3 | 8 | -2 |
| 11.20 " | -2 | 10 | -4 | 26 | -3 | 14 | 0 | 21 | -3 | 11 | -3 |
| 50 " | -3 | 13 | -5 | 30 | -3 | 17 | 0 | 24 | -3 | 13 | -3 |
| 12.30 " | -3 | 15 | -5 | 34 | -3 | 20 | 0 | 28 | -4 | 14 | -4 |
| End of fire. | | | | | | | | | | | |
| March 5. Floor cool; load, 150 lbs. per sq. ft. | | | | | | | | | | | |
| 8.45 a. m. | 0 | 2 | -2 | 8 | 0 | 2 | 0 | 7 | 0 | 3 | 0 |
| Load, 600 lbs. per sq. ft. on 5' span. | | | | | | | | | | | |
| 1.30 " | 0 | 2 | -2 | 7 | -1 | 2 | 0 | 8 | 0 | 3 | 0 |
| Load, 600 lbs. per sq. ft. on 8' span. | | | | | | | | | | | |
| 2.40 " | 0 | 4 | -1 | 13 | 0 | 4 | 1 | 7 | 2 | 3 | 2 |
| No load. | | | | | | | | | | | |
| 4.30 " | 0 | 0 | 0 | 6 | -2 | 0 | 0 | 4 | 0 | 0 | 0 |

EXHIBIT C-163 (continued):

CORRECTED TOTAL DEFLECTIONS.

For Middle of Beam, Taking Into Account the Rise of Ends of Beams.

8' Span.

| | Rod 2. South Beam. | Rod 4. Centre Floor Slab. | Rod 6. Centre Beam. |
|---|-----------------------|------------------------------|------------------------|
| March 4. | | | |
| End of fire, 12.30 p. m. | $1\frac{3}{16}''$ | $1\frac{1}{32}''$ | $1\frac{1}{32}''$ |
| March 5. | | | |
| Floor cool; load, 150 lbs. per sq. ft. 8.45 a. m. | $\frac{3}{16}''$ | $\frac{3}{8}''$ | $\frac{1}{8}''$ |
| Load, 600 lbs. per sq. ft. 2.40 p. m. | $\frac{9}{32}''$ | $\frac{9}{16}''$ | $\frac{7}{32}''$ |
| No load. 4.30 p. m. | 0'' | $\frac{3}{8}''$ | $\frac{1}{16}''$ |

5' Span.

| | Rod 6. Centre Beam. | Rod 8. Centre Floor Slab. | Rod 10. North Beam. |
|---|------------------------|------------------------------|------------------------|
| March 4. | | | |
| End of fire. 12.30 p. m. | $1\frac{1}{32}''$ | $\frac{1}{16}''$ | $\frac{1}{8}''$ |
| March 5. | | | |
| Floor cool, load, 150 lbs. per sq. ft. 8.45 a. m. | $\frac{1}{8}''$ | $\frac{9}{32}''$ | $\frac{3}{16}''$ |
| Load, 600 lbs. per sq. ft. 1.30 p. m. | $\frac{7}{32}''$ | $\frac{11}{32}''$ | $\frac{3}{16}''$ |
| No load. 4.30 p. m. | $\frac{1}{16}''$ | $\frac{1}{4}''$ | 0'' |

NOTE—The results are obtained as follows:

For all beam deflections when the ends rise and the middle falls, add the middle deflections to the mean of the two end rises. When the ends and middle fall, subtract.

EXHIBIT C-163 (continued):

LOG OF TEMPERATURE READINGS.

FIRE TEST.

THE AMERICAN STEEL & WIRE COMPANY.

FIREPROOF FLOOR CONSTRUCTION.

10

Temperatures Read by J. S. Macgregor, M. S.

| | Time | Couple No. 1 | Couple No. 2 | Couple No. 3 |
|----|-------|--------------|--------------|--------------|
| | 8.30 | Start. | | |
| | 33 | 205 | 394 | 261 |
| | 36 | 815 | 1259 | 828 |
| | 39 | 935 | 1311 | 1130 |
| | 42 | 1019 | 1380 | 1254 |
| | 45 | 1156 | 1397 | 1311 |
| 20 | 48 | 1248 | 1457 | 1324 |
| | 51 | 1346 | 1494 | 1374 |
| | 54 | 1385 | 1530 | 1415 |
| | 57 | 1447 | 1586 | 1397 |
| | 9.00 | 1524 | 1622 | 1415 |
| | 03 | 1562 | 1635 | 1426 |
| | 06 | 1584 | 1647 | 1462 |
| | 09 | 1610 | 1659 | 1499 |
| | 12 | 1635 | 1671 | 1545 |
| 30 | 15 | 1659 | 1719 | 1562 |
| | 18 | 1647 | 1731 | 1573 |
| | 21 | 1719 | 1755 | 1597 |
| | 24 | 1719 | 1743 | 1586 |
| | 27 | 1707 | 1755 | 1622 |
| | 30 | 1719 | 1767 | 1635 |
| | 33 | 1779 | 1814 | 1659 |
| | 36 | 1802 | 1825 | 1719 |
| | 39 | 1732 | 1756 | 1708 |
| | 42 | 1768 | 1850 | 1768 |
| 40 | 45 | 1838 | 1844 | 1774 |
| | 48 | 1844 | 1850 | 1792 |
| | 51 | 1780 | 1844 | 1768 |
| | 9.54 | 1720 | 1780 | 1708 |
| | 57 | 1732 | 1756 | 1690 |
| | 10.00 | 1804 | 1827 | 1756 |
| | 03 | 1744 | 1756 | 1732 |

EXHIBIT C-163 (continued) :

| | Time | Couple No. 1 | Couple No. 2 | Couple No. 3 |
|----|-------|--------------|--------------|--------------|
| | 06 | 1756 | 1774 | 1744 |
| | 09 | 1780 | 1821 | 1804 |
| | 12 | 1768 | 1780 | 1756 |
| | 15 | 1732 | 1738 | 1696 |
| | 18 | 1684 | 1708 | 1732 |
| 10 | 21 | 1756 | 1792 | 1744 |
| | 24 | 1741 | 1789 | 1717 |
| | 27 | 1836 | 1830 | 1765 |
| | 30 | 1857 | 1895 | 1765 |
| | 33 | 1707 | 1753 | 1693 |
| | 36 | 1765 | 1777 | 1717 |
| | 39 | 1847 | 1853 | 1824 |
| | 42 | 1830 | 1836 | 1813 |
| | 45 | 1753 | 1789 | 1741 |
| | 48 | 1741 | 1765 | 1729 |
| 20 | 51 | 1847 | 1801 | 1777 |
| | 54 | 1819 | 1830 | 1824 |
| | 57 | 1836 | 1847 | 1830 |
| | 11.00 | 1824 | 1836 | 1813 |
| | 03 | 1705 | 1729 | 1671 |
| | 06 | 1777 | 1765 | 1729 |
| | 09 | 1789 | 1836 | 1777 |
| | 12 | 1777 | 1824 | 1789 |
| | 15 | 1705 | 1693 | 1771 |
| | 18 | 1795 | 1807 | 1747 |
| 30 | 21 | 1819 | 1830 | 1783 |
| | 24 | 1771 | 1795 | 1771 |
| | 27 | 1687 | 1711 | 1650 |
| | 11.30 | 1638 | 1650 | 1625 |
| | 33 | 1640 | 1638 | 1644 |
| | 36 | 1640 | 1625 | 1644 |
| | 39 | 1687 | 1723 | 1675 |
| | 42 | 1711 | 1735 | 1717 |
| | 45 | 1759 | 1795 | 1771 |
| | 48 | 1675 | 1723 | 1675 |
| 40 | 51 | 1771 | 1795 | 1723 |
| | 54 | 1747 | 1771 | 1723 |
| | 57 | 1759 | 1759 | 1711 |
| | 12.00 | 1612 | 1648 | 1601 |
| | 03 | 1745 | 1743 | 1687 |
| | 06 | 1757 | 1769 | 1745 |

EXHIBIT C-163 (continued):

| | Time | Couple No. 1 | Couple No. 2 | Couple No. 3 |
|----|---------------|--------------|--------------|--------------|
| | 09 | 1721 | 1732 | 1697 |
| | 12 | 1600 | 1635 | 1622 |
| | 15 | 1757 | 1769 | 1757 |
| | 18 | 1740 | 1758 | 1734 |
| | 21 | 1704 | 1728 | 1692 |
| 10 | 24 | 1618 | 1607 | 1579 |
| | 27 | 1629 | 1562 | 1593 |
| | 30 | 1608 | 1593 | 1580 |
| | Averages..... | <u>1655</u> | <u>1704</u> | <u>1644</u> |

20

30

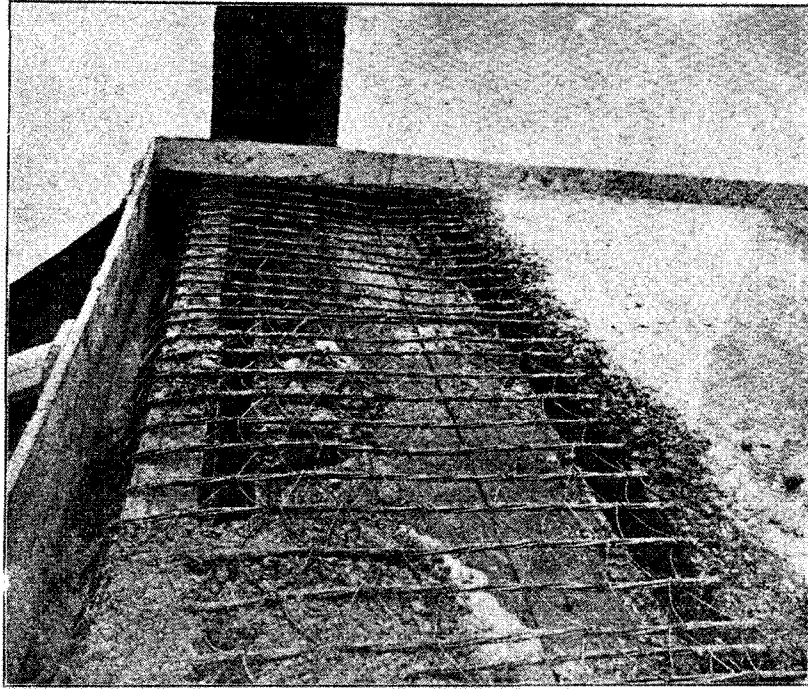
40

EXHIBIT C-163 (continued) :

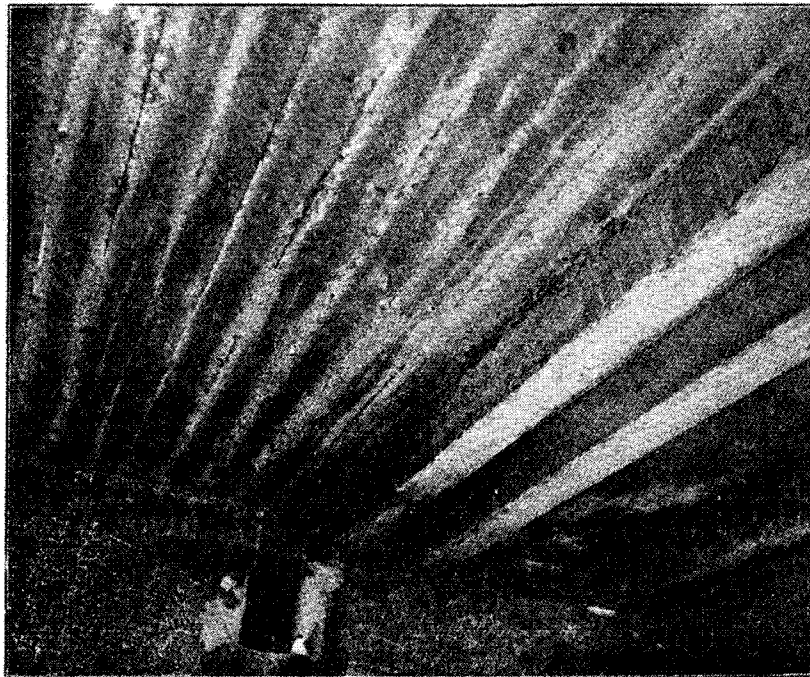


Arrangement of Metal in the Floor.
Concrete Partially in Place on the 5-Foot Span. 8-Foot Span in the Foreground.

EXHIBIT C-163 (continued) :

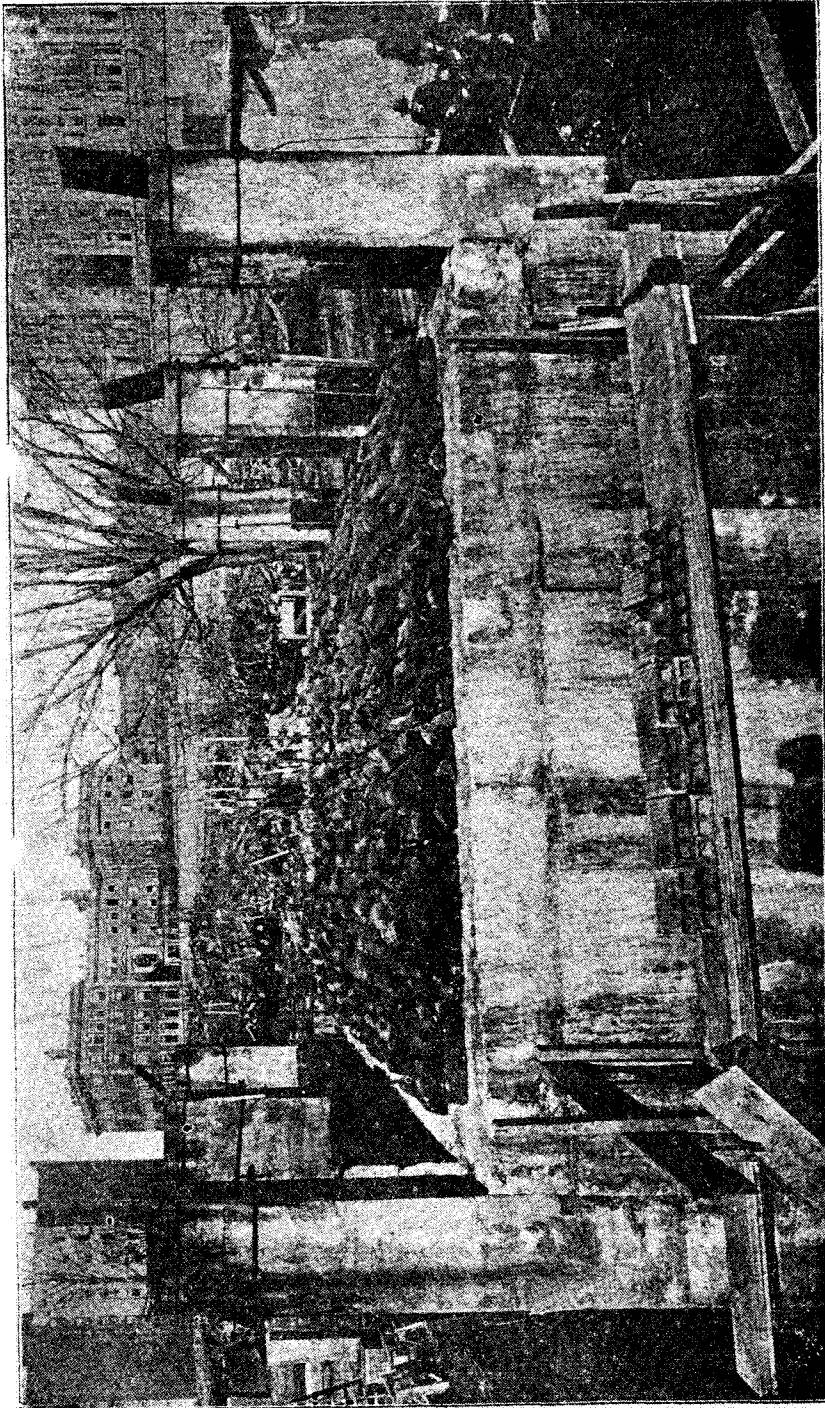


Method of Anchoring Metal at Edge of Floor.
Concrete in Place on 8-Foot Span.



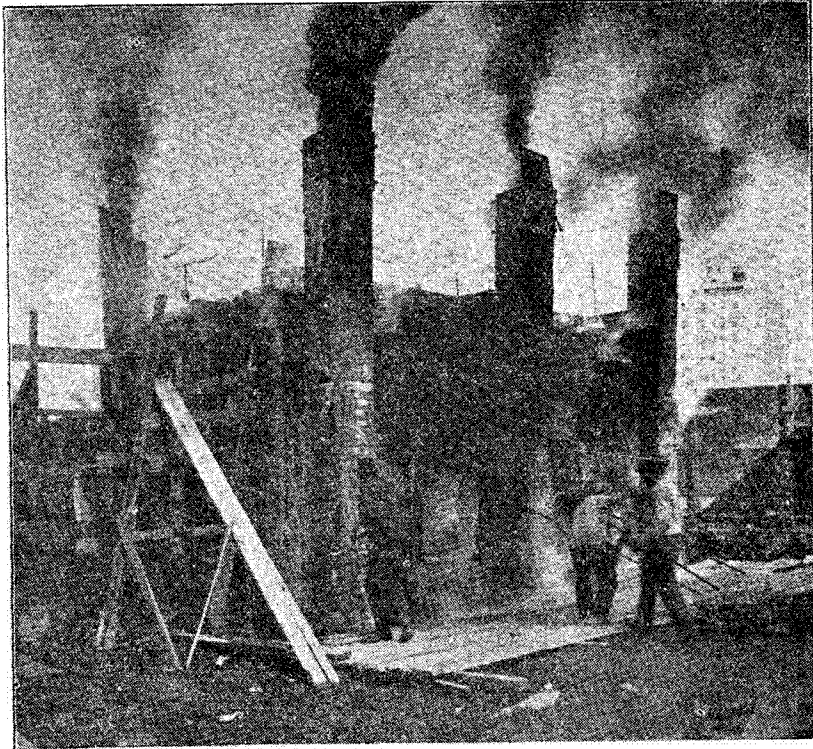
Underside of Floor Before Test, Showing Two Middle
Beams, and 8-Foot Span.

EXHIBIT C-163 (continued):

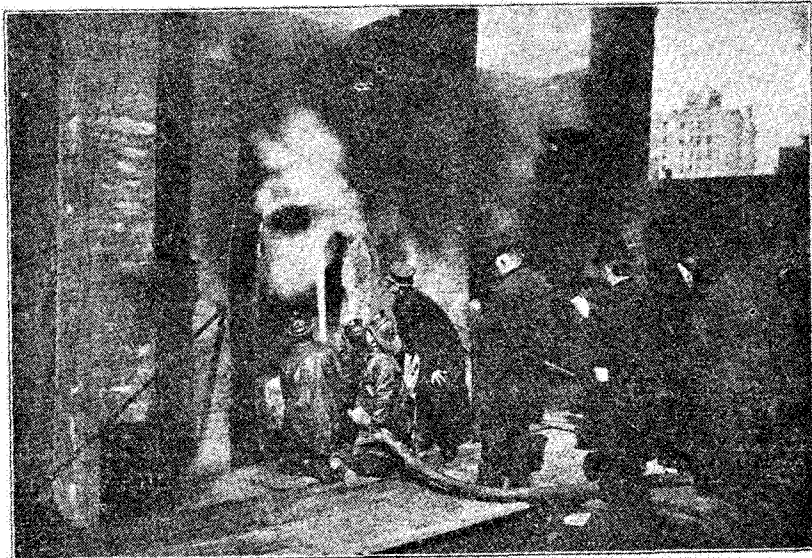


Load of 150 Pounds Per Square Foot Carried by Floor During Fire.

EXHIBIT C-163 (*continued*):



Building During the Fire.



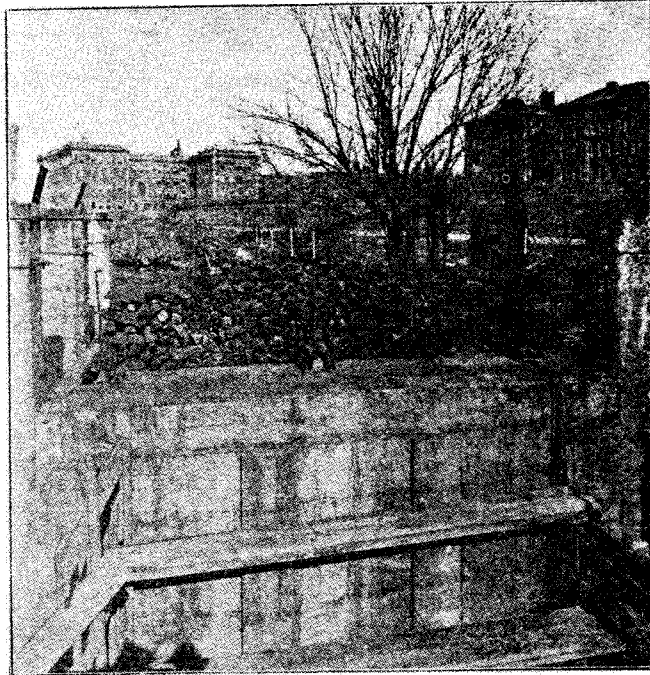
Firemen Applying Water.

EXHIBIT C-163 (*continued*):

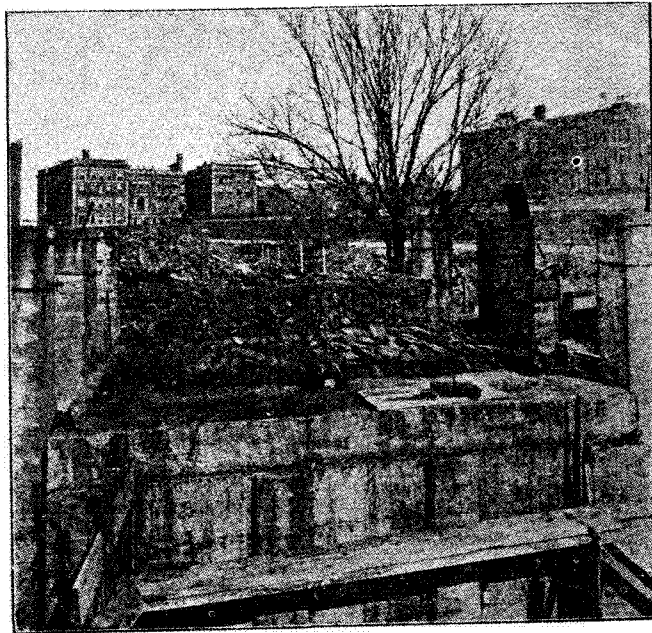


Underside of Floor After Test.
Condition of 8-Foot Span Shown at Top of Picture. Beams in the
Middle, and 5-Foot Span Beyond.

EXHIBIT C-163 (*continued*):



Load of 600 Pounds Per Square Foot on 8-Foot Span.



Load of 600 Pounds Per Square Foot on 5-Foot Span.

EXHIBIT C-157:

EXHIBIT C-157.

(Frederick H. Weaver Inventor Sewer Pipe Section.)

F. H. WEAVER.
SEWER PIPE SECTION.

APPLICATION FILED OCT. 6, 1914. RENEWED SEPT. 22, 1915.

1,180,459.

Patented Apr. 25, 1916.

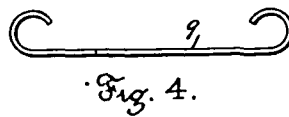
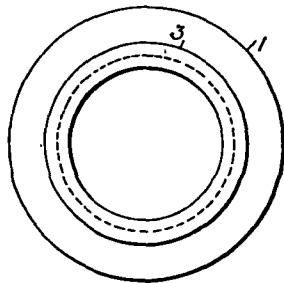
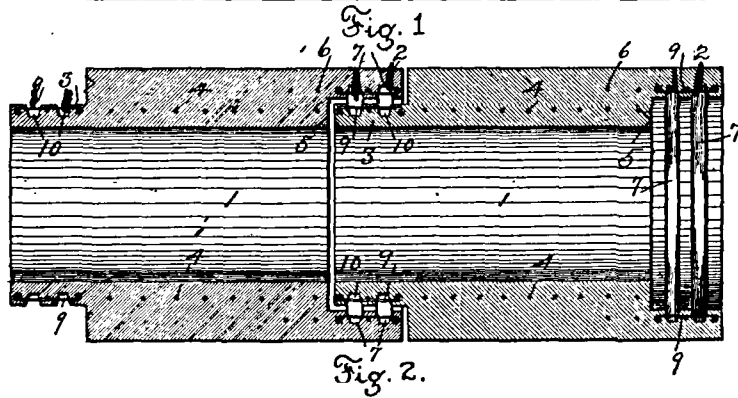
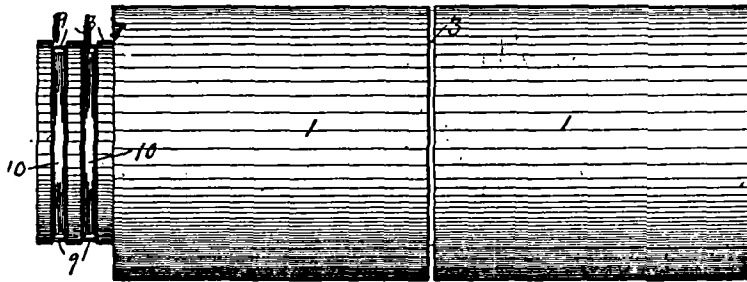


Fig. 3.
Witnesses:
J. L. Sarbach
Maude M. Arnold.

Inventor
Frederick H. Weaver
By Chapman & Ferguson
Attorney

EXHIBIT C-12:

EXHIBIT C-12.

(*City Record*, August 1, 1916.)

THE CITY RECORD

Vol. XLIV, Number 13140 Price, 3 Cents.

10 New York, Tuesday, August 1, 1916.

THE CITY RECORD

Official Journal of the City of New York.

Published Under Authority of Section 1526, Greater New York
Charter, by the Board of City Record.

John Purroy Mitchel, Mayor.

20 Lamar Hardy, Corporation Counsel.

William A Prendergast, Comptroller.

David Ferguson, Supervisor.

Supervisor's Office, Municipal Building, 8th floor.

Published daily, at 9 a. m., except legal holidays, at Nos.
96 and 98 Reade st. (north side), between West Broadway and
Church st., Manhattan, New York City.

30 Subscription, \$9.30 a year, exclusive of supplements. Daily
issue, 3 cents a copy.

SUPPLEMENTS: Civil List (containing names, salaries,
etc., of the City employees), Two Dollars, Postage Extra; Official
Canvass of Votes, 10 cents; Registry Lists, 5 cents each assembly
district; Law Department Supplement, 10 cents; Annual Assessed
Valuation of Real Estate, 25 cents each section; postage pre-
paid.

40 ADVERTISING: Copy for publication in the City Record
must be received at least TWO (2) days before the date fixed for
the first insertion; when proof is required for correction before
publication, copy must be received THREE (3) days before the
date fixed for the first insertion.

COPY for publication in the corporation newspapers of
Brooklyn must be received at least THREE (3) days before the
date fixed for the first insertion.

Entered as Second-class Matter, Post Office at New York City.

EXHIBIT C-9:

EXHIBIT C-9.

Contract No. 47340 Sigretto & Co. and City of New York for construction of Collins Ave. Sewer, August 2nd, 1916.

10 THE CITY OF NEW YORK—DEPARTMENT OF FINANCE
Office of the Comptroller

CONTRACT SUMMARY

Contractor JOSEPH L. SIGRETTO & CO. No. 47340

Names of Sureties: National Surety Co.

20 The U. S. Fidelity & Guaranty Co.

Amount of bond \$56000.00

Date of award: Apr. 10, 1917 Department: President, Borough of Queens; Date of contract: Apr. 23, 1917; Borough: Queens; Date of expiration: 250 days; Date of filing: Apr. 13, 1917; Damages: \$10.00 per day; Date paid in full: 8/22/19.

DESCRIPTION OF WORK

30 For construction of a sewer and appurtenances in Collins Ave., etc.

Original Estimate, \$143,030.79

AE 20,143.05

163,173.84

40

ACCOUNTS TO BE CHARGED

CFM 25

EXHIBIT C-9 (continued) :

PAYMENTS, AMOUNTS RETAINED AND EARNED

| | Date | ...% Payments | Amount paid to date | Amount retained to date | Amount earned to date |
|----|----------|---------------|---------------------|-------------------------|-----------------------|
| | 9/17/17 | 7,658.03 | 7,658.03 | 1,351.42 | 9,009.45 |
| 10 | 10/19/17 | 5,827.09 | 13,485.12 | 2,379.73 | 15,864.85 |
| | 12/14/17 | 20,957.69 | 34,442.81 | 6,078.14 | 40,520.95 |
| | 1/28/18 | 30,143.29 | 64,586.10 | 11,397.55 | 75,983.65 |
| | 4/19/18 | 7,265.28 | 71,851.38 | 12,679.65 | 84,531.03 |
| | 5/20/18 | 15,238.52 | 87,089.90 | 15,368.80 | 102,458.70 |
| | 6/20/18 | 8,588.74 | 95,678.64 | 16,884.46 | 112,563.10 |
| | 7/29/18 | 10,492.23 | 106,170.87 | 18,736.03 | 124,906.90 |
| | 9/ 3/18 | 7,547.23 | 113,718.10 | 20,067.90 | 133,786.00 |
| | 10/ 1/18 | 10,124.56 | 123,842.66 | 21,854.59 | 145,697.25 |
| | 11/22/18 | 12,917.37 | 136,760.03 | 24,134.12 | 160,894.15 |
| 20 | 12/30/18 | 24,923.23 | 161,683.26 | 1,490.58 | 163,173.84 |
| | 8/ 4/19 | 1,490.58 | 163,173.84 | | 163,173.84 |
| | | <hr/> | | | |
| | | 163,173.84 | | | |

IN FULL

30

THE CITY OF NEW YORK

Department of Finance

Bureau of Audit—Division of Disbursements

Municipal Building
Room 631

\$1490 58/100

New York, Aug. 22 1919.

40 Received from CHARLES L. CRAIG, Comptroller, Warrant No. 99865 for the sum of ONE THOUSAND FOUR HUNDRED NINETY 58/100 Dollars, on account of the within Contract numbered 47340 for in full of repairing security.

Mailer Aug. 22, 1919.

R. O'CONNOR,
Disbursing Clerk.

EXHIBIT C-9 (continued):

Feb. 1, 1919.

CORPORATION

General Release

To all to whom these Presents shall come or may concern,
Greeting:

10 KNOW DE, That JOS. L. SIGRETTO & CO., for and in
consideration of the sum of TWENTY FOUR THOUSAND,
NINE HUNDRED, TWENTY THREE 23/100 Dollars, lawful
money of the United States of America, to it paid by The
City of New York, the receipt of which is hereby acknowledged,
have remised, released and forever discharged, and by these
presents does for itself, its successors and assigns, remise, re-
lease and forever discharge the said The City of New York, their
20 successors and assigns, of and from all and all manner of action
and actions, cause and causes of action, suits, debts, dues, sums
of money, accounts, reckonings, bonds, bills, specialties, covenants,
contracts, controversies, agreements, promises, variances, tres-
passes, damages, judgments, extents, executions, claims and
demands whatsoever in law or equity, which against them it ever
had, now has or which it or its successors or assigns hereafter
can, shall or may have, for, upon or by reason of a certain con-
tract or agreement made the 23rd day of April, A. D., 1917, by
and between JOS. L. SIGRETTO & CO., and the said THE CITY
30 OF NEW YORK, for Contract No. 47340, Sewer, Collins Ave.,
&c., or by reason of any matter, cause or thing whatsoever re-
sulting or arising therefrom from the beginning of the world to
the day of the date of these presents, excepting the sum of \$1490.58
retained as repairing security.

IN WITNESS WHEREOF, JOS. L. SIGRETTO & CO.,
has caused its corporate seal to be affixed hereto and its corporate
name to be signed to these presents by its President this 1st day
of February in the year one thousand, nine hundred and nineteen.

40 Sealed and delivered in the presence of

WM. F. HEFFERNAN

JOSEPH L. SIGRETTO & CO.,

By Joseph Sigretto.
President.

EXHIBIT C-9 (*continued*):

State of New York,
County of New York, ss.:
City of New York,

10 On this 1st day of February 1919, before me personally came JOS. L. SIGRETTO to me known, who being by me duly sworn, did depose and say that he resided in Woodhaven, L. I., that he is the President of the Jos L. Sigretto & Co., the Corporation described in and which executed the above instrument, that he knew the seal of said Corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

20 WM. F. HEFFERNAN,
Comm of Deeds, N. Y. City
Residing in N. Y. County
New York Co. Clerks No. 6
Term expires Jan. 22, 1920.

City of New York

PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

30 Joseph Flanagan
Borough Secretary

Hugh Hall
Secretary to President

Long Island City, December 24, 1918.

Hon. Charles L. Craig, Comptroller,
City of New York.

40 Sir:—

Referring to contract No. 47340;—

“For constructing a sewer and appurtenances in COLLINS AVENUE from Mount Olivet Avenue to Adriatic St., ADRIATIC STREET from Collins Ave. to Fresh Pond Road, and in FRESH POND ROAD from Mount Olivet Ave. to Woodbine St., 2nd Ward, Borough of Queens.”

EXHIBIT C-9 (continued):

I beg to inform you that in accordance with the recommendation of the Engineer in Charge, Engineering-Construction, and the Engineer of Sewers, this department, I have this day granted the contractor, Joseph L. Sigretto & Co., 1455 Woodhaven Avenue, Woodhaven, N. Y., an extension of time of 184½ days in which to complete the work on the above named contract.

- 10 The contractor was delayed on account of being unable to obtain the necessary lumber, other material and the scarcity of labor. Ground water and boulders were encountered greatly in excess of what was to be anticipated.

Yours very truly,

FRANK C. SULLIVAN,

Acting President of the Borough of Queens.

JR-PJH

20

THE CITY OF NEW YORK

Office of the

President of the Borough of Queens

Bureau of Sewers

Maurice E. Connolly, President of the Borough
John R. Higgins, Superintendent

30

Queens Subway Building

HT/KAC Long Island City, N. Y., December 11, 1918.

Mr. Peter L. Kenney, Chief Clerk
Division of Audits
Department of Finance
Municipal Building
New York City.

Dear Sir:

40

In the matter of the 85% certificate, payment #11, issued November 18, 1918 in favor of Joseph L. Sigretto and Company on contract #47,340:

For constructing a sewer and appurtenances in COLLINS AVENUE from Mount Olivet Av. to Adriatic St., ADRIATIC STRRET from Collins Av. to Fresh Pond Road,

EXHIBIT C-9 (*continued*):

and in

FRESH POND ROAD from Mount Olivet Av. to Woodbine St., Second Ward of the Borough of Queens:

10 I beg to state that although the amount of this certificate is 12% above the contract price, this is caused by the use of a large quantity of sheeting and foundation timber.

In making up the estimate for this contract, the items of 5,000 feet B. M. Timber for Bracing and Sheeting and 5,000 feet B. M. Timber for Foundation were included in the estimate for the purpose of obtaining a bid price.

Paragraph VI, page 13 of the Contract provides that the quantity of material to be furnished and the amount of work to be done, as stated in the proposal, are approximate only.

20 In making up the estimate of the amount of work to be done, the quantity of lumber to be used and rock to be excavated are so indeterminate that, as a rule, the item is included in the estimate for the purpose of obtaining a price, so that the contractor may be paid for the lumber, if used, or rock, if excavated.

30 This, in our opinion in which we have been supported by the Corporation Counsel, does not come under the head of additional work or materials, as provided for in paragraph VIII of the Contract, which must be made the subject of a separate agreement and limited to five per cent. of the contract price.

Yours very truly,

HAROLD TAIT,
Engineer of Sewers.

EXHIBIT C-9 (continued):

“COPY”

AGREEMENT made this 14th day of May 1918, between THE CITY OF NEW YORK, party of the First Part, and JOSEPH L. SIGRETTO AND COMPANY, #1455 Woodhaven Avenue, Woodhaven, N. Y., party of the second part,

10 WHEREAS, a contract #47,340:

For constructing a sewer and appurtenances in COLLINS AVENUE from Mt. Olivet Av. to Adriatic St., ADRIATIC STREET from Collins Av. to Fresh Pond Road,

and in

FRESH POND ROAD from Mt. Olivet Av. to Woodbine St., Second Ward of the Borough of Queens

20 was on the 23rd day of April, 1917, let by the Party of the First Part to the Party of the Second Part, the contract plan indicating that the 3'6" sewer in Fresh Pond Road at the easterly intersection of Ralph Street should have an invert elevation of 76.75' and,

30 WHEREAS, in making a restudy of the drainage plan of the territory to the east of Fresh Pond Road, it was discovered that an error had been made in the elevation, as indicated on the drainage plan and that, in order to connect the proposed sewer in Ralph Street with the sewer in Fresh Pond Road, it was necessary to lower the sewer at that point 3.33' redesign the junction chamber, and construct the sewer at a greater depth than indicated on the plan, for a distance of about 104'0" northerly; and,

WHEREAS, this modification in the plan required additional work, as follows:

15 cubic yards of extra excavation at the junction chamber

52 cubic yards of extra excavation in the sewer trench

40 3 cubic yards of extra concrete in the chamber, besides extra pipe and fittings; and,

WHEREAS, it has been determined that a fair and reasonable price for the execution of the above work is Two Dollars and Fifty cents (\$2.50) per cubic yard for the earth excavation, and Eight Dollars (\$8.00) per cubic yard for the extra concrete in place, and Fifteen Dollars (\$15.00) for the extra pipe and fittings, required in the junction chamber, which at the above prices,

EXHIBIT C-9 (*continued*):

amounts to Two hundred and six dollars and fifty cents (\$206.50); and,

WHEREAS, Paragraph VIII of the Contract provides:

10 “*This contract may be modified and changed from time to time as may previously be agreed to in writing between the parties hereto in a manner not materially affecting the substance thereof or increasing the contract price therein, in order to carry out and complete more fully and perfectly the work herein to be done and performed.*”

20 NOW, THEREFORE, the Party of the Second Part, for themselves, their successors, and assigns, agrees to and with the Party of the First Part, that the said contract and specifications be amended so as to provide for the elimination of the construction of 104 lineal feet of 3'6" reinforced concrete sewer in Fresh Pond Road and a junction chamber at the easterly intersection of Ralph Street and Fresh Pond Road, as shown on the original contract plan, and that there shall be substituted therefor and in lieu therefor 104 lineal feet of 3'6" reinforced concrete sewer and a junction chamber, as indicated on an amended plan relating to this contract, dated November 26, 1917, and that, in view of this extra work being performed, the Party of the Second Part shall receive Two hundred and Six dollars and fifty cents (\$206.50) above the price bid for the construction of this portion of the sewer and junction chamber, and that there shall be no further claim or charge made against the Party of the First Part by reason of this modification and waives any further claim by reason of this substitution.

30

IN WITNESS WHEREOF the parties hereto have executed this agreement in the day and year first above mentioned.

.....
Acting President of the Borough of Queens
For the City of New York

40

PARTY OF THE FIRST PART

Joseph L. Sigretto, President
FOR Joseph L. Sigretto & Company

PARTY OF THE SECOND PART

EXHIBIT C-9 (*continued*):

THIS AGREEMENT made this 14th day of February, 1918, between THE CITY OF NEW YORK, acting by the President of the Borough of Queens, party of the first part (hereinafter called the City) and JOSEPH L. SIGRETTO & CO., a domestic corporation, party of the second part (hereinafter called the contractor).

10 WITNESSETH:

 WHEREAS the parties hereto under date of April 23, 1917 entered into a contract designated by the Comptroller of The City of New York as No. 47340, whereby the contractor agreed to furnish all the labor and materials required for the construction and completion of a sewer and appurtenances in Collins Avenue from Mt. Olivet Avenue to Adriatic Street; Adriatic Street from Collins Avenue to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue to Woodbine Street, Second Ward,
20 Borough of Queens, and

 WHEREAS the contractor has requested and the City is willing, in view of the abnormal conditions prevailing due to the present War and the inability to procure coal for the operation of the plant necessary in the construction of this sewer, that the contract be modified so that partial payments may be made to the contractor as the work progresses for reinforced concrete pipe delivered on the site of the work, although not incorporated in the sewer structure, and

30 WHEREAS the contract provides, among other things, as follows:

 “This contract may be modified and changed from time to time as may previously be agreed to, in writing, between the parties hereto, in a manner not materially affecting the substance thereof or increasing the contract price thereunder, in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed.”

40 NOW, THEREFORE, in consideration of the premises and other valuable considerations it is agreed:

 I. That the contract No. 47340 dated April 23, 1917 be and the same hereby is modified to provide that eighty-five per cent (85%) progress payments be made to the contractor for

EXHIBIT C-9 (*continued*):

reinforced concrete pipe actually delivered on the site of the work and accepted by the engineer in accordance with the Schedule of Prices annexed hereto and made part hereof, and in accordance with Clause XLIV of the contract.

10 II. No payment will be made by the City for any reinforced concrete pipe so delivered but not incorporated in the sewer structure unless and until the contractor shall have furnished to the Comptroller of the City satisfactory written evidence that the contractor is the sole owner of said materials, free and clear from all liens or other incumbrances. Said materials upon being estimated for payment shall become the property of the City. The contractor, however, shall not by reason of said payments be relieved from responsibility for said materials and the protection thereof and shall make good any loss or damage thereto and shall be responsible for the entire work until the same is finally accepted by the City as provided in the contract.

20 III. Except as hereby expressly provided the provisions of the contract shall be binding upon the parties with the same force and effect as if this modification had not been made.

IV. This agreement shall take effect if and when and only when the written consents of the National Surety Company and the United States Fidelity and Guaranty Company, the sureties upon the said contract, are obtained and attached hereto and the Comptroller of the City has approved the Schedule of Prices.

30 IN WITNESS WHEREOF the parties hereto have executed this agreement in triplicate the day and year first above written.

THE CITY OF NEW YORK

By Maurice E. Connolly
President of the Borough of Queens.

JOSEPH L. SIGRETTO & CO.

40 By Joseph L. Sigretto,
President.

The undersigned being sureties on the bonds given as security for the faithful performance of the contract mentioned

EXHIBIT C-9 (continued):

in the foregoing agreement hereby consent to the making of the foregoing agreement.

NATIONAL SURETY COMPANY

By J. R. Wells,
Attest Vice President.

10

F. J. Danahy,
Res. Ass't Secretary

UNITED STATES FIDELITY AND
GUARANTY COMPANY,

By Adolphus A. Jackson,
Attorney in fact

Attest Gilman Ashburner,
Attorney in fact

20

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

On Feb. 14, 1918 before me personally appeared J. R. WELLS, Vice-President of the NATIONAL SURETY COMPANY, with whom I am personally acquainted, who, being by me
30 duly sworn, said that he is the Vice-President of the NATIONAL SURETY COMPANY, the corporation described in and which executed the within instrument; that he knows the corporate seal of said Company; that the seal affixed to the within instrument is such corporate seal; that it was affixed by order of the Board of Directors of said Company, and that he signed said instrument as Vice-President of said Company by like authority; and that the liabilities of said Company, do not exceed its assets as determined by an audit of the Company's annual statement filed with
40 the Superintendent of Insurance of the State of New York and certified to by said Superintendent, pursuant to Section 2 of chapter 182 of the laws of the State of New York for the year 1913, amending Section 182 of chapter 33 of the Laws of the State of New York for the year 1909 constituting Chapter 28 of the Consolidated Laws of the State of New York. And said J. R. WELLS further said that he is acquainted with F. J. DANAHY and knows to be the Resident Assistant Secretary of said Com-

EXHIBIT C-9 (*continued*):

pany; that the signature of the said F. E. DANAHY subscribed to the said instrument is in the genuine handwriting of the said F. J. DANAHY and was hereto subscribed by the like order of the said Board of Directors and in the presence of him, the said Vice-President.

P. P. MARCONE

10 Notary Public for New York County, No. 286
Certificate Filed in Kings, No. 45, Queens, No. 286
Bronx No. 10, Richmond and Westchester Counties
New York County Register's Office No. 8137
Kings County Register's Office No. 8076
Bronx County Register's Office No. 829
My Commission Expires March 30, 1918

COPY OF BY-LAW

20

BE IT REMEMBERED: That at a regular meeting of the Board of Directors of the NATIONAL SURETY COMPANY, duly called and held on the sixth day of February, 1912, a quorum being present, the following By-Law was adopted:

ARTICLE XIII.

30 Section 1. *Signatures required.*—All bonds, recognizances, or contracts of indemnity, policies of insurance, and all other writings obligatory in the nature thereof, shall be signed by the President, a Vice-President, a Resident Vice-President, or Attorney-in-fact, and shall have the seal of the Company affixed thereto, duly attested by the Secretary, an Assistant Secretary, or Resident Assistant Secretary. All Vice-Presidents and Resident Vice-Presidents shall each have authority to sign such instruments, whether the President be absent or incapacitated, or not, and the Assistant Secretaries and Resident Assistant Secretaries shall each have authority to seal and attest such instruments, whether the Secretary be absent or incapacitated, or not; and the
40 Attorneys-in-Fact shall each have authority, in the discretion of such Attorneys-in-Fact, to affix to such instruments an impression of the Company's seal, whether the Secretary be absent or incapacitated, or not, or to attach the individual seal of the Attorney-in-Fact thereto, or to use the scroll of the Attorney-in-Fact, or a wafer, wax, or other similar adhesive substance affixed thereto or a seal of paper or other similar substance affixed thereto by mucilage, or other adhesive substance, or use the word

EXHIBIT C-9 (continued):

“Seal” or the letters “L. S.” opposite the signature of such Attorneys-in-Fact, as the case may be.

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

10 I, F. J. DANAHY, Resident Assistant Secretary of the
NATIONAL SURETY COMPANY, have compared the foregoing
By-Law with the original thereof, as recorded in the Minute
Book of said Company, and do certify that the same is a correct
and true transcript therefrom, and of the whole of Article XIII,
Section 1 of said original By-Law.

Given under my hand and the seal of the Company,
in the County of New York Feb. 14, 1918.

F. J. DANAHY,
Resident Assistant Secretary.

20

For use in New York and other states which do not require
published figures to conform to statement furnished the depart-
ment of such state after audit by them.

30 NATIONAL SURETY COMPANY OF NEW YORK

Financial Statement, December 31st, 1917.

WM. B. JOYCE, President HUBERT J. HEWITT, Secretary

ASSETS.

| | | |
|----|--|-----------------|
| | Cash in Banks and Offices | \$ 796,843.18 |
| | Liberty Bonds | 1,136,250.00 |
| | Other Government, Municipal and Industrial | |
| 40 | Bonds, and Stocks | 10,384,453.02 |
| | Real Estate, Mortgages and Collateral Loans | 255,960.29 |
| | Unpaid Premiums (excluding Premiums 90 days | |
| | overdue) | 1,039,086.01 |
| | Accrued Interest and Accounts Receivable | 642,538.98 |
| | | \$14,255,131.48 |
| | Total, | |

EXHIBIT C-9 (continued):

LIABILITIES.

| | | |
|----|--|-----------------|
| | Unearned Premium Reserve | \$ 3,239,280.34 |
| | Contingent Claim and Expense Reserve (Less Re- insurance) | 1,465,189.63 |
| | Reserve for taxes and Unpaid Commissions (not due) | 500,301.69 |
| 10 | Accounts Payable and Expenses Incurred (not due) | 346,007.73 |
| | Dividends Declared (Payable January 2nd, 1918) | 120,000.00 |
| | Capital Stock | 4,000,000.00 |
| | Surplus | 4,584,352.09 |
| | Total, | \$14,255,131.48 |

20 NOTE:—Securities valued on basis determined by National Con-
vention of Insurance Commissioners.

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

I, John L. Mee, Assistant Secretary of the National Surety
Company, do hereby certify that the above is a true statement
of the assets and liabilities of said Company as of December 31st,
1917.

30 Company's Seal JOHN L. MEE,
Assistant Secretary.

STATE OF NEW YORK ss.:
COUNTY OF NEW YORK

Subscribed and sworn to before me, a Notary Public of the
State of New York, in the City of New York, this 31st day of
January A. D. 1918.

40 WM. M. WEAVER
Notary Public for New York County, No. 36
Certificate filed in Kings, No. 51 Nassau, Queens, No. 468
Bronx No. 4 Richmond and Westchester Counties.
New York County Register's Office No. 8058.
Kings County Register's Office No. 8004.
Bronx County Register's Office No. 811.
My Commission Expires March 30, 1918.

Notarial
Seal

EXHIBIT C-9 (continued) :

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

On this 14th day of February, 1918, before me personally came Maurice E. Connolly, who known and known to me to be the President of the Borough of Queens of The City of New York the person described as such herein and who as such executed the foregoing instrument and who duly acknowledged to me that he executed the same as such President for the purposes therein mentioned.

FRANCIS J. HOGAN
Notary Public, Kings County, No. 269.
Kings County Register's, No. 9107.
Cert. filed New York County, No. 335.
New York County Register's, No. 9249.

20 **STATE OF NEW YORK,**
CITY OF NEW YORK, ss. :
COUNTY OF NEW YORK

On this 14th day of February, 1918, before me personally came Joseph L. Sigretto who known and known to me to be the President of Joseph L. Sigretto & Co., who being by me duly sworn did depose and say: that he resides in Orange, N. J., that he is the President of Joseph L. Sigretto & Co., the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and so affixed by the Board of Directors of the corporation, and that by like order he thereto signed his name and official designation.

FRANCIS J. HOGAN
Notary Public, Kings County, No. 269.
Kings County Register's, No. 9107.
Cert. filed New York County, No. 335.
New York County Register's, No. 9249.

40

EXHIBIT C-9 (continued) :

State of New York, County of New York, ss:

On the 14th day of Feb. 1918, before me personally came ADOLPHUS A. JACKSON, to me known, who, being by me duly sworn did depose and say that he resides in the City of New York; that he is attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, the corporation described in,
10 and which executed the within instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation, and that he signed his name thereto by like order; and that the said Company has received from the Superintendent of Insurance of the State of New York a certificate of solvency and of its sufficiency as surety or guarantor, under Chapter 182 of the Insurance Law of the State of New York as amended by Chapter 182 of the Laws of
20 1913, and that such certificate has not been revoked. And the said ADOLPHUS A. JACKSON further said that he is acquainted with GILMAN ASHBURNER, and knows him to be the Attorney-in-fact of said Company; that the signature of said GILMAN ASHBURNER, subscribed to the within instrument, is in the genuine handwriting of said GILMAN ASHBURNER, and was subscribed thereto by like order of said Board of Directors, and in the presence of him the said ADOLPHUS A. JACKSON.

GERTRUDE ACHILLES,
30 Commissioner of Roads of the City of New York,
Residing in Richmond County; Certificates filed in New York County Clerk's Office No. 8, Reg. No. 19002; Kings County Clerk's No. 58, Reg. No. 9000, Bronx County Clerk's No. 1, Reg. No. 9000, Queens County Clerk's No. 8191, and Richmond County. My Commission Expires January 23rd, 1919.

At a special meeting of the Board of Directors of the UNITED STATES FIDELITY AND GUARANTY COMPANY,
40 held in the City of Baltimore, State of Maryland, on the 22nd day of October, A. D. 1915, the following resolution was unanimously adopted:

Resolved, That ALONZO GORE OAKLEY, or EDWARD R. LEWIS, or ADOLPHUS A. JACKSON, or WILLIAM H. ESTWICK, or GILMAN ASHBURNER, or A. VAN TAM-BACHT, or J. FRANK SUPPLEE, or E. G. BABCOCK, or

EXHIBIT C-9 (*continued*) :

10 GEORGE A. READING, or CHARLES E. FINKEN, or S. FRANK HEDGES, attorneys-in-fact of this Company in the State of New York, be and they hereby are, and each of them is authorized and empowered to execute and deliver and to attach the seal of the Company to any and all bonds and undertakings for, or on behalf of the Company, in its business of guaranteeing the fidelity of persons holding places of public or private trust and the performance of contracts other than insurance policies, and executing or guaranteeing bonds and other undertakings required or permitted in all actions or proceedings or by law required, including co-suretyship and reinsurance agreements; such bonds, undertakings and agreements, however to be attested in every instance by one other of the persons above named, as occasion may require, provided, that if such bonds, undertakings and agreements are not executed by either ALONZO GORE OAKLEY, or EDWARD R. LEWIS, or ADOLPHUS A. JACKSON, or WILLIAM H. ESTWICK, then and in such event, said bonds, undertakings and agreements shall be attested by either the said 20 ALONZO GORE OAKLEY, or EDWARD R. LEWIS, or ADOLPHUS A. JACKSON, or WILLIAM H. ESTWICK; and the aforesaid attorneys-in-fact are, and each of them is hereby authorized and empowered to certify a copy of this resolution under the seal of this Company.

State of New York, County of New York, ss:

30 I, GILMAN ASHBURNER, Attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, have compared the foregoing resolution with the original thereof, as recorded in the minute book of the said Company, and do hereby certify that the same is a true and correct transcript therefrom, and of the whole of said original resolution.

Given under my hand and the seal of the Company, at the City of New York, this 14th day of Feb. 1918.

GILMAN ASHBURNER,
Attorney-in-fact.

40

EXHIBIT C-9 (continued):

STATEMENT UNITED STATES FIDELITY AND
GUARANTY COMPANY,

At the Close of Business September 30, 1917.

Commenced Business August 1, 1896.

ASSETS

| 10 | Par Value | | Market Value. |
|----|----------------|--|-----------------|
| | \$1,000,000.00 | Government Bonds | \$ 973,875.00 |
| | 4,563,564.57 | Baltimore City and other Municipal, State and County Bonds | 4,353,183.57 |
| | 1,957,600.00 | Railway and Equipment Bonds ... | 1,722,416.00 |
| | 235,000.00 | Street Railway Bonds | 212,400.00 |
| | 1,285,000.00 | Miscellaneous Bonds | 1,215,577.50 |
| | 435,525.00 | Bank, Railway and Miscellaneous Stocks | 618,995.00 |
| 20 | 100,000.00 | Lawyers Surety Co. Stock, repres- ented by \$150,000 New York City Bonds deposited with the Superin- tendent of Insurance of the State of New York, and other assets | 140,000.00 |
| | <hr/> | | |
| | \$9,576,689.57 | Total Bonds and Stocks Market Values September 30, 1917 | \$9,236,447.07 |
| | | Home Office Property appraised by Insurance Department of Maryland | 615,000.00 |
| 36 | | Other Property appraised by Insurance Depart- ment of Maryland | 127,671.80 |
| | | Loans secured by pledge of Collaterals | 46,007.85 |
| | | Loans secured by Mortgages | 26,800.00 |
| | | Cash on Hand and in Depositories | 1,867,674.27 |
| | | Premiums in course of collection, not more than three months due | 2,490,787.34 |
| | | Accounts with Suspended Banks | 52,496.66 |
| | | Deposits with Workmen's Compensation Bureau .. | 176,671.80 |
| | | Interest due and accrued | 122,186.13 |
| 40 | | Other Assets | 87,038.74 |
| | | | <hr/> |
| | | | \$14,848,781.66 |

EXHIBIT C-9 (continued):

LIABILITIES.

| | | |
|---|----------------|-----------------|
| Capital Stock paid in cash | \$3,000,000.00 | |
| Due for Return Premiums and Reinsurance | 83,971.30 | |
| Funds held under Reinsurance Treaties | 36,018.51 | |
| Reserve for Taxes and Expenses in transit | 188,853.36 | |
| Commissions accrued on uncollected premiums | 441,489.51 | |
| 10 Premium Reserve Computed in Ac- cordance with Requirements of New York Insurance Dept. | \$5,445,117.96 | |
| Reserve for Claims Admitted and not Admitted, all Departments, in accordance with New York Laws | 3,699,702.91 | |
| Surplus | 1,953,628.08 | 11,098,448.95 |
| | | <hr/> |
| | | \$14,848,781.66 |

20 State of New York, County of New York, ss:

GILMAN ASHBURNER, being duly sworn, says: that he is the Attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, and that, to the best of his knowledge and belief, the foregoing is a true and correct statement of the financial condition of said Company, as of Sept. 30, 1917, and that the financial condition of said Company is as favorable now as it was when such statement was made.

GILMAN ASHBURNER.

30 Subscribed and sworn to before me
this 14th day of Feb. 1918.

40 GERTRUDE ACHILLES,
Commissioner of Roads of the City of New York,
Residing in Richmond County; Certificates filed in
New York County Clerk's Office No. 8, Reg. No.
19002; Kings County Clerk's No. 58, Reg. No. 9000,
Bronx County Clerk's No. 1, Reg. No. 9000; Queens
County Clerk's No. 8191, and Richmond County,
My Commission Expires January 23rd, 1919.

EXHIBIT C-9 (continued) :

SCHEDULE OF UNIT PRICES TO BE USED IN MAKING UP 85 PER CENT. CERTIFICATES ON CONTRACT #47,340. J. L. SIGRETTO & COMPANY, #1455 WOODHAVEN AVENUE, WOODHAVEN, N. Y., CONTRACTORS,

10 For constructing a sewer and appurtenances in: COLLINS AVENUE from Mt. Olivet Av. to Adriatic St., ADRIATIC STREET from Collins Av. to Fresh Pond Road, FRESH POND ROAD from Mt. Olivet Av. to Woodbine St.,

Second Ward.

January 18, 1918.

| | | | | |
|----|---|---|---------|-------------|
| | 901 lin. ft. 7'6" Reinforced Concrete Pipe Sewer (Precast Type B) | @ | \$36.00 | \$32,436.00 |
| | Cost of pipe furnished and delivered.. | | \$14.30 | |
| 20 | (Laying & jointing of pipe (Excavation (Backfill (Pumping | | 21.70 | 36.00 |
| | 2,055 lin. ft. 7'0" Reinforced Concrete Pipe Sewer, (Precast Type B) | @ | \$31.00 | \$63,705.00 |
| | Cost of pipe furnished and delivered.. | | \$13.20 | |
| 30 | (Laying & jointing of pipe (Excavation (Backfill | | 17.80 | 31.00 |
| | 62 lin. ft. 5'0" Reinforced Concrete Pipe Sewer, (Precast Type B) | | \$21.00 | \$ 1,302.00 |
| | Cost of pipe furnished and delivered.. | | \$ 8.25 | |
| | (Laying & jointing of pipe (Excavation (Backfill | | 12.75 | 21.00 |
| 40 | 303 lin. ft. 3'9" Reinforced Concrete Pipe Sewer, (Precast Type B) | @ | \$14.00 | \$ 4,242.00 |
| | Cost of pipe furnished and delivered.. | | \$ 5.55 | |
| | (Laying & jointing of pipe (Excavation (Backfill | | 8.45 | 14.00 |

EXHIBIT C-9 (continued):

THE CITY OF NEW YORK

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

10 Mason O. Smedley
Borough Secretary

Hugh Hall
Secretary to President

Long Island City, May 5, 1917.

Hon. William A. Prendergast, Comptroller,
Department of Finance, City of New York,
20 Municipal Building, Borough of Manhattan.

Sir:—

Referring to contract No. 47340;—

30 “For the construction of a sewer and appurtenances
in COLLINS AVENUE from Mt. Olivet Avenue to Adriatic
Street; ADRIATIC STREET from Collins Avenue to
Fresh Pond Road; FRESH POND ROAD from Mt. Olivet
Avenue to Woodbine Street, Second Ward. Type “B”
construction.”

I beg to inform you that the contractors, Joseph L. Si-
gretto & Co., 1455 Woodhaven Avenue, Woodhaven, N. Y., have
been ordered to commence the work embraced in said contract
on May 14, 1917, or before five days from the receipt of their
notice.

Yours very truly,

40 WPB-PJH

.....
Acting President of the Borough of Queens.

EXHIBIT C-9 (continued) :

CONTRACT No. 47340

(To be filled in by the Dept. of Finance)

The City of New York

ADVICE OF AWARD OF CONTRACT

(This copy to be retained by Bookkeeping Division,
Department of Finance)

10 Dep't of President, Borough of Queens

*Date April 10, 1917.

Comptroller of The City of New York :

Please take notice that the following described contract has this day * been awarded to Contractor Joseph L. Sigretto & Company, Address 1455 Woodhaven Avenue, Woodhaven, L. I.

SURETIES

AMT. OF BONDS

\$28,000

\$56000.00

20 National Surety Company, 115 Broadway

\$28,000

The United States Fidelity & Guaranty Co.,
66 Liberty St., N. Y.

15855

DETAILS OF PURPOSE OF CONTRACT

30 For the construction of a sewer and appurtenances in Collins Avenue from Mt. Olivet Avenue to Adriatic Street; Adriatic Street from Collins Avenue to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue to Woodbine Street, Second Ward. Type "B" construction.

| Contract Chargeable to Code No. | Estimated Amount | Contracts Previously Awarded (Including Adjustments) | Open Market Orders Issued To Date (Including Adjustments) | Misc. Vouchers, Payrolls, and Other Charges |
|---------------------------------|------------------|--|---|---|
| CFM 25 | 143,030.79 | 1,545,789.87 | 28,091.52 | 89,685.23 |

Enter full titles of accounts below and refer to code numbers by means of line numbers in margins.

Street Improvement Fund.

40

Yours respectfully,

MAURICE E. CONNOLLY,
President, Borough of Queens.

* This will be the date of the entry by which the fund is charged with the estimated amount of the contract both in the department making the award and by the Department of Finance. There must therefore be no delay in forwarding this advice.

EXHIBIT C-9 (continued) :

Amended Feb. 14th, 1917.

NOTICE.—Bidders are particularly requested to carefully examine the Proposal for Bids, Form of Agreement, Specifications, Plan and the location of the work and the surroundings thereof before bidding.

10 No

THE CITY OF NEW YORK

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

20

BUREAU OF SEWERS

1916

ASSESSMENT WORK

30

Proposal for Bids, Bid, Bond, Agreement and Specifications for Constructing Sewers and Appurtenances in **COLLINS AVENUE**, from Mt. Olivet Ave. to Adriatic St.; **ADRIATIC STREET**, from Collins Ave. to Fresh Pond Rd.; **FRESH POND ROAD**, from Mt. Olivet Ave. to Woodbine St., Second Ward, Borough of Queens, together with all the work incidental thereto.

APPROVED

Feb. 15, 1917

40

JAMES RICE,
Engineer in Charge.

ENGINEERING CONSTRUCTION

EXHIBIT C-9 (*continued*):

"The Largest Surety Company in the World"

We bond more people than any other company in the world

Wm. B. Joyce,
President

10

NATIONAL SURETY COMPANY

Capital and Surplus over \$6,000,000.00

LWF-im 115 Broadway,
New York.

Address reply to
Contract Department

20

Howard Abrahams
Joseph R. Wells, Vice Presidents
Robert C. Carson, Assistant Secretary.

Apr. 19th, 1917.

Hon. William A. Prendergast,
Comptroller.

SIR:

30

Jos. L. Sigretto has been awarded a contract by the Department of President of the Borough of Queens, for construction of a Sewer and appurtenances in Collins Ave., from Mt. Olivet Ave. to Adriatic St., et al, Borough of Queens, and he has requested this company to prepare the surety bond in the sum of \$28,000.00.

We desire to furnish the bond as requested subject to your approval as to its adequacy and sufficiency.

Respectfully yours,

40

Mr. BURNS

FRANK T. GIERON,
Resident Vice-President.

EXHIBIT C-9 (continued) :

Department of Queens.

The adequacy and sufficiency of the above bond is herein approved and the NATIONAL SURETY COMPANY, may now be notified to execute the surety bond and attach it to the contract.

10 This letter of approval should be affixed to and made a part of the original contract to be hereafter filed in the Department of Finance.

Apr. 20, 1917. LOUIS H. HAHLO,
Deputy and Acting Comptroller.

UNITED STATES FIDELITY AND GUARANTY COMPANY
47 Cedar Street

20 Alonzo Gore Oakley, Telephone
Edward R. Lewis, Managers John 2740

New York, Apr. 19th 1917.

Hon. William A. Prendergast,
Comptroller,
New York, N. Y.

Sir:

30 Joseph L. Sigretto & Co. has been awarded a contract by the Department of President of the Borough of Queens for
No. 2. For the construction of a sewer and appurtenances in Collins Ave., from Mt. Olivet Ave. to Adriatic St.; Adriatic St., from Collins Ave., to Fresh Pond Rd.; Fresh Pond Rd, from Mt. Olivet Ave. to Woodbine St., Second Ward, Borough of Queens,
and it has requested this Company to prepare the surety bond in the sum of \$28,000.

We desire to furnish the bond as requested subject to your approval as to its adequacy and sufficiency.

40 Respectfully yours,
UNITED STATES FIDELITY AND
GUARANTY COMPANY,
By Edward R. Lewis,
Attorney-in-fact.
Attest: S. Frank Hedges,
Attorney-in-fact.

EXHIBIT C-9 (continued) :

Department of Queens.

The adequacy and sufficiency of the above bond is herein approved and the United States Fidelity and Guaranty Company may now be notified to execute the surety bond and attach it to the contract.

10 This letter of approval should be affixed to and made a part of the original contract to be hereafter filed in the Department of Finance.

Apr. 20, 1917. LOUIS H. HAHLO,
Deputy and Acting Comptroller.

THE CITY OF NEW YORK

20

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

Joseph Flanagan
Borough Secretary

30 Hugh Hall
Secretary to President

Long Island City, April 28, 1917.

Hon. William A. Prendergast,
Comptroller, Department of Finance,
City of New York.

Sir:—

40 I beg to transmit herewith for registration in the Department of Finance, the following named contracts:—

“For constructing sewer and appurtenances in
COLLINS AVENUE from Mt. Olivet Ave. to Adriatic St.,
ADRIATIC STREET from Collins Ave. to Fresh Pond
Road,
FRESH POND ROAD from Mt. Olivet to Woodbine St.,
Second Road, Borough of Queens.”

EXHIBIT C-9 (continued) :

“For constructing sewer and appurtenances in ATLANTIC AVENUE, north side, from Willard (Vander-veer) Avenue to Freedom Avenue, and in HATCH AVENUE from Atlantic Avenue, north side, to Fulton Street, Fourth Ward of the Borough of Queens.”

10 “For constructing sewer and appurtenances in BEAUFORT AVENUE from Guion Avenue to Seattle Street, PORTLAND AVENUE from Beaufort Avenue to the Crown north of Beaufort Avenue; HERALD AVENUE from Beaufort Avenue. to Chichester Ave., and in GUION AVENUE from Beaufort Avenue to Chichester Avenue, Fourth Ward of the Borough of Queens.”

20 “For constructing sewers and appurtenances in McCOMB PLACE (Wyckoff Avenue) from Central Avenue to Myrtle Avenue; RIDGEWOOD PLACE from Central Avenue to Copeland Avenue, and in COPELAND AVENUE from Ridgewood Place to McComb Place, Second Ward of the Borough of Queens.”

“For furnishing and delivering 14,000 cubic yards of Highway and Asphalt cement as directed in the Borough of Queens.”

30 Yours very truly,

WPB-PJH

.....
Acting President of the Borough of Queens.

encls

EXHIBIT C-9 (continued):

Time for presenting bids.

1. *Scaled bids* for the above-entitled work will be received at the office of the President of the Borough of Queens, Borough Hall, Jackson avenue and Fifth street, Long Island City, in The City of New York, until 11 o'clock A. M., on Wednesday April 4th, 1917.

10 Time allowed for completion.

2. The time allowed for the full completion of the work herein described will be two hundred and fifty (250) CONSECUTIVE WORKING DAYS.

Security required.

3. The amount of security required will be Fifty-six thousand Dollars (\$56,000.00).

20 Bidders referred to form of agreement, etc.

4. Bidders are referred to the form of agreement, to the specifications and to the plan and drawings of Standard Details on file at the office of the President, and to the following Engineer's estimate of the quantity and kind of work required, the items whereof in all cases include all materials and labor necessary to fully complete said work. Prices for each item shall be named, upon the sum total of which the comparison and tests of bids will be made.

30 Engineer's estimate.

NOTICE TO BIDDERS

Bidders are invited to tender bids on *monolithic* plain and reinforced concrete sewers from 30" upward, these sewers being the standards of the Sewer Department, and hereafter designated as type A, or reinforced concrete pipe sewers from 24" upward (precast) which will be designated as type B, or on both types if they so desire; but it is to be distinctly understood that no bids will be accepted on combinations of types A & B. All bidders may secure specifications for reinforced concrete pipe sewers type B on request.

EXHIBIT C-9 (continued):

TYPE A or SEWER DEPT. STANDARD

| | | |
|----|-------|---|
| | 901 | Linear Feet 7'-6" Reinforced Concrete Sewer |
| | 2,055 | Linear Feet 7'-0" Reinforced Concrete Sewer |
| | 62 | Linear Feet 5'-0" Reinforced Concrete Sewer |
| | 303 | Linear Feet 3'-9" Plain Concrete Sewer |
| | 354 | Linear Feet 3'-6" Plain Concrete Sewer |
| 10 | 488 | Linear Feet 3'-0" Plain Concrete Sewer |
| | 516 | Linear Feet 2'-6" Plain Concrete Sewer |
| | 265 | Linear Feet 24-inch Vitrified Pipe Sewer |
| | 375 | Linear Feet 22-inch Vitrified Pipe Sewer |
| | 265 | Linear Feet 20-inch Vitrified Pipe Sewer |
| | 9 | Linear Feet 18-inch Vitrified Pipe Sewer |
| | 3 | Linear Feet 15-inch Vitrified Pipe Sewer |
| | 222 | Linear Feet 12-inch Vitrified Pipe Sewer |
| | 85 | Six-inch Spurs, 24-inches long, on Concrete Sewer |
| | 18 | Six-inch Spurs on 24-inch Vitrified Pipe Sewer |
| 20 | 33 | Six-inch Spurs on 22-inch Vitrified Pipe Sewer |
| | 18 | Six-inch Spurs on 20-inch Vitrified Pipe Sewer |
| | 18 | Six-inch Spurs on 12-inch Vitrified Pipe Sewer |
| | 1,257 | Feet Risers for House Connections, including Y's |
| | 39 | Manholes, Complete |
| | 47 | Basin Manholes, (New type) Complete |
| | 68 | Inlets, (New type) Complete |
| | 1,665 | Linear Feet 12-inch Vitrified Pipe for Basin Connections |
| | 1,100 | Linear Feet 10-inch Vitrified Pipe for Basin Connections |
| | 1,540 | Linear Feet 6-inch Vitrified Pipe for House Connections |
| 30 | 1 | Chamber at Collins Ave. & Adriatic St. |
| | 1 | Chamber at Fresh Pond Rd. & Adriatic St. |
| | 1 | Chamber at Fresh Pond Rd. & Winifred St. |
| | 1 | Chamber at Fresh Pond Rd. & Metropolitan Ave. |
| | 1 | Chamber at Fresh Pond Rd. & Ralph St. |
| | 1 | Drop Chamber at Fresh Pond Rd. near Adriatic St. |
| | 5,000 | Feet B. M. Timber for bracing and sheet piling |
| | 5,000 | Feet B. M. Timber for Foundation |
| | 500 | Pounds Structural Steel, exclusive of steel shown on plan |
| 40 | 500 | Pounds Reinforcing Steel, exclusive of steel shown on plan |
| | 40 | Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan |
| | 7,900 | Cubic Yards Displaced Material for Sewer Embankment |
| | 2,350 | Linear Feet of Wooden Fence |

EXHIBIT C-9 (continued) :

TYPE "B"

| | | |
|----|-------|---|
| | 901 | Linear Feet 7'-6" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 2,055 | Linear Feet 7'-0" Reinforced Concrete Pipe Sewer (Precast Type B) |
| 10 | 62 | Linear Feet 5'-0" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 303 | Linear Feet 3'-9" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 354 | Linear Feet 3'-6" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 488 | Linear Feet 3'-0" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 516 | Linear Feet 2'-6" Reinforced Concrete Pipe Sewer (Precast Type B) |
| 20 | 265 | Linear Feet 24" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 375 | Linear Feet 22" Vitrified Pipe Sewer |
| | 265 | Linear Feet 20" Vitrified Pipe Sewer |
| | 9 | Linear Feet 18" Vitrified Pipe Sewer |
| | 3 | Linear Feet 15" Vitrified Pipe Sewer |
| | 222 | Linear Feet 12" Vitrified Pipe Sewer |
| | 103 | Six-inch Spurs 24-inches long, on Reinforced Concrete Pipe Sewer |
| | 33 | Six-inch Spurs on 22" Vitrified Pipe Sewer |
| 30 | 18 | Six-inch Spurs on 20" Vitrified Pipe Sewer |
| | 18 | Six-inch Spurs on 12" Vitrified Pipe Sewer |
| | 1,257 | Feet Risers for House Connections, including Y's |
| | 39 | Manholes, Complete |
| | 47 | Basin Manholes (New type), Complete |
| | 68 | Inlets (New type), Complete |
| | 1,665 | Linear Feet 12" Vitrified Pipe for Basin Connections |
| | 1,100 | Linear Feet 10" Vitrified Pipe for Basin Connections |
| | 1,540 | Linear Feet 6" Vitrified Pipe for House Connections |
| 40 | 1 | Chamber at Collins Ave. & Adriatic St. |
| | 1 | Chamber at Fresh Pond Rd. & Adriatic St. |
| | 1 | Chamber at Fresh Pond Rd. & Winifred St. |
| | 1 | Chamber at Fresh Pond Rd. & Metropolitan Ave. |
| | 1 | Chamber at Fresh Pond Rd. & Ralph St. |
| | 1 | Drop Chamber at Fresh Pond Rd. near Adriatic St. |
| | 5,000 | Feet B. M. Timber for Bracing and Sheet Piling |
| | 5,000 | Feet B. M. Timber for Foundation |
| | 500 | Pounds Structural Steel, Exclusive of steel shown on plan |

EXHIBIT C-9 (continued):

500 Pounds Reinforcing Steel, exclusive of steel shown on plan
40 Cubic Yards Class "A" Concrete, exclusive of concrete
shown on plan
7,900 Cubic Yards Displaced Material for sewer embankment
2,350 Linear Feet of Wooden Fence

10 Personal examination of work.

5. The foregoing Engineer's Estimate is *approximate only* and is not to be considered as a binding feature of the contract. Bidders are required to submit their bids upon the following express conditions which apply to and become a part of every bid received. Bidders must satisfy themselves by personal examination of the location of the proposed work and surroundings thereof, and by such other means as they may prefer as to the accuracy of the foregoing estimate, and shall not at any time after submission of their bids, dispute or complain of such estimate of the engineer, nor assert that there was any misunderstanding in regard to the quantity or kind of materials to be furnished or work to be done.

Prices to be stated in writing and in figures.

6. Any bid which fails to name a price, written both in words and in figures, per unit of measurement for each of the items for which quantities are given, will be held to be informal and will be rejected. In case of any discrepancy between the price in words and that in figures, the price in words will be considered as the bid.

Prices bid to cover.

7. The prices bid must cover the cost of furnishing *all necessary materials and labor for and the complete performance of all the work* set forth in this proposal, described in the form of agreement and specification annexed hereto, and indicated by the plan of the work on file in the office of the President, to all of which information the bidders are referred.

Rock excavation.

8. The attention of the bidders is particularly directed to the specifications relating to rock excavation. If no item of rock excavation appears in the Engineer's Estimate the cost of

EXHIBIT C-9 (*continued*):

excavating and removing rock shall be covered by all the prices bid for all the items for which prices are asked.

Bids may be rejected.

10 9. Permission will not be given for the withdrawal of any bid and the right is expressly reserved by the President to reject all bids if he shall deem it to the public interest so to do. No bid will be accepted from, or contract awarded to, any person who is in arrears to The City of New York upon debt or contract or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

Times and places for commencing and prosecuting work to be determined by the President.

20 10. Bidders are especially notified that the President reserves the right to determine the times and places for commencing and prosecuting the work, and that postponement or delay on the whole, or any part thereof, occasioned by the precedence of other contracts, which may be either let or executed before the opening of the bids for this work, can constitute no claim for damages nor for a reduction of the damages fixed for delay in completing the work beyond the time allowed.

No extra compensation.

30 11. The Contractor will be required to complete the entire work to the satisfaction of the President and in accordance with the agreement, the specifications and the plan of the work. No extra compensation beyond the amount payable for the several classes of work hereinbefore enumerated, which shall be actually furnished and performed at the prices bid therefor by the bidder to whom the contract is awarded, shall be due or payable for the entire materials and work.

Deposit to accompany bid.

40 12. No bid will be received or considered unless accompanied by either a certified check upon one of the National or State Banks of The City of New York, drawn to the order of the Comptroller, or money or corporate stock or certificate of indebtedness of any nature issued by The City of New York, which the Comptroller shall approve as of equal value with the security required, to an amount of five per centum of the amount of the bond required for the faithful performance of the contract (as provided by section 420 of The Greater New York Charter, as

EXHIBIT C-9 (*continued*):

amended). Such check or money or other form of security must not be inclosed in the sealed envelope containing the bid, but must be handed to the officer or clerk who has charge of the bidding, and no bid can be deposited in the box for that purpose until such check or money or other form of security has been examined by said officer or celrk and found to be correct. All such deposits, except those of the lowest three bidders, will be
10 returned to the persons making the same within ten days after the opening of the bids; within three days after the awarding of the contract, the remaining deposits, except that made by the bidder whose bid has been accepted, will be returned to the persons making the same. If the successful bidder shall refuse or neglect to execute the contract within five days after notice that it has been awarded to him, and that the adequacy and sufficiency of the security offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and
20 retained by The City of New York, but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

Names of persons interested.

13. Bidders are required to state in their bids, under oath, their names and places of residence or business, the names of all persons interested with them therein, and if no other person be so interested, they shall distinctly state that fact; also, that it is made without any connection with any other person making
30 any bid for the same purpose, and that it is in all respects fair and without collusion or fraud: and that no member of the Board of Aldermen, head of a department, chief of a bureau, deputy thereof or clerk therein or officer or employee of The City of New York, is, shall be or become interested, directly or indirectly, as contracting party, partner, stockholder, surety or otherwise, in or in the performance of the contract or in the material, work or business to which it relates, or in any portion of the profits thereof. Bidders must verify by oath, in writing, the several matters stated in their bids.

40 Sealed bids to be submitted.

14. Each bid must be delivered in a sealed envelope, endorsed with the *title* given above of the work for which the bid is made, with the name of the bidder, and the date of presentation to the President at his office, on or before the date and hour hereinbefore named, at which time and place the bids received

EXHIBIT C-9 (*continued*):

will be publicly opened by the President and read and the award of the contract made according to law as soon thereafter as practicable. The person or persons to whom the contract may be awarded will be required to attend at said office with the sureties offered by him or them and execute the contract within five days from the date of the service of a notice to the effect that the contract has been so awarded and the surety accepted; and in case of failure or neglect so to do he or they will be considered as having abandoned the contract and as being in default to the City.

Bidders shall use blank forms to be furnished by the President.

15. Bidders shall make their bids upon the forms prepared by the President, a copy of which with the proper envelope in which to enclose the same can be obtained upon application therefor at the office of the President, Borough Hall, Jackson avenue and Fifth street, Long Island City, where the plan can be seen, as also the form of contract, including the specifications in the form approved by the Corporation Counsel.

MAURICE E. CONNOLLY,
President of the Borough of Queens.

The City of New York,....., 191

30

THE CITY OF NEW YORK
OFFICE OF THE PRESIDENT OF THE BOROUGH
OF QUEENS

BUREAU OF SEWERS

CONTRACT FOR

the construction of a sewer and appurtenances in: COLLINS AVENUE, from Mt. Olivet Ave. to Adriatic St.; ADRIATIC STREET, from Collins Ave. to Fresh Pond Rd.; FRESH POND ROAD, from Mt. Olivet Ave. to Woodbine St., Second Ward, Borough of Queens, together with all the work incidental thereto.

Parties.

THIS AGREEMENT, made and entered into this 23rd day of April, in the year one thousand nine hundred and seventeen

40

EXHIBIT C-9 (*continued*):

by and between The City of New York, party of the first part, by the President of the Borough of Queens, and Joseph Sigretto and Co., 1455 Woodhaven Avenue, Woodhaven, L. I., Contractor, party of the second part, pursuant to the provisions of The Greater New York Charter, and the resolution of The Board of Estimate and Apportionment adopted on the 17th day of March 1916, of which resolution the following is a copy:

10

RESOLUTION

BOARD OF ESTIMATE AND APPORTIONMENT

City of New York

(Cal. No. 68)

20 WHEREAS, The President of the Borough of Queens has transmitted to the Board of Estimate and Apportionment a copy of a resolution of the Local Board of the Newton District, duly adopted by said Board of the 18th day of July, 1914 and approved by the President of the Borough of Queens on the 18th day of July 1914 as follows, to wit:

“RESOLVED, That this Board does hereby initiate proceedings for the said local improvement to wit:

30 For the construction of a sewer and appurtenances in Collins Avenue from Mt. Olivet Avenue to Adriatic Street, Adriatic Street, from Collins Avenue to Fresh Pond Road, Fresh Pond Road, from Mt. Olivet Avenue to Woodbine Street, Second Ward of the Borough of Queens.”

NOTE:—The preliminary authorization was given with the understanding that when the work has been performed, the authorization of the construction will be deferred until the outlet sewer has been provided for.

40 and which resolution is accompanied with an approximate estimate of the cost of work and the assessed value of the property benefited.

RESOLVED, That the Board of Estimate and Apportionment hereby authorizes the President of the Borough of Queens to prepare plans, specifications and an estimate of cost based on actual survey, and also to ensure a determination of the boundary

EXHIBIT C-9 (*continued*):

of the district of assessment; the entire expense of the work done subsequent to the date of this authorization to be charged against the Street Improvement Fund and later included in the assessment.

10 RESOLVED, That the Board of Estimate and Apportionment will consider the authorization of the construction of the said proposed improvement after the President of the Borough of Queens has submitted a statement showing that all of the above described work has been done, that he has secured the approval of the form of contract by the Corporation Counsel, that he is prepared to place the improvement under contract as soon as he receives the consent of the Board, and that the assessment map will be completed on or before the date of payment on acceptance; this report being accompanied by a further statement showing the quantity of work to be performed under each item and the unit price thereof, the expense incurred for preliminary work, the 20 allowance to be made for additional engineering and contingencies, the total probable cost, and the number of working days to be allowed the contractor for carrying out the work.

I hereby certify that the foregoing is a true copy of a resolution adopted by the Board of Estimate and Apportionment at a meeting of said Board held on March 17, 1916.

Dated, New York, March 20, 1916.

30 (Signed) JAMES MATHEWS,
Assistant Secretary,
JCD. Board of Estimate and Apportionment.

BOARD OF ESTIMATE and APPORTIONMENT

CITY OF NEW YORK

(Cal. No. 133)

40 A copy of a resolution of the Local Board of the Newtown District, duly adopted by said Board on the 16th day of July, 1914, and approved by the President of the Borough of Queens on the 18th day of July, 1914, having been transmitted to the Board of Estimate and Apportionment, as follows, to wit:

“RESOLVED, That this Board does hereby initiate proceedings for the said local improvement, to wit:

EXHIBIT C-9 (continued):

10 For the construction of a sewer and appurtenances in:
Collins Avenue from Mt. Olivet Avenue to Adriatic Street;
Adriatic Street, from Collins Avenue to Fresh Pond Road, Fresh
Pond Road, from Mt. Olivet Avenue to Woodbine Street, Second
Ward of the Borough of Queens," and thereupon, on the 17th
day of March, 1916, resolutions having been adopted by the Board
of Estimate and Apportionment authorizing the President of
the Borough of Queens to prepare the necessary plans, specifica-
20 tions and an estimate of the cost of the proposed improvement
based on actual survey and further resolving that the Board of
Estimate and Apportionment will consider the authorization of
the construction of the proposed improvement after the President
of the Borough of Queens has submitted certain statements as
provided in the said resolution, and the said resolution having
been duly complied with by the President of the Borough of
Queens, as appears by papers and documents on the files of the
Board of Estimate and Apportionment, and there having been
20 presented to the Board of Estimate and Apportionment an estim-
ate in writing in such details as the Board has directed, that the
cost of the proposed work or improvement, together with the
preliminary expenses will be the sum of \$123,400; and a statement
of the assessed value according to the last preceding tax roll of
the real estate included within the probable area of assessment,
to wit, the sum of \$1,435,120. having also been presented, it is

30 **RESOLVED**, That the said resolution of the Local Board
be and the same is hereby approved and the construction of the
local improvement therein provided for is hereby authorized.
This Board does hereby determine that no portion of the cost
and expense thereof shall be borne and paid by The City of New
York, but that the whole of such cost and expense, including the
aforesaid preliminary expenses, shall be assessed upon the prop-
erty deemed to be benefited by the said local improvement.

40 I hereby certify that the foregoing is a true copy of a resolu-
tion adopted by the Board of Estimate and Apportionment at a
meeting of said Board held on June 9, 1916.

Dated, New York, June 12, 1916.

(Signed) JAMES MATTHEWS,
Assistant Secretary,

JCD.

Board of Estimate and Apportionment.

EXHIBIT C-9 (*continued*):

Covenant.

WITNESSETH, That the parties to these presents, each in consideration of the agreements on the part of the other herein contained, have mutually agreed, and hereby mutually agree, the party of the first part for itself and its successors, and the party of the second part for itself, himself, or themselves, and its, his or their executors, administrators, successors, and assigns, as follows:

Contract.

I. The contract for the hereinbefore entitled work shall include the following, which are hereby agreed upon as forming part and parcel thereof: the Proposal for Bids, the Bid, the Bond, this Agreement and the Specifications hereto annexed; also the Plan of the Work dated June 2, 1916, filed in the office of the President of the Borough, entitled: Plan, Profile and Details for the construction of a sewer in COLLINS AVENUE, from Mt. Olivet Ave. to Adriatic St.; ADRIATIC STREET, from Collins Ave. to Fresh Pond Rd.; Fresh Pond Road, from Mt. Olivet Ave. to Woodbine St.; Second Ward, Borough of Queens, and also the Drawings of Standard Details pertinent thereto on file in the office of the Engineer.

Party of the first part.

II. Whenever the term "The City" or a word "President," or a pronoun in place of either, is used, it refers to and means The City of New York, the party of the first part hereto, or the President of the Borough of Queens, or his authorized representative.

Party of the second part.

Whenever the word "Contractor," or a pronoun in place thereof, is used, it refers to and means the party of the second part hereto.

Engineer described.

III. Whenever the word "Engineer," or a pronoun in place thereof, is used, it refers to and means the Engineer in Charge of Sewers, Borough of Queens, acting either directly or through assistants designated by him to act in the premises, limited to the particular duties entrusted to them. In case said

EXHIBIT C-9 (continued):

Engineer may not be able to act, then such Engineer as may be designated by the President shall act in his place.

Terms defined.

10 IV. Whenever the word "plan" is used it refers to and means the plan of this work and the standard drawings pertinent thereto. Whenever it is provided that anything is "to be" or "to be done," "if" or "as," or "when" or "where approved," "required," "directed," "permitted," "ordered," "designated" or "deemed necessary" it shall be taken to mean approved, required, permitted, ordered, designated or deemed necessary as the case may be by the Engineer. Whenever the words "desirable," "suitable," "sufficient," "satisfactory" or others of a similar purport are used it is hereby agreed that the desirability, suitability, sufficiency, satisfactoriness or other denominated condition shall be as determined by the Engineer.

20 Contractor to furnish tools, proper appliances, etc.

V. The Contractor hereby agrees to furnish and provide all materials, labor, and appliances necessary and proper for the purpose, to excavate for, build, complete and connect in a good substantial manner, to the satisfaction of the President, and in conformity with the contract, the hereinbefore entitled work and all the work incidental thereto, and the Contractor hereby agrees to receive and accept as and for his full compensation the following prices, which are the amounts or rates at which this contract was awarded to the Contractor at the public letting thereof:

30 Prices.

TYPE "A" or SEWER DEPT. STANDARD.

| | | | |
|----|-------|--|---------------------|
| | 901 | Linear Feet 7'-6" Reinforced Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| | 2,055 | Linear Feet 7'-0" Reinforced Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| 40 | 62 | Linear Feet 5'-0" Reinforced Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| | 303 | Linear Feet 3'-9" Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 354 | Linear Feet 3'-6" Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 488 | Linear Feet 3'-0" Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |

EXHIBIT C-9 (continued) :

| | | | |
|----|-------|--|--------------------|
| | 516 | Linear Feet 2'-6" Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 265 | Linear Feet 24-inch Vitrified Pipe Sewer, Per Linear Foot, | Dollars (.....). |
| | 375 | Linear Feet 22-inch Vitrified Pipe Sewer, Per Linear Foot, | Dollars (.....). |
| 10 | 265 | Linear Feet 20-inch Vitrified Pipe Sewer, Per Linear Foot, | Dollars (.....). |
| | 9 | Linear Feet 18-inch Vitrified Pipe Sewer, Per Linear Foot, | Dollars (.....). |
| | 3 | Linear Feet 15-inch Vitrified Pipe Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 222 | Linear Feet 12-inch Vitrified Pipe Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 85 | Six-inch Spurs, 24 inches long, on Concrete Sewer, Each, | Dollars (\$.....). |
| 20 | 18 | Six-inch Spurs on 24-inch Vitrified Pipe Sewer, Each, | Dollars (\$.....). |
| | 33 | Six-inch Spurs on 22-inch Vitrified Pipe Sewer, Each, | Dollars (\$.....). |
| | 18 | Six-inch Spurs on 20-inch Vitrified Pipe Sewer, Each, | Dollars (\$.....). |
| | 18 | Six-inch Spurs on 12-inch Vitrified Pipe Sewer, Each, | Dollars (\$.....). |
| | 1,257 | Feet Risers for House Connections, including Y's, Per Foot, | Dollars (\$.....). |
| 30 | 39 | Manholes, Complete, Each, | Dollars (\$.....). |
| | 47 | Basin Manholes, (New type) Complete, Each, | Dollars (\$.....). |
| | 68 | Inlets, (New type), Complete, Each, | Dollars (\$.....). |
| | 1,665 | Linear Feet 12-inch Vitrified Pipe for Basin Connections, Per Linear Foot, | Dollars (\$.....). |
| | 1,100 | Linear Feet 10-inch Vitrified Pipe for Basin Connections, Per Linear Foot, | Dollars (\$.....). |
| 40 | 1,540 | Linear Feet 6-inch Vitrified Pipe for House Connections, Per Linear Foot, | Dollars (\$.....). |
| | 1 | Chamber at Collins Avenue and Adriatic Street, Complete, | Dollars (\$.....). |
| | 1 | Chamber at Fresh Pond Road and Adriatic Street, Complete | Dollars (\$.....). |
| | 1 | Chamber at Fresh Pond Road and Winifred Street, Complete | Dollars (\$.....). |

EXHIBIT C-9 (continued) :

| | | | |
|----|-------|--|--------------------|
| | 1 | Chamber at Fresh Pond Road and Metropolitan Avenue, Complete | Dollars (\$.....). |
| | 1 | Chamber at Fresh Pond Road and Ralph Street, Complete | Dollars (\$.....). |
| | 1 | Drop Chamber at Fresh Pond Road near Adriatic Street, Complete, | Dollars (\$.....). |
| 10 | 5,000 | Feet B. M. Timber for Bracing and Sheet Piling, Per 1,000 Feet | Dollars (\$.....). |
| | 5,000 | Feet B. M. Timber for Foundation, furnished and laid, Per 1,000 Feet, | Dollars (\$.....). |
| | 500 | Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, | Dollars (\$.....). |
| | 500 | Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, | Dollars (\$.....). |
| 20 | 40 | Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, Per Cubic Yard, | Dollars (\$.....). |
| | 7,900 | Cubic Yards Displaced Material for Sewer Embankment, in place, Per Cubic Yard, | Dollars (\$.....). |
| | 2,350 | Linear Feet of Wooden Fence, Per Linear Foot, | Dollars (\$.....). |

TYPE "B"

| | | |
|----|-------|--|
| 30 | 901 | Linear Feet 7'-6" Reinforced Concrete Pipe Sewer (Precast Type B), Per Linear Foot, Thirty six and 00/100 Dollars (\$36.00). |
| | 2,055 | Linear Feet 7'-0" Reinforced Concrete Pipe Sewer (Precast Type B), Per Linear Foot, Thirty one and 00/100 Dollars (\$31.00). |
| | 62 | Linear Feet 5'-0" Reinforced Concrete Pipe Sewer (Precast Type B), Per Linear Foot, Twenty one and 00/100 Dollars (\$21.00). |
| 40 | 303 | Linear Feet 3'-9" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Fourteen and 00/100 Dollars (\$14.00). |
| | 354 | Linear Feet 3'-6" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Eleven and 36/100 Dollars (\$11.36). |

EXHIBIT C-9 (continued):

- 488 Linear Feet 3'-0" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Eight and 40/100 Dollars (\$8.40).
- 516 Linear Feet 2'-6" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Six and 40/100 Dollars (\$6.40).
- 265 Linear Feet 24" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Five and 05/100 Dollars (\$5.05).
- 10 375 Linear Feet 22" Vitrified Pipe Sewer, Per Linear Foot, Five and 85/100 Dollars (\$5.85).
- 265 Linear Feet 20" Vitrified Pipe Sewer, Per Linear Foot, Three and 85/100 Dollars (\$3.85).
- 9 Linear Feet 18" Vitrified Pipe Sewer, Per Linear Foot, Three and 00/100 Dollars (\$3.00).
- 3 Linear Feet 15" Vitrified Pipe Sewer, Per Linear Foot, Two and 00/100 Dollars (\$2.00).
- 222 Linear Feet 12" Vitrified Pipe Sewer, Per Linear Foot, Two and 40/100 Dollars (\$2.40).
- 20 103 Six-inch Spurs, 24-inches long, on Reinforced Concrete Pipe Sewer, Each, Fifty cents (\$0.50).
- 33 Six-inch Spurs on 22" Vitrified Pipe Sewer, Each, Five and 75/100 Dollars (\$5.75).
- 18 Six-inch Spurs on 20" Vitrified Pipe Sewer, Each, Three and 50/100 Dollars (\$3.50).
- 18 Six-inch Spurs on 12" Vitrified Pipe Sewer, Each, One and 50/100 Dollars (\$1.50).
- 1,257 Feet Risers for House Connections, including Y's, Per Foot, One and 60/100 Dollars (\$1.60).
- 30 39 Manholes, Complete, Each, One hundred and 00/100 Dollars (\$100.00).
- 47 Basin Manholes, (New type), Complete, Each, Eighty and 00/100 Dollars (\$80.00).
- 68 Inlets, (New type), Complete, Each, Thirty eight and 00/100 Dollars (\$38.00).
- 665 Linear Feet 12" Vitrified Pipe for Basin Connections, Per Linear Foot, One and 25/100 Dollars (\$1.25).
- 1,100 Linear Feet 10" Vitrified Pipe for Basin Connections, Per Linear Foot, One and 15/100 Dollars (\$1.15).
- 40 1,540 Linear Feet 6" Vitrified Pipe for House Connections, Per Linear Foot, Eighty cents (\$0.80).
- 1 Chamber at Collins Ave. and Adriatic St., Complete, Nine hundred and 00/100 Dollars (\$900.00).
- 1 Chamber at Fresh Pond Road and Adriatic St., Complete, Seven hundred and twenty and 00/100 Dollars (\$720.00).

EXHIBIT C-9 (continued):

- 1 Chamber at Fresh Pond Road and Winifred St., Complete, Six hundred and fifty and 00/100 Dollars (\$650.00).
- 1 Chamber at Fresh Pond Road and Metropolitan Ave., Complete, Six hundred and 00/100 Dollars (\$600.00).
- 1 Chamber at Fresh Pond Road and Ralph Street, Complete, Four hundred and 00/100 Dollars (\$400.00).
- 10 1 Drop Chamber at Fresh Pond Road near Adriatic Street, Complete, Three hundred and 00/100 Dollars (\$300.00).
- 5,000 Feet B. M. Timber for Bracing and Sheet Piling, Per 1,000 Feet, Fifty and 00/100 Dollars (\$50.00).
- 5,000 Feet B. M. Timber for Foundation, furnished and laid, Per 1,000 Feet, Fifty and 00/100 Dollars (\$50.00).
- 500 Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Ten cents (\$0.10).
- 500 Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Ten cents (\$0.10).
- 20 40 Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, Per Cubic Yard, Eight and 00/100 Dollars (\$8.00).
- 7,900 Cubic Yards Displaced Material for sewer embankment, in place, Per Cubic Yard, Twenty five cents (\$0.25).
- 2,350 Linear Feet of Wooden Fence, Per Linear Foot, Fifty cents (\$0.50).

Quantities are approximate only.

No extra compensation.

- 30 VI. The Contractor admits that the quantities of materials to be furnished and the amount of work to be done, as stated in the proposal for bids for the work, are approximate only. The Contractor agrees that The City is not to be held responsible that any of said quantities and amounts shall obtain in the construction of the work, as he has judged for himself as to such quantities and amounts and each of them, and as to the other circumstances affecting the cost of the performance of this contract; and that he will not at any time dispute or complain
- 40 of such statement nor assert that there was any misunderstanding in regard to the character, size or depth of the excavations to be made or the kind or amount of the materials to be furnished or work to be done. The Contractor hereby agrees that he will not ask, demand, sue for, nor seek to recover for the entire work any extra compensation beyond the amount payable for the several classes of work and kinds of materials in this contract

EXHIBIT C-9 (*continued*):

enumerated, which shall be actually performed and furnished, at the prices therefor herein agreed upon and fixed.

Sewers, etc., to be built as shown on the plan.

10 VII. The sewer and appurtenances will be built on the lines, at the depths and at the grades and in the manner shown on the plan of the work as the same will be designated on the ground by the Engineer.

Line may be changed.

20 The President may change the line of the sewer or the location of the receiving basins, or other sewer appurtenances provided such changes do not materially affect either the character or the amount of the work to be done, or the conditions under which it is to be performed, and the Contractor hereby agrees to make no claim for damages or extra compensation on account thereof.

Preservation of points, stakes, etc.

The Contractor will safeguard all points, stakes, grade marks, monuments and bench marks made or established on or near the line of work, and he agrees to accept responsibility for and to remedy at his cost any mistakes that may be caused by the unauthorized disturbance or removal of such points, stakes, grade marks, monuments and bench marks.

30 Written order for extra work.

40 VIII. No claim for additional work or materials shall be made by or allowed to the Contractor, unless before the performance of such additional work the President shall have first authorized the same, in writing, and the same shall have been done or furnished under a written order from the President, given before the performance of such additional work or the furnishing of such additional materials. The aggregate price to be paid for additional work or materials so authorized or ordered shall not exceed five per cent. (5%) of the contract price or the total cost of the work and materials.

Contract may be modified.

This contract may be modified and changed from time to time as may previously be agreed to, in writing, between the parties hereto, in a manner not materially affecting the substance

EXHIBIT C-9 (*continued*) :

thereof or increasing the contract price thereunder, in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed.

Limit to extras.

10 All claims for additional work or materials in any month shall be made to the Engineer, in writing, before the 15th day of the following month, and failing to make such claim within the time required, the rights of the Contractor to additional pay for such additional work or materials shall be deemed to have been waived and forfeited.

Inspection.

Work or materials may be condemned at any time.

20 IX. The Engineer shall inspect the materials furnished and the work done and see that the same correspond with the specifications. The Engineer is hereby authorized and empowered to reject and refuse all labor and material or method of application, or any part thereof, offered under or in fulfillment of this contract, that do not comply in kind, quality or quantity with the terms thereof. Any material delivered or offered to be delivered under this contract, which shall be rejected by the Engineer as not conforming to the terms thereof, will be forthwith removed by the Contractor, and material which does so conform will be forthwith furnished and delivered by him in place thereof. The
30 Contractor hereby agrees not to use any material which has not been inspected and accepted, nor to perform any work except under inspection, to which end he further agrees to notify the Engineer when lines, grades or inspection are required so that the Engineer may have time to provide for the same. No inspection, approval or acceptance of any part of the work herein contracted for or of the materials used therein, or any payment on account thereof, shall prevent the President from refusing to accept the work or materials at any time thereafter.

40 Engineer to be final arbiter.

X. To prevent all disputes and litigation, it is hereby agreed that the Chief Engineer in Charge of Sewers shall, in all cases determine the amount and the quality of the several kinds of work and materials which are to be paid for under this contract, and he shall determine all questions in relation to the work and materials and the construction thereof, and he shall in all

EXHIBIT C-9 (*continued*):

cases decide every question which may arise relative to the execution of this contract on the part of the Contractor, and his decision will be final and conclusive; and such decision, in case any question shall arise, shall be a condition precedent to the right of the Contractor to receive any money under this contract.

10 Any doubt as to the meaning of this contract and the specifications thereof, or any obscurity as to the wording of them, or any discrepancy between them and the plan will be explained by the Engineer, and his explanation will be accepted by the Contractor, who hereby agrees to execute the work in accordance with such explanation, and to make no charge or claim for any extra work or damage on account thereof.

Work and materials must agree with specifications.

20 XI. The work will be performed in the best manner, and all materials of which the work is composed will be of the best kind, and a sufficient number of persons will be at all times employed to execute the work with due dispatch, the whole to be done to the satisfaction of the Engineer, and any materials furnished or work done not satisfactory to the Engineer will be immediately removed and satisfactorily replaced by the Contractor at his own expense; or if he shall neglect or refuse to remove and replace the same when notified so to do by a written notice to be served upon him, then the President may remove, or cause the same to be removed and satisfactorily replaced, by contract or otherwise, as he may deem expedient, and charge the expense
30 thereof to the Contractor: and the expense so charged shall be deducted and paid by The City out of such moneys as are or may become due under this contract.

Examinations.

40 During the progress or after the completion of the work, should the Engineer require it, for the purpose of examining the same, the Contractor will make such openings, and to such extent through such part or parts of the work as the Engineer may direct, and the Contractor will satisfactorily restore the work so disturbed. Should the openings disclose defects in the work such defects shall be remedied in accordance with the provisions of the first paragraph of this section.

Use of patented articles.

XII. Wherever an article or any kind of material is specified by a trade name or by the name of a patentee, manufac-

EXHIBIT C-9 (*continued*):

10 turer or dealer, or by reference to the catalogue of a manufacturer or dealer, it shall be taken as intending to mean and specify the article or kind of material designated, or any other equal thereto in quality, finish and durability, and equally serviceable for the purposes for which it is or they are intended. Nothing on the plan or in the specifications shall be interpreted or taken to violate the provisions of section 1554 of the Greater New York Charter, which provides that "except for repairs, no patented pavement shall be laid and no patented article shall be advertised for, contracted for or purchased, except under such circumstances that there can be a fair and reasonable opportunity for competition, the conditions to secure which shall be prescribed by the Board of Estimate and Apportionment."

Claims for infringement.

20 The Contractor will be responsible for any claims made against The City for any infringement of patents, by the use of patented articles or processes in the construction and completion of the work, and he will have harmless and indemnify The City against all costs, expenses and damages caused by reason of any infringement of patents used in the construction and completion of the work.

Commencement and completion.

30 XIII. The Contractor will begin the work herein agreed to be performed on such date as the President shall notify him to begin on and from which date the time hereinafter fixed for the completion of the work shall begin to run. The place where the work is to be begun will be either stated in said notice or designated on the ground by the Engineer. The commencement of work by the Contractor shall be deemed and taken to be a waiver on his part of notice to begin work, in which case the time for the completion of the work will begin to run on and from the date the work was commenced.

Time of performance.

40 XIV. The Contractor will carry on the work with such force and in such manner and order and at such places, times and seasons, including freezing weather, as may be directed by the Engineer, and will execute all the work in every respect in a thorough and workmanlike manner; and he will fully and entirely perform this contract on his part before the expiration of TWO HUNDRED FIFTY (250) CONSECUTIVE WORKING DAYS.

EXHIBIT C-9 (*continued*):

Time important.

10 It is hereby agreed that the time designated for the performance of all the work under this Contract is of the essence of this agreement, in view whereof it is hereby further agreed that a rate of progress will be maintained so that the work performed up to any time will be at least the same percentage of the total work to be performed under this contract as the net elapsed time at such time is of the total time allowed for the performance of all the work under this contract.

20 In the computation of the number of consecutive working days, the time during which the completion of the work has been delayed in consequence of the condition of the weather, or tides, or by any act or omission of the party of the first part or during such period as the work has been suspended by written order of the President, or delays for which the Contractor is not responsible (all of which will be terminated by the President, who shall certify to the same in writing, and whose determination and certificate thereof shall be binding and conclusive upon the Contractor), will be allowed to the Contractor and will be deducted in computation. Sundays and also holidays on which no work is done, will also be excluded from said computation. In case a larger amount of rock excavation than is set forth in the Engineer's Estimate shall be necessary, an allowance of one day will be made for each cubic yards of such excess of rock excavated and removed in accordance with the measurement of rock allowed
30 by the specifications. If the completion of the work to be done under this contract shall require work or materials or both in greater amounts than those set forth in the Engineer's Estimate of quantities, or if unforeseen obstacles are encountered in the prosecution of said work, then the time which the Contractor is delayed on account thereof will be determined and allowed by the President at the completion of the work, upon the receipt by him of a written application from the Contractor for such determination and allowance. No demand by the Contractor that the President determine and certify the matters aforesaid shall be of
40 any effect whatsoever unless the same be made in writing and duly served upon the President prior to the filing in the office of the Comptroller of The City of the final certificate of the completion and acceptance of the work.

EXHIBIT C-9 (*continued*):

End of time period.

The time shall run against this contract until all work called for in this contract is completed to the satisfaction of the Engineer.

Liquidated damages.

- 10 XV. In case the Contractor shall fail to complete the work hereunder in accordance with the contract within the time aforesaid, he agrees to pay to The City the sum of Ten Dollars (\$10.00) for each and every day the time consumed in said performance and completion exceeds the time hereinbefore allowed for that purpose; which said sum, in view of the difficulty of ascertaining the loss which The City will suffer by reason of delay in the performance of the work hereunder, is hereby agreed upon, fixed and determined by the parties hereto as the liquidated damages that The City will suffer by reason of said delay and default, and not as a penalty; and The City shall and may deduct and retain the amount of such liquidated damages out of the moneys which may be due or become due to the Contractor under this contract.
- 20

Work no provided for in contract.

- 30 XVI. If, before the completion of the work contemplated herein, it shall become necessary to do any other or further work on or near the line thereof than is provided for in this contract, the Contractor will not in any way interfere with or molest such person or persons as the President may employ to do such work, and will carry on the work under this contract in such manner as may be ordered so as to afford all reasonable facilities for doing such other or further work; and no damage or claim by the Contractor shall be allowed therefor, except such allowance of time for delay as the President may deem reasonable.

President's right to suspend work.

- 40 XVII. The President is hereby authorized to suspend the whole or any part of the work herein contracted to be done, if he shall deem it for the interest of The City so to do. During such suspension the trenches shall be backfilled, if required, and the roadways and pavements over the same satisfactorily restored, and all materials upon the work shall be neatly piled so as not to obstruct public travel, or shall be removed from the line of the work, if directed.

EXHIBIT C-9 (continued):

No damages to be claimed for delay
due to other contracts.

10 XVIII. Should postponement or delay be occasioned by the precedence of paving or other contracts, which may have been either let or executed before the opening of the bids for this contract, the Contractor will make no claim for damages therefor nor for any damages in consequence of the street or the adjoining sewers not being in the condition contemplated by the parties at the time of making the contract; if, however, the Contractor shall be delayed in performance of his work by reason of the street or the adjoining sewers not being in such condition, or by reason of the work or any work or any part thereof being suspended as herein before provided, such allowance of time on account thereof as the President shall deem reasonable will be made.

20 If the work be suspended or delayed by any act or omission of The City, or for the reason that The City does not own or has not obtained possession of, or the right to enter upon the land upon which the work is to be performed, or because of any act or omission of any employee or agent of The City or any other Contractor performing work for The City, the President, or whoever is directed by this contract, to make the certificate in reference to time, shall make such allowance of time for the completion of the work as the Engineer shall certify that the work has been delayed. No allowance whatever as damages will be made to the Contractor because of any such suspension or delays, and no
30 claim shall be made by the Contractor on account thereof.

Allowance of time for delays.

XIX. No allowances of time for delays under the provisions of this contract nor the delivery and acceptance of any articles or materials called for by this contract, shall be deemed to be a waiver by the President of the right to abrogate this contract for abandonment or delay in the manner hereinafter provided.

40 Right to construct sewers, etc.

Permits for connections.

XX. Prior to the commencement of and during the progress of the work under this contract the President shall have the right to undertake, and to grant permits for, any construction, reconstruction, and repairing of any pipes, sewers, basins,

EXHIBIT C-9 (continued):

subway ducts and railway tracks, and any appurtenances thereof located on and adjoining the line of the work, and for any connections with and additions to such pipes, etc., and for such purposes the President is hereby authorized to suspend work on any part of this contract, in accordance with Section XVII., and the Contractor will not interfere with nor place any obstructions in the way of any person or persons who may be engaged upon such work. The President is hereby authorized to connect, by contract or otherwise, any sewers and drains with the work built under this contract and to grant permits to any person or persons to make connections therewith at any time before it is completed; and the Contractor will not interfere with nor place obstructions in the way of such persons as may be employed in building such sewers and drains, or in making such connections, and the flow from such sewers, drains and connections will be permitted by the Contractor to discharge into the work built under this contract and the Contractor agrees to make no claim for compensation, damages or delay on account thereof. The issuance of such permits shall not be considered as an acceptance by The City of that part of the sewer into which such connections empty or flow, nor shall the Contractor on account thereof be relieved from the cleaning of the sewer prior to the final examination of the work. No new connections or drains will be allowed to be made or joined to the work built under this contract unless a permit therefor has been duly issued by the President, which permit shall be shown in all cases to the Inspector of the work.

30 Flow of sewer and drains, etc.

Drains, etc., interrupted.

Sewers, etc., to be kept clean.

40 XXI. The Contractor will provide at his own cost for the flow of the sewers, drains and water courses interrupted during the progress of the work, and will immediately cart away and remove all offensive matter. The flow throughout the entire length of such sewers and appurtenances as are to be replaced by the work to be done under this contract will be maintained by the Contractor. The Contractor will remove at his own cost and expense all such bulkheads, as may be directed, from the sewers with which the work under this contract will be connected. When the permanent removal of any existing pipe sewers and appurtenances and pipe drains is necessitated by the work to be done under this contract, such of the materials of such structures as

EXHIBIT C-9 (*continued*):

may be directed shall be carefully taken up, piled and left at the disposal of The City, and shall not be used in the work, and the remainder shall be removed from the work and disposed of by the Contractor. Wherever the work to be built under this contract, or the trenches in which it is to be constructed, follow the line, and occupy the place of or intercept the Fire Alarm Telegraph System of The City, or any existing sewers, drains, culverts, basin connections or house connections for which permits may have been granted prior to the opening of the bids for this contract, the Contractor will make the same good, and will rebuild the Fire Alarm Telegraph System of The City and also said sewers, drains, culverts and connections, or connect the same with the sewer built under this contract, whichever he may be directed to do, at his own cost and expense. All sewers, drains, culverts, basins and basin connections rendered unnecessary by the construction of the work herein contemplated, shall be thoroughly broken up, except as otherwise hereinbefore provided, and satisfactorily filled in by the Contractor at his own cost and expense, as shall also all portions of water courses in, through or across any street that may be rendered unnecessary by the construction of this work. During the progress of the work, and until the completion and acceptance thereof, the sewers, drains, basins, culverts and connections built under this contract shall be kept thoroughly cleaned throughout, and shall be left clean.

Sale of sand or earth.

30 XXII. The Contractor will not sell, nor permit to be removed from the line of the work, before the trench shall have been backfilled, any building sand or earth thrown up, except upon written permission, and then only so much as shall remain after reserving a sufficient quantity to backfill the trench and complete the paving; and the Contractor will, in all cases, backfill the trench with the same material thrown out, provided it be suitable, then the same shall be removed from the line of work, and suitable material procured and used for backfilling the trench, and when required sand of proper quality and depth shall
40 be spread on the surface to receive the pavement.

The Contractor hereby agrees that all excavated material and materials of construction placed by him or for him upon private property, unless by written permission of the owners or lessees thereof, will be removed by him and all damage to said property remedied by him at his own cost and expense. Unless such materials are removed and such damage remedied by the

EXHIBIT C-9 (continued) :

Contractor within 48 hours after the receipt by him of a written notice so to do, he agrees that the President shall be and is hereby authorized to dispose of such materials, and to remedy such damage and to deduct the expense thereof from the moneys due or to become due under this contract.

Contractor to give personal attention to work.

10 Not to assign or sublet.

20 XXIII. The Contractor will give his personal attention constantly to the faithful prosecution of the work; he will not assign, transfer, convey, sublet or otherwise dispose of this contract, or his right, title or interest in or to the same, or any part thereof, without the previous consent, in writing, of the President, indorsed hereon or hereto attached; and he will not assign, by power of attorney or otherwise, any of the moneys to become due and payable under this contract, unless by and with the like consent, signified in like manner: If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys due or to become due under this contract, to any other person, company or other corporation, this contract may, at the option of the President, be revoked and annulled, and The City shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the Contractor, and to his assignee or transferee; provided that nothing herein contained shall be construed to hinder, prevent or affect an assignment by the Contractor for the benefit of his creditors, made pursuant to the statutes of the State of New York; and no right under this contract, or to any money to become due hereunder, shall be asserted against The City, in law or in equity, by reason of any so-called assignment of this contract, or any part thereof, or of any moneys due or to become due hereunder, unless authorized as aforesaid by the written consent of the President.

40 When Contractor is absent.

Disorderly workmen.

Contractor to provide assistance.

XXIV. Whenever the Contractor is not present on any part of the work where it may be necessary to give directions, orders will be given by the Engineer to and shall be received and

EXHIBIT C-9 (*continued*):

obeyed by the superintendents and foremen who may have immediate charge of the men employed on the particular work in relation to which the order may be given; and at any time, if a foreman or workman employed by the Contractor shall be declared by the Engineer to be disobedient, incompetent or disrespectful, the Contractor, on receiving written notice to that effect, will forthwith dismiss such person, and will not again employ him on any part of the work. The Contractor will provide all necessary assistance for the Engineer when required, without charge or expense to The City or Engineer.

Contractor to plank and bridge for traffic.

XXV. The Contractor will observe the law and all ordinances of The City in relation to obstructing the streets, keeping open passageways and protecting the same where they are exposed and would be dangerous to the public travel, and such passageways shall, as may be required, be planked or bridged by the Contractor, at his own expense.

Guards and lights.

Indemnification of City.

XXVI. During the performance of the work herein set forth the Contractor will place proper guards upon and around the same for the prevention of accidents, and at night will put up and keep suitable and sufficient lights, and he will indemnify and save harmless The City against and from all claims, suits and actions, of every name and description, brought against it, and all costs and damages to which it may be put on account or by reason of any injury or alleged injury to the person or property of another, resulting from the prosecution of the work or from negligence or carelessness in the performance of the work, or in guarding the same, or from any improper materials used in its prosecution, or by or on account of any act or omission of the Contractor or his agents; and the Contractor agrees that the whole or so much of the moneys due to the Contractor under and by virtue of this contract, as shall or may be considered necessary by the Comptroller of The City, may, as its option, be retained by The City until all such suits and claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the Comptroller.

EXHIBIT C-9 (*continued*):

Contractor to make repairs.

10 XXVII. In case any injury is done to property along the line of the work, or to any sidewalk, in consequence of any act or omission on the part of the Contractor or his employees or agents in carrying out any of the provisions or requirements of this contract, the Contractor will make such repairs as are necessary in consequence thereof, at his own expense and to the satisfaction of the President, and in case of failure on the part of the Contractor to promptly make such repairs, they may be made by the President, and the expense thereof will be deducted out of the moneys due or to become due to the Contractor under this contract.

Loss or damage to be assumed by Contractor.

20 XXVIII. The Contractor agrees to assume, and to make no claim on account of, any and all loss or damages arising out of the nature of the work to be done under this contract, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the action of the elements, or from incumbrances on or near the line of the work, or from the breaking of water mains, sewer and gas mains on or near the line of the work.

Claims for labor, etc.

30 XXIX. The Contractor will pay promptly, and in cash, for all labor employed upon and all materials furnished and used in the work, and if at any time before or within thirty days after the whole work herein agreed to be performed has been completed and accepted by The City, any person or persons claiming to have performed any labor or furnished any materials toward the performance and completion of the contract, shall file with the President and with the Comptroller of The City any such notice as is described in the Lien Law or any act of the Legislature of the State of New York, then, and in every such case, The City shall retain—anything herein contained to the contrary thereto
40 notwithstanding—from the moneys under its control, and due or to become due under this contract, so much of the moneys as shall be sufficient to pay off, satisfy and discharge the amount in such notice alleged or claimed to be due to the person or persons filing such notice, together with the reasonable cost of any action or actions brought to enforce such claim or the lien created by the filing of such notice. The money so retained shall be retained by The City until the lien thereon created by the said act and the

EXHIBIT C-9 (*continued*):

filing of the said notice shall be discharged, pursuant to the provisions of the said act.

Contractor will prevent filing of liens, etc.

10 XXX. The Contractor will not, at any time, suffer or permit any lien, attachment, or other incumbrances, under the law of this State or otherwise, by any person or persons whomsoever, to remain on file in the Finance Department or at the office of the City Department having supervision of the work against any money due or to become due for any work done or materials furnished under this contract, or by reason of any other claim or demand against the Contractor; and that any such lien, attachment, or other incumbrance, until it is removed, shall preclude any and all claim or demand for any payment whatsoever under or by virtue of this contract.

20 Evidence of satisfaction of liens, etc.

The Contractor further agrees that he will present to the party of the first part satisfactory evidence that all just liens, claims and demands of his employees, or of parties from whom materials used in the construction of the work may have been purchased or procured are fully satisfied and that the materials furnished and work done under this contract are fully released from all such liens, claims and demands before said party of the second part will demand or shall receive the sums due one final payment under this contract.

30 Notice to gas companies, etc.

Not to hinder other companies.

40 XXXI. The Contractor will give notice in writing to all gas, railroad and other companies owning or controlling any pipe, tracks or other structures which during the progress of the work may be affected by the prosecution of the same so that said companies may protect or remove their structures, and he will not cause any hindrance to, or interference with, any such gas company or other company or companies in protecting their said pipes, tracks or other structures, nor in removing or otherwise protecting and replacing the main and service pipe, lampposts, lamps, tracks or other structures where necessary, but the Contractor will suffer the said company or companies to take all such measures as are requisite for the purpose aforesaid. But if said gas, railroad, or other companies, within five days after receipt

EXHIBIT C-9 (*continued*):

of such notice, fail to support, remove or otherwise protect their structures (except such railroad tracks or other railroad structures upon or within a right of way owned by a railroad company (see Section XXXIV), the Contractor will upon the approval of the President protect or remove the same, it being expressly understood that the cost thereof shall not be a charge against The City, but shall be a matter for adjustment between the Contractor
10 and the company or companies concerned.

Pipes, conduits, etc., of private companies.

XXXII. It is hereby agreed that The City is not responsible or liable for the support, protection or reconstruction of such gas pipes, conduits, water pipes, tracks or structures owned by private companies enjoying special franchises or occupying any portion of the street or way on or below the surface in its streets or ways, as the Contractor admits that he has carefully
20 examined the location of work, has made special inquiry at the offices of the companies owning, controlling or operating said pipes, conduits, tracks and structures, and he has determined to his satisfaction the character, size, location and length of such pipes, conduits, tracks and structures; that he has inspected the public records of the various City Departments having cognizance and control of pipes, conduits, and other subsurface structures, and of The City's water pipes, conduits and sewers, and he has made such further personal inspection and investigation as he deemed proper to determine the correctness of the information
30 so obtained; and he clearly understands that The City does not insure the accuracy of such reports or information, and agrees that he will not make any claim against The City for damages or extra work caused or occasioned by his relying upon such records, reports or information furnished by any City Department or any companies, either as a whole or in part.

Protection and restoration of pipes, etc., of private companies.

XXXIII. The Contractor agrees to confer with and to
40 make to or entertain an offer from such private companies as own the said pipes, conduits, tracks or structures, except such railroad companies whose tracks or other railroad structures are upon or within a right of way owned by said companies (see Section XXXIV); and the Contractor further agrees to enter into an agreement with said companies by what terms and at what prices the support, protection, removal and reconstruction

EXHIBIT C-9 (*continued*) :

of the pipes, conduits, tracks and structures will be undertaken and accomplished, and in the event of the failure to make such an agreement with said companies, he will not complain nor make any demand on The City for additional compensation or pay for supporting, protecting, removing or restoring the said pipes, conduits, tracks or other structures.

- 10 Agreement between City and railroad company, etc.

XXXIV. If for the purpose of performing the work required by this contract The City has entered into an agreement with any railroad company owning a right of way, or with the owners of any property through or across which the work, or any part thereof, is to be constructed, the Contractor agrees to carry on such part thereof as directed in accordance with the terms of such agreement, a copy whereof is hereto annexed and is hereby agreed upon as forming part of this contract.

- 20 Contractor to notify Department Water Supply, Gas and Electricity.

XXXV. At least twenty-four hours before breaking ground, for the purpose of constructing the work of this contract, the Contractor agrees to give notice thereof in writing to the Department of Water Supply, Gas and Electricity.

City's water pipes, etc.

- 30 XXXVI. If upon excavating it shall be found that any existing water pipes or appurtenances owned or controlled or operated by The City follow the lines, or occupy the place, of the sewer or sewers and appurtenances to be laid or built as shown on the plan, such existing water pipes and appurtenances will be removed and relaid, or rebuilt, by and at the cost of the Department of Water Supply, Gas and Electricity of The City of New York; if, however, in order to facilitate the work to be done under this contract, it be found desirable to temporarily remove any water pipes or appurtenances owned or controlled or operated by
40 The City, the removal and replacing in their original positions of such water pipes and appurtenances will be done by the Department of Water Supply, Gas and Electricity for the Contractor at his cost and expense.

Protection of City's water pipes, etc.

XXXVII. The Contractor agrees to protect all water mains and service water pipes owned, controlled or operated by

EXHIBIT C-9 (*continued*):

10 The City which may be affected in any manner by the work done under this contract, except as hereinbefore provided, and to protect all such water and service pipes from freezing, and if he fails to do so, the Commissioner of Water Supply, Gas and Electricity is hereby authorized to protect such main and service pipes, or in the event of their having suffered injury to replace such pipes, and recalk and repair the same immediately, as the work progresses, and the cost thereof shall be charged to the Contractor; the cost so charged shall be deducted from any sum or sums due or to become due to the Contractor under this contract, and in case such sum or sums shall be insufficient to cover such cost, the Contractor will be liable for the balance.

Protection of gas and water mains and pipes, etc.

20 XXXVIII. The Contractor agrees to sustain in their places and protect from injury all water or gas mains, conduits, subways or service pipes, steam pipes and pneumatic pipes, and all sidewalks, curbs, stoops, areas, and all other property in the vicinity of his work, from direct or indirect injury by caving or otherwise, and he hereby assumes all expenses for direct or indirect damage which may be occasioned by injury to any of them, and he agrees to have at all times a sufficient quantity of timber and other necessary materials and appliances on the ground, and will use the same, as required, for bracing and sheeting the sides and ends of excavations, and for sustaining and supporting any an dall pipes, conduits, subways, lamp-posts and lamps or other
30 structures that are undermined, weakened, endangered or threatened; and in case any damage or injury shall or may result to said pipes, conduits, subways, lamp-posts and lamps and other works or structures or any gas, electric, railroad or other company whatsoever, or to any private property, through or by reason of any negligence, wilfulness, carelessness or want of skill on the part of the Contractor, his agents or servants, the Contractor hereby agrees to pay such amount as may be sufficient to cover the expense and damages occasioned by such negligence, wilfulness, carelessness or unskillfulness, and that such amount shall
40 be charged against him; and the President is hereby authorized to deduct and retain from any moneys which may be due, or which shall become due, under this Contract, a sum sufficient, in his judgment, to cover the cost of making good any such damages, expense or loss, and to apply said sum so deducted and retained to the requisite repairs or renewals, or to reimburse the parties damaged or injured.

EXHIBIT C-9 (*continued*):

Old water and gas pipes.

- 10 XXXIX. All iron, water and gas pipes which it becomes necessary to remove shall be considered the property of The City and will be piled by the Contractor in such part or parts of the streets as may be directed, unless notice to the contrary is given him in writing, in which case he will remove the same at his own expense.

Change of grade.

- XL. In case the grade of the street shall be changed during the progress of the work, the Contractor will conform to the altered grade at the contract prices, as far as they are applicable; and for any work for which there is no contract price, the provisions in relation to work not provided for in this contract shall apply.

- 20 Measurement of work and material.

- 30 XLI. All quantities of work and materials to be paid for will be measured and determined, according to the plan and the working lines that may be given, and the specifications, when the work conforms thereto. No allowance will be made on any part of the work for any excess above the quantities required by such plan, lines and specifications. Should the dimensions of any part of the work, or of the materials, be less than those required by the plan, the actual quantities only will be allowed in measurement.

Payment on acceptance of work.

- 40 XLII. The Contractor will not be entitled to demand or receive payment for any portion of the work or materials unless the same has been fully completed in the manner set forth in this contract, and such completion duly certified by the Engineer in Charge of Sewers, and until each and every one of the stipulations hereinbefore mentioned is complied with, and the work completed to the satisfaction of the President and accepted by him, and the final certificate of completion and acceptance thereof, signed by the President and said Engineer, filed with the Comptroller. The City will pay to the Contractor on or before the expiration of thirty days from the filing of said final certificate of completion and acceptance in the office of the Comptroller, the whole of the moneys accruing to the Contractor, under this contract, except such sum or sums of money as shall be retained under any of the

EXHIBIT C-9 (*continued*) :

provisions herein contained for that purpose, or in any law of the State, or under any ordinance of The City passed prior to the date of this contract and now in force.

Moneys to be retained for repairs to unpaved streets.

10 It is hereby further agreed that The City shall be and is hereby authorized to retain out of the moneys payable to the Contractor, during a period of six months from the date of the final completion and the acceptance by the President of the work done under this contract, the sum of 15 cents for each linear foot of sewer, basin connection, and house connection constructed under this contract. And should the Contractor fail to make such repairs to the street surface as may become necessary by reason of the work done under this contract within two days of the date of service of notice upon him so to do, then the President may expend such sum or any part thereof in making such repairs.

20 Payment of retained moneys to be made after six months.

It is hereby further agreed that The City, upon the expiration of the said period of six months, will pay to the said party of the second part the whole or such part of the moneys retained as may remain after the expenses of making said repairs, in the manner aforesaid, shall have been paid therefrom.

Termination of six months' period.

30 It is hereby further agreed that if the termination of the said period of six months after the completion and acceptance of the work done under this contract shall fall within the months of December, January, February or March, then and in that case the said months of December, January, February and March, or such part thereof as the President may determine, will not be included in the computation of said period of six months.

Final certificate to control.

40 XLIII. The action of the Engineer in Charge of Sewers, by which the Contractor is to be bound and concluded according to the terms of this Contract shall be that evidenced by said Engineer's final certificate, all prior certificates upon which eighty-five per centum (85%) payments may have been made being merely estimates, and subject to the corrections of such final certificate, which may be made without notice to the Contractor thereof, or of the measurements upon which the same is based.

EXHIBIT C-9 (continued) :

85% payments.

10 XLIV. In case the amount of this contract, based on the
Engineer's estimate and the contract prices, shall be five thou-
sand dollars (\$5,000.00) or over, payment will be made to the Con-
tractor by monthly installments of eighty-five Per Cent. (85%)
of the estimated value of the work performed, provided the work
is being prosecuted in conformity with the provisions of the con-
tract, and in a manner satisfactory to the Engineer, in which case,
however, the quantity returned shall be such that the amount paid
will be fairly due and in accordance with the provisions and
stipulations of this contract; provided, the amount of work done
on each installment shall not be less than fifteen hundred dollars
(\$1,500.00); and provided that The City may at all times reserve
and retain out of said installments, or any of them, all such sum
or sums as by the terms hereof or any act of the Legislature of the
20 State of New York, or of any ordinance of The City of New York,
now in force, it is or may be authorized to reserve or retain; and
provided that where the Contractor, although the lowest bidder
in the gross calculation, is to receive unusual or extraordinary
prices for any of the different items of the work when considered
separately, nothing herein contained shall be construed to affect
the right of the President to determine the amount that may be
due from time to time, not necessarily by the prices agreed upon
in this contract, but by causing an estimate to be made of the
value of the work done, taking as a basis of the calculations the
whole amount of money that will have become due, according to
30 the terms of this contract, when the whole work shall be com-
pleted.

If abandoned, etc.

Contract may be declared abandoned.

Completion of work to be undertaken by President.

40 XLV. The Contractor hereby agrees that if the work to
be done under this contract shall be abandoned by him, or if this
contract shall be assigned or the work sublet by him otherwise
than as provided by the terms hereof, or if at any time the En-
gineer shall be of the opinion, and shall so certify, in writing, to
the President that the performance of the contract is unneces-
sarily or unreasonably delayed, as evidenced by its actual rate
of progress compared with the required progress (See Section
XIV); or that the Contractor is wilfully violating any of the

EXHIBIT C-9 (continued) :

conditions or covenants of this contract or the specifications thereof, or is executing the same in bad faith, or not in accordance with the terms thereof, or that the work is not fully completed within the time designated in this contract for its completion, the President may declare this contract or any part thereof abandoned and notify the Contractor to discontinue all work or any part thereof under this contract, by a written notice to be
10 served upon the Contractor either personally, or by leaving said notice at his residence, or with his agent in charge of the work, or in the manner provided in Section XLVI., or with any employee found on the work, and the Contractor agrees to thereupon discontinue said work or such part thereof, and he further agrees that the President shall thereupon have the power to contract for the completion of the contract in the manner prescribed by law, or to place such and so many persons as he may deem
20 advisable, by contract or otherwise, to work at and complete the work declared abandoned, and to use such materials as he may find upon the line of the work, and to procure other materials for the completion of the same, and to charge the expense of said labor and materials to the Contractor; and it is further agreed that the expense so charged shall be deducted and paid by The City out of such moneys as may be due or may at any time thereafter become due to the Contractor under and by virtue of this contract, or any part thereof. And in case such expense shall exceed the amount which would have been payable under the contract if the same had been completed by the Contractor, he shall
30 and will pay the amount of such excess to The City. Should the Contractor fail to complete the work as stipulated herein, or should the contract be declared abandoned, he agrees to forfeit all money earned, but unpaid whether certified or not at the time of the abandonment of the contract. In case such expense shall be less than the sum which would have been payable under the Contract if the same had been completed by the Contractor, he agrees to forfeit all claim to the remainder; and when any particular part of the work is being carried on by the President, by contract or otherwise, under the provisions of this clause of the
40 contract, the Contractor agrees to continue the remainder of the work in conformity with the terms of this contract and in such manner as in nowise to hinder or interfere with the persons or workman employed, as above provided, by the President, by contract or otherwise, to do any part of the work, or to complete the same under the provisions of this section of the contract.

EXHIBIT C-9 (*continued*):

Notice to Contractor.

10 XLVI. It is agreed that the residence or place of business, given in the bid upon which this contract is founded, is hereby designated as the place where all notices, letters and other communications shall be served, mailed or delivered. It is further agreed that any notice, letter or other communication addressed to the Contractor and delivered at the above-named place, or deposited in a post-paid wrapper in any post-office box regularly maintained by the post-office, shall be deemed sufficient service thereof upon the Contractor. It is also further agreed that the place named may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the President. It is also further agreed that nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

20 Labor law.

30 XLVII. The Contractor agrees that he will comply with the provisions of "The Labor Law." He further agrees that no laborer, workman or mechanic in the employ of the Contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be permitted or required to work more than eight hours in any one calendar day, except in cases of extraordinary emergency, caused by fire, flood or danger to life or property: that the wages to be paid for a legal day's work to all classes of such laborers, workmen or mechanics upon public work or upon any material to be used thereupon shall not be less than the prevailing rate for a day's work in the same trade or occupation in the locality where such public work is being constructed. Each such laborer, workmen or mechanic shall receive the prevailing rate of wages. This contract shall be void and of no effect, unless the person or corporation, making or performing the same shall comply with the provisions of section 14 of the Labor Law.

40 No estoppel.

XLVIII. The City shall not, nor shall any Department or officer thereof be precluded or estopped by any return or certificate made or given by the President, any Engineer or other officer, agent or appointee of The City under any provision of this contract from at any time (either before or after the final completion and acceptance of the work and payment therefor pur-

EXHIBIT C-9 (*continued*):

10 suant to any such return or certificate) showing the true and correct amount, quality and character of the work done and materials furnished by the Contractor, or any other person under this contract, or from showing at any time that any such return or certificate is untrue and incorrect or improperly made in any particular, or that the work and materials, or any part thereof do not in fact conform to the contract; and The City shall not be precluded or estopped, notwithstanding any such return or certificate or payment in accordance therewith, from demanding and recovering from the Contractor such damages as it may sustain by reason of his failure to comply with the contract.

Understanding of plans and specifications.

20 XLIX. The Contractor hereby distinctly and expressly declares and acknowledges that, before the signing of this contract, he has carefully read the same, and the whole thereof, together with and in connection with the plan and specifications, and that he has made such examination of this contract and of said plan and specifications, and the location where said work is to be done, and such investigation of the work required to be done, and in regard to the material required to be furnished, as to enable him to thoroughly understand the intention of the same, and the requirements, covenants, agreements, stipulations and restrictions contained in this contract and in said plan and specifications; and distinctly agrees that he will not hereafter make any claim or demand upon The City, based upon or arising out of any alleged misunderstanding or misconception on his part of the said requirements, covenants, stipulations and restrictions: and that any information given to the Contractor by the Engineer or others as to the quantities in the work, prior to, or during the progress of the work, shall have no bearing or effect whatsoever, upon the total amount of work to be paid for, in the final settlement.

30 Chap. 478, Laws 1916.

40 This contract shall be void and of no effect unless the person or corporation making or performing the same shall secure compensation for the benefit of, and keep insured during the life of this contract, the employees engaged thereon, in compliance with the provisions of Chapter 41 of the laws of 1914, known as the Workmen's Compensation Law, and acts amendatory thereof.

EXHIBIT C-9 (continued) :

IN WITNESS WHEREOF, The President of the Borough of Queens has hereunto set his hand for and on behalf of The City of New York, and the Contractor has also hereunto set his or its hand the day and year herein first above written; and the President and Contractor have executed this agreement in triplicate; one part of which is to remain with the President, one other to be filed with the Comptroller of The City of New York, and the third to be delivered to the Contractor.

.....
Acting President of the Borough of Queens.

JOSEPH L. SIGRETTO & CO.,

By Joseph L. Sigretto,
President.

(Contractor (s)).

20

The City and State of New York, ss.
County of Queens

On this 27th day of April 1917, before me personally came Richard S. Newcombe to me known and known to me to be the Acting President of the Borough of Queens, of The City of New York, the person described as such in and who as such executed the foregoing instrument, and he acknowledged to me that he executed the same as said Acting President for the purposes therein mentioned.

30

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

40

EXHIBIT C-9 (*continued*):

The City and State of New York, ss:
County of Queens

On this 23rd day of April, 1917, before me personally came Joseph L. Sigretto to me known and known to me to be the President of Joseph L. Sigretto and Co. who being by me duly sworn, did depose and say for himself that he resides in Orange, N. J.; that he is the President of Joseph L. Sigretto and Co., the corporation described in and which executed the above instrument; that he knew the corporate seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said Joseph L. Sigretto and Co., and that, by like order, he thereunto signed his name and official designation.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

20

KNOW ALL MEN BY THESE PRESENTS, That we Joseph L. Sigretto and Co., as principal, and National Surety Company and United States Fidelity and Guaranty Company as surety are held and firmly bound unto The City of New York, in the sum of FIFTY SIX THOUSAND DOLLARS, lawful money of the United States of America, to be paid unto THE CITY OF NEW YORK, or to its certain attorneys, successors or assigns; for which payment, well and truly to be made, we and each of us do bind ourselves, and our several and respective heirs, executors, administrators and assigns, jointly and severally, firmly by these presents.

30

Signed and dated this 23rd day of April, 1917.

WHEREAS, The above bounden Joseph L. Sigretto and Co., by an instrument in writing, under their hands, and bearing even date with these presents, one part whereof is hereto annexed, have contracted with The City of New York, by the President of the Borough of Queens, to furnish all the labor and materials, and to excavate for, build, construct and in all respects complete sewer and appurtenances in Collins Avenue from Mt. Olivet Avenue to Adriatic Street; Adriatic Street, from Collins Avenue to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue to Woodbine Street, Second Ward, together with all the work incidental thereto, as is fully and at large set forth and described in the contract aforesaid.

40

EXHIBIT C-9 (*continued*):

10 NOW, THEREFORE, The condition of the above obligation is such that if the said above bounden Joseph L. Sigretto and Co and its, his or their heirs, executors, administrators and assigns, or any or either of them, shall well and truly, and in a good, sufficient and workmanlike manner, perform or cause to be performed the said contract, and each and every of the covenants, promises, agreements and provisions therein contained on their part to be performed, and complete the same within the period therein stipulated, and in each and every respect comply with the conditions therein contained, then this obligation to be void; otherwise, to remain in full force and virtue.

Joseph L. Sigretto & Co. [L. S.]

By JOSEPH L. SIGRETTO [L.S.]
President.

20 National Surety Company [L. S.]

By FRANK T. GILSON [L. S.]
Resident Vice-President.

Attest L. W. FITZGERALD
Res. Ast. Secretary.

United States Fidelity and Guaranty
Company

30 ALONZO GORE OAKLEY,
Attorney-in-fact.

Attest A. VAN TAMBACHT,
Attorney-in-fact.

The City and State of New York, ss.
County of Queens

40 On this 23rd day of April, 1917, before me personally came Joseph L. Sigretto to me known and known to me to be the President of Joseph L. Sigretto and Co. who, being by me duly sworn, did depose and say for himself that he resides in Orange, N. J.; That he is the President of the Joseph L. Sigretto and Co., the corporation described in, and which executed the above instrument, that he knew the corporate seal of said corporation; that the seal affixed to the said instrument is such corporate seal: that it was so affixed by order of the Board of Directors of said

EXHIBIT C-9 (*continued*):

Joseph L. Sigretto and Co., and that by like order he thereto signed his name and official designation.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

10 STATE OF NEW YORK,
COUNTY OF NEW YORK, ss.

On April 25, 1917, before me personally appeared FRANK T. GILSON, Resident Vice-President of the NATIONAL SURETY COMPANY, with whom I am personally acquainted, who, being by me duly sworn, said that he is the Resident Vice-President of the NATIONAL SURETY COMPANY, the corporation described in and which executed the within instrument; that he knows the corporate seal of said Company; that the seal affixed to the within instrument is such corporate seal; that it was affixed by order of the Board of Directors of said Company, and that he signed said instrument as Resident Vice-President of said Company by like authority; and that the liabilities of said Company, do not exceed its assets as determined by an audit of the Company's annual statement filed with the Superintendent of Insurance of the State of New York and certified to by said Superintendent, pursuant to Section 2 of Chapter 182 of the Laws of the State of New York for the year 1913, amending section 182 of chapter 33 of the Laws of the State of New York for the year 1909 constituting chapter 28 of the Consolidated Laws of the State of New York. And said FRANK T. GILSON further said that he is acquainted with L. W. FITZGERALD and knows him to be the Resident Assistant Secretary of said Company; that the signature of the said L. W. FITZGERALD subscribed to the said instrument is in the genuine handwriting of the said L. W. FITZGERALD and was thereto subscribed by the like order of the said Board of Directors and in the presence of him, the said Resident Vice-President.

40 CHARLES J. KOCH,
Notary Public, For Kings County, No. 33; Certificate filed in New York Co. No. 156; Bronx No. 10, Queens No. 76, Richmond & Westchester Counties; Kings County Register's Office No. 8025; New York County Register's Office No. 8139; Bronx County Register's Office No. 823; My Commission expires March 30, 1918.

EXHIBIT C-9 (*continued*):

COPY OF BY-LAW

BE IT REMEMBERED: That at a regular meeting of the Board of Directors of the NATIONAL SURETY COMPANY, duly called and held on the sixth day of February, 1912, a quorum being present, the following By-Law was adopted:

ARTICLE XIII.

10

Section I. *Signatures required*.—All bonds, recognizances, or contracts of indemnity, policies of insurance, and all other writings obligatory in the nature thereof, shall be signed by the President, a Vice-President, a Resident Vice-President, or Attorney-in-Fact, and shall have the seal of the Company affixed thereto, duly attested by the Secretary, an Assistant Secretary, or Resident Assistant Secretary. All Vice-Presidents and Resident Vice-Presidents shall each have authority to sign such instruments, whether the President be absent or incapacitated, or not, and the Assistant Secretaries and Resident Assistant Secretaries shall each have authority to seal and attest such instruments, whether the Secretary be absent or incapacitated, or not; and the Attorneys-in-Fact shall each have authority, in the discretion of such Attorneys-in-Fact, to affix to such instruments an impression of the Company's seal, whether the Secretary be absent or incapacitated, or not, or to attach the individual seal of the Attorney-in-Fact thereto, or to use the scroll of the Attorney-in-Fact, or a water, wax, or other similar adhesive substance affixed thereto, or a seal of paper or other similar substance affixed thereto by mucilage, or other adhesive substance, or use the word "seal" or the letters "L. S." opposite the signature of such Attorneys-in-Fact, as the case may be.

20

30

The City and State of New York, ss:
County of Queens

I, L. W. FITZGERALD, Resident Assistant Secretary of the NATIONAL SURETY COMPANY, have compared the foregoing By-Law with the original thereof, as recorded in the Minute Book of said Company, and do certify that the same is a correct and true transcript therefrom, and of the whole of Article XIII. Section I of said original By-Law.

40

Given under my hand and the seal of the Company,
in the County of New York, April 25, 1917.

L. W. FITZGERALD,
Resident Assistant Secretary.

EXHIBIT C-9 (continued) :

For use in New York and other states which do not require published figures to conform to statement furnished the department of such state after audit by them.

NATIONAL SURETY COMPANY OF NEW YORK

Financial Statement, December 30th, 1916.

10 **WM. B. JOYCE, President. HUBERT J. HEWITT, Secretary.**

ASSETS

| | | |
|----|---|------------------------|
| | Cash in Banks and Offices | \$2,475,272.31 |
| | Government, Municipal and Other Bonds, and Stocks | 8,734,216.18 |
| | Real Estate, Mortgages and Collateral Loans | 264,157.99 |
| | Unpaid Premiums (excluding Premiums 90 days overdue) | 962,208.57 |
| 20 | Accrued Interest and Accounts Receivable | 505,057.52 |
| | Total, | <u>\$12,940,912.57</u> |

LIABILITIES.

| | | |
|----|--|------------------------|
| | Unearned Premium Reserve | \$2,780,723.87 |
| | Contingent Claim and Expense Reserve (Less Re- insurance) | 1,079,726.62 |
| 30 | Reserve for taxes and Unpaid Commissions (not due) | 287,026.46 |
| | Accounts Payable and Expenses Incurred (not due) | 157,339.87 |
| | Dividend Declared (Payable Jan. 2nd, 1917) | 90,000.00 |
| | Capital Stock | 4,000,000.00 |
| | Surplus | 4,546,095.75 |
| | Total, | <u>\$12,940,912.57</u> |

40 **STATE OF NEW YORK,**
COUNTY OF NEW YORK, ss:

L. W. FITZGERALD being duly sworn, says: That he is Resident Assistant Secretary of the NATIONAL SURETY COMPANY, that said Company is a Corporation duly organized, existing, and engaged in business as a Surety by virtue of the Laws of the State of New York, and has duly complied with all the requirements of the Laws of said State and of the Laws of the

EXHIBIT C-9 (*continued*):

10 State of New York applicable to said Company, and is duly qualified to act as Surety under such Laws; that said Company has also complied with and is duly qualified to act as Surety under the Act of August 13, 1894, entitled, "An Act Relative to Recognizances, Stipulations, Bonds and Undertakings, and To Allow Certain Corporations To be Accepted As Surety Thereon," as amended by the Act of Congress of March 23, 1910. That the foregoing is a full, true and correct statement of the financial condition of said Company on the 30th day of December, 1916.

L. W. FITZGERALD,
Resident Assistant Secretary.

Sworn to before me this April 25, 1917,

20 CHARLES J. KOCH,
Notary Public For Kings County, No. 33; Certificate filed in New York Co. No. 156; Bronx No. 10, Queens No. 76, Richmond & Westchester Counties; Kings County Register's Office No. 8025; New York County Register's Office No. 8139; Bronx County Register's Office No. 823; My Commission expires March 30, 1918.

FUNDS

PRESIDENT'S CERTIFICATE

30 It is hereby certified that the estimated cost of the work and materials required by the within contract is ONE HUNDRED AND FORTY THREE THOUSAND AND THIRTY AND 79/100 DOLLARS (\$143,030.79), and is chargeable to the Street Improvement Fund of The City of New York.

.....
Acting President of the Borough of Queens.

40 The City of New York, April 27th, 1917.

EXHIBIT C-9 (continued):

State of New York, County of New York, ss:

10 On the 25 day of April 1917, before me personally came ALONZO GORE OAKLEY, to me known, who, being by me duly sworn did depose and say that he resides in the City of New York; that he is attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, the corporation described in, and
20 which executed the within instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation, and that he signed his name thereto by like order; and that the said Company has received from the Superintendent of Insurance of the State of New York a certificate of solvency and of its sufficiency as surety or guarantor, under Chapter 182 of the Insurance Law of the State of New York as amended by Chapter 182 of the Laws of 1913, and that
20 GORE OAKLEY further said that he is acquainted with A. VAN TAMBACHT and knows him to be the Attorney-in-fact of said Company; that the signature of said A. VAN TAMBACHT, subscribed to the within instrument, is in the genuine handwriting of said A. VAN TAMBACHT, and was subscribed thereto by like order of said Board of Directors, and in the presence of him the said ALONZO GORE OAKLEY.

GERTRUDE ACHILLES,

30 Commissioner of Deeds of the City of New York, Residing in Richmond County; Certificates filed in New York County Clerk's Office No. 3, Reg. No. 19002; King's County Clerk's No. 53a, Reg. No. 9000, Bronx County Clerk's No. 1, Reg. No. 9080, Queens County Clerk's No. 8191, and Richmond County. My Commission Expires January 23rd, 1919.

40 At a special meeting of the Board of Directors of the UNITED STATES FIDELITY AND GUARANTY COMPANY, held in the City of Baltimore, State of Maryland, on the 22nd day of October, A. D. 1915, the following resolution was unanimously adopted:

Resolved, That ALONZO GORE OAKLEY, or EDWARD R. LEWIS, or ADOLPHUS A. JACKSON, or WILLIAM H. ESTWICK, or GILMAN ASHBURNER, or A. VAN TAMBACHT, or J. FRANK SUPPLEE, or E. G. BABCOCK, or

EXHIBIT C-9 (*continued*):

10 GEORGE A. READING, or CHARLES E. FINKEN, or S. FRANK HEDGES, attorneys-in-fact of this Company in the State of New York, be and they hereby are, and each of them is authorized and empowered to execute and deliver and to attach the seal of the Company to any and all bonds and undertakings for, or on behalf of the Company, in its business of guaranteeing the fidelity of persons holding places of public or private trust and the performance of contracts other than insurance policies, and executing or guaranteeing bonds and other undertakings re-
20 quired or permitted in all actions or proceedings or by law required, including co-suretyship and reinsurance agreements; such bonds, undertakings and agreements, however, to be attested in every instance by one other of the persons above named, as occasion may require, provided, that if such bonds, undertakings and agreements are not executed by either ALONZO GORE OAKLEY, or EDWARD R. LEWIS, or ADOLPHUS A. JACKSON, or WILLIAM H. ESTWICK, then and in such event, said bonds, undertakings and agreements shall be attested by either the said ALONZO GORE OAKLEY, or EDWARD R. LEWIS, or ADOLPHUS A. JACKSON, or WILLIAM H. ESTWICK; and the aforesaid attorneys-in-fact are, and each of them is hereby authorized and empowered to certify a copy of this resolution under the seal of this Company.

State of New York, County of New York, ss:

30 I, _____, Attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, have compared the foregoing resolution with the original thereof, as recorded in the minute book of the said Company, and do hereby certify that the same is a true and correct transcript therefrom, and of the whole of said original resolution.

Given under my hand and the seal of the Company, at the City of New York, this 25th day of April 1917.

J. FRANK SUPPLEE,
Attorney-in-fact.

EXHIBIT C-9 (continued) :

**STATEMENT UNITED STATES FIDELITY AND
GUARANTY COMPANY**

At the close of business Dec. 31, 1916.

Commenced business August 1, 1896.

ASSETS

| 10 | Par Value. | | Market Value. |
|----|----------------|--|----------------------|
| | \$ 653,000.00 | Government Bonds | \$ 644,450.00 |
| | 4,434,448.84 | Baltimore City and other Municipal, State and County Bonds | 4,340,560.84 |
| | 1,999,600.00 | Railroad and Equipment Bonds | 1,871,829.00 |
| | 235,000.00 | Street Railway Bonds | 223,225.00 |
| | 1,129,000.00 | Miscellaneous Bonds | 1,111,182.50 |
| | 396,095.00 | Bank, Railway and Miscellaneous Stocks | 588,276.00 |
| 20 | 100,000.00 | Lawyers Surety Co. Stock, repres- ented by \$150,000 New York City Bonds deposited with the Superin- tendent of Insurance of the State of New York, and other assets | 140,000.00 |
| | <hr/> | | |
| | \$8,947,143.84 | Total Bonds and Stocks Market Values Dec. 31, 1916 | <hr/> \$8,919,523.34 |
| | | Home Office Property appraised by Insurance De- partment of Maryland | 600,000.00 |
| 30 | | Other Real Estate appraised by Insurance Depart- ment of Maryland | 120,608.11 |
| | | Loans secured by pledge of Colaterals | 29,399.00 |
| | | Loans secured by Mortgages | 18,800.00 |
| | | Cash on Hand and in Depositories | 1,535,191.07 |
| | | Premiums in course of collection, not more than three months due | 1,608,056.18 |
| | | Due for Subscriptions Department of Guaranteed Attorneys | 77,571.76 |
| | | Accounts with Suspended Banks | 1,864.41 |
| 40 | | Deposits with New York Compensation Commission and Workmen's Compensation Reinsurance Bu- reau | 111,152.48 |
| | | Deposits with New York Excise Reinsurance Com- mission | 80,328.00 |
| | | Audited and approved claim Peoples Surety Com- pany | 28,041.11 |

EXHIBIT C-9 (continued) :

| | |
|--------------------------------|-----------------|
| Interest due and accrued | 121,565.63 |
| Other Assets | 87,438.74 |
| | <hr/> |
| | \$13,339,539.83 |

LIABILITIES.

| | | | |
|----|---|----------------|-----------------|
| 10 | Capital Stock paid in cash | \$3,000,000.00 | |
| | Due for Return Premiums and Reinsurance | 89,862.15 | |
| | Funds held under Reinsurance Treaties | 51,163.94 | |
| | Reserve for 1917 Taxes and Expenses in transit ... | 206,984.23 | |
| | Commissions accrued on uncollected premiums | 314,324.97 | |
| | Due U. S. Government Federal Income Tax de- deducted from salaries | 1,059.50 | |
| | Premium Reserve Compound in Ac- cordance with Requirements of New York Insurance Dept. | \$4,832,490.80 | |
| 20 | Reserve for Claims Admitted and not Admitted, all Departments, in accordance with New York Laws | 3,058,370.36 | |
| | Surplus | 1,785,283.88 | 9,676,145.04 |
| | | | <hr/> |
| | | | \$13,339,539.83 |

State of New York, County of New York, ss:

....., being duly sworn, says: that he is the Attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, and that, to the best of his knowledge and belief, the foregoing is a true and correct statement of the financial condition of said Company, as of Dec. 31, 1916, and that the financial condition of said Company is as favorable now as it was when such statement was made.

J. FRANK SUPPLEE.

Subscribed and sworn to before me
this 25th day of April, 1917.

40 GERTRUDE ACHILLES,
Commissioner of Deeds of the City of New York,
Residing in Richmond County; Certificates filed in
New York County Clerk's Office No. 3, Reg. No.
19002; Kings County Clerk's No. 53a, Reg. No. 9000,
Bronx County Clerk's No. 1, Reg. No. 9080, Queens
County Clerk's No. 8191, and Richmond County. My
Commission Expires January 23rd, 1919.

EXHIBIT C-9 (continued):

SPECIFICATIONS

TRENCHES

Length of trench.

- 10 1. Unless otherwise directed or permitted not more than 200 feet of any trench in advance of the end of the built sewer shall be open at any time, and unless written permission to the contrary is given, the trench shall be excavated to its full depth for a distance of at least 20 feet more than the minimum length of sewer permitted to be laid in it. (See paragraphs 159 and 182.) Trenches for house connection drains shall not be open on both sides of the street at the same time, unless permission has previously been given to close the street. Unless otherwise directed each trench for basin connections and house connection drains shall be fully excavated for its entire length before any pipes are laid therein.

20 Sheeting and bracing.

- 30 2. Where necessary the sides of the trenches and excavations shall be supported by adequate sheeting and bracing. Steel sheeting may be used only where shown on the plan or directed. Sheeting and bracing will be paid for only when left in place by written order, in which event the amount left in place will be paid for at the contract price for such material. Unless specially permitted sheeting against which concrete is placed shall not be removed and will not be paid for. The Contractor will be held accountable and responsible for the sufficiency of all sheeting and bracing used, and for all damage to persons or property resulting from the improper quality, strength, placing, maintaining or removing of the same.

Sheeting in soft material.

- 40 3. Where the material to be excavated is of such a character as to render is necessary, the sheeting shall be closely driven and to such depth below the bottom of the sewer as may be directed.

Tunneling.

4. All work shall be done in open trenches or excavations; no tunneling shall be done except with the consent of the Engineer.

EXHIBIT C-9 (*continued*) :

Trees and stumps.

5. The Contractor shall grub and clear the surface over the trenches and excavations of all trees and stumps and remove the same from the work.

Material to be disinfected.

10 6. If required, any or all of the excavated material shall be satisfactorily disinfected or deodorized or immediately removed from the work.

Roadway, sidewalks, etc., to be kept clear.

20 7. The excavated material and materials of construction shall be so deposited, and the work shall be so conducted as to leave open and free for traffic all crosswalks, a space on each sidewalk not less than one-third the width of such sidewalk and unless permission is given to the contrary a roadway not less
30 than 8 feet wide for the free passage of vehicles. Street hydrants, water gates, fire alarm boxes and letter boxes shall be kept accessible for use. Not more than feet of sidewalk shall be used at any time for storage of materials of construction or material excavated from any one trench. During the progress of the work the Contractor shall maintain such crosswalks, sidewalks and roadways in satisfactory condition, and the work shall at all times be so conducted as to cause a minimum inconvenience to public travel, and permit of safe and convenient access to
private and public property along the line of the work.

Surplus material.

8. If all of the excavated material cannot be stored on the street in such a manner as to maintain the traffic conditions hereinbefore specified, the surplus shall be removed from the work and stored. After the construction of the sewer, so much of this material as is of satisfactory quality and necessary for the purpose shall be brought back and used for backfilling the
40 trench.

Material from first feet to be carted away.

9. Where directed, in built-up districts and in streets where traffic conditions render it necessary, the material excavated from the first feet of trench shall be carted away by the Contractor as soon as excavated, and the material subsequently excavated, if suitable for the purpose, shall be used

EXHIBIT C-9 (continued) :

to backfill the trench in which the sewer has been built, and neither the excavated material nor materials of construction shall be stored on the roadway or sidewalks.

Fence.

- 10 10. Where necessary a suitable fence shall be placed along the sides of the trench to keep the street safe for traffic.

Temporary bridges.

11. Where any crosswalk is interested by the trench, it shall be temporarily replaced by a substantial timber bridge not less than 3 feet wide, with side railings. Where required, suitable temporary bridges for vehicles shall be provided and maintained across the trench.

Disposal of water from trenches.

- 20 12. The Contractor shall at all times during the progress of the work keep the trenches and excavations free from water. The water from the trenches and excavations shall be disposed of in such a manner as will not cause injury to the public health, not to public or private property, not to the work completed or in progress, not to the surface of the streets, nor cause any interference with the use of the same by the public.

Cost to be covered.

- 30 13. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 1 to 12 inclusive, except as otherwise provided, shall be covered by all the contract prices for all the items for which there are contract prices.

EARTH EXCAVATION.

14. Earth excavation shall include the removal of all material other than rock as hereinafter defined.

- 40 Width of trench for sewers, etc.

15. The minimum widths of trenches in earth, for pipe sewers, basin connections, house connection and other drains not over 18 inches in diameter, shall be such as to give a clearance inside the sheeting of 8 inches on each side of the pipe, and for those of larger diameters 10 inches on each side of the pipe, exclusive of spurs and hubs; and all such

EXHIBIT C-9 (*continued*) :

trenches shall have a clear width equal to the maximum width of the cradles of the sewers to be laid in them, when such cradles are wider than the minimum widths herein specified. The minimum width of trenches in earth, inside the sheeting, for other sewers shall be the greatest external width of the structures, including the necessary forms, to be built therein.

- 10 16. Where a riser, manhole or other appurtenance or the foundation therefor extends beyond the exterior lines of the sewer or its foundation, the minimum excavation in earth, required for the same shall be that contained in a prism with vertical sides and a horizontal section equal to the smallest rectangle which will enclose such appurtenance and its foundation.

Excavation for receiving basins, etc.

- 20 17. The minimum dimensions of the excavation in earth for brick receiving basins, inlet basins, shall be such as to give a clearance inside the sheeting of 1 foot on all sides, above the foundation, but in all such cases the excavation shall be large enough to include the foundations for such structures shown on the plan. The excavation for concrete receiving basins, catch basins shall be of such dimensions as to permit the proper placing and removal of the necessary forms.

Depth of trenches.

- 30 18. The trenches shall be excavated to the depths required for the foundations of the sewers and appurtenances shown on the plan, and where the conditions are such as to make it necessary, to such additional depths as may be directed. Where pipe is laid without a cradle the bottom of the trenches shall be excavated to fit the lower third of the pipe, and excavations shall be made to receive the hubs. All irregularities in the bottoms of the trenches shall be filled up to the required grade with suitable material.

Cost to be covered.

- 40 19. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 15 to 18 inclusive, except as otherwise provided, shall be covered by all the contract prices for all the items for which there are contract prices.

EXHIBIT C-9 (*continued*):

ROCK EXCAVATION.

20. Rock excavation shall include the excavation and removal of the following materials:

10 (a) Rock which shall be determined to be of such a character as to warrant its removal by blasting, in order to insure the prompt and proper prosecution of the work.

(b) Boulders and pieces of rock, masonry in mortar and concrete, each of which contains 1 cubic yard or more, except the masonry and concrete of old sewers and their appurtenances.

BACKFILLING.

Backfilling around sewers, etc.

20 30. Unless otherwise specified or directed, all trenches and excavations shall be backfilled immediately after the structures are built therein. For a depth of at least 2 feet over the top of the sewer, basin connection, house connection or other drain, the material for backfilling trenches as excavated, shall be clean earth, sand or rock dust. It shall be carefully deposited in uniform layers not exceeding 6 inches in depth, and unless otherwise permitted, each layer shall be carefully and solidly tamped with appropriate tools in such a manner as to avoid injuring or disturbing the completed work.

Backfilling for remainder of trench.

30 31. Backfilling for the remainder of the trenches as excavated, shall be proved material free from organic matter and containing no stone over 10 inches in their largest dimensions. Any stones shall be so distributed through the mass that all interstices are filled with the fine material. This backfilling shall be deposited as directed, and unless otherwise permitted, shall be spread in layers and solidly tamped.

Backfilling around manholes, receiving basins, etc.

40 32. Backfilling within 2 feet of manholes, house connection drains, receiving basins, inlet basins, and other structures shall be of the same quality as that specified in paragraph 30. 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 thereon.

EXHIBIT C-9 (*continued*) :

puddling.

33. Backfilling shall, if required, be flooded or puddled with water as the work progresses, instead of being tamped.

10 34. When sheeting is drawn, 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 as directed.

Deficiency of filling.

35. Unless otherwise shown on the plan, the trenches shall be backfilled to the height of the surface of the ground as it existed at the commencement of the work. Should there be a deficiency of proper material for the purpose, the Contractor shall furnish and place such additional material as may be re-
20 quired.

Temporary bulkheads.

36. For retaining the backfilling only temporary bulkheads will be allowed over sewers, basin connections and drains. Such bulkheads shall not be of stone, and they shall be removed as the trenches are backfilled.

Curves, branches, etc., not to be covered.

30 37. Sewers built on curves, also drains, basin connections, house and sewer connections and intersections, ends of sewers and branches shall not be covered until the Engineer shall have inspected, measured and located the same, and given permission to backfill the trenches over them.

Removal of surplus material.

40 38. As the trenches are backfilled, the Contractor shall remove all surplus material and regrade and leave free, clear and in good order all roadways and sidewalks to within feet of the end of the completed work. During the progress of and until the final acceptance of the work, he shall maintain in good and safe condition the surface of the street over all the trenches, and promptly fill all depressions over and adjoining the trenches caused by settlement of the backfilling. In case of failure or neglect on the part of the Contractor to comply with the requirements of this paragraph within 24 hours after the service upon him of a written notice so to do, the President may

EXHIBIT C-9 (*continued*):

furnish all materials and do all work required, and the cost thereof will be charged to the Contractor and deducted from any moneys due or to become due him under this contract. All surplus material or any part thereof shall, if required, be deposited as directed on the streets and avenues within the limits of this contract where the same are below grade, and in such a manner as to leave the surfaces of the filled material even.

10

Cost covered.

39. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 30 to 38 inclusive, shall be covered by all the contract prices for all the items for which there are contract prices.

CEMENT.

20

40. All cement used in the work shall be a high grade Portland cement of a well-established and approved brand. It shall be the product obtained by finely pulverizing clinker produced by calcining to incipient fusion, an intimate mixture of properly proportioned argillaceous and calcareous substances, with only such additions subsequent to calcining as may be necessary to control certain properties. Such additions shall not exceed 3 per cent. by weight, of the calcined product.

Specific gravity; weight.

30

41. The cement shall have a specific gravity of not less than 3.10 after being thoroughly dried at 212° F. It shall weigh not less than 380 pounds net, to the barrel, 4 bags of 95 pounds each being considered equivalent to a barrel.

Fineness.

40

42. The cement shall be dry, finely ground, of uniform color and free for lumps. It shall leave a residue of not more than 8 per cent. by weight, when passed through a No. 100 sieve, and not more than 25 per cent. when passed through a No. 200 sieve.

Tensile strength.

43. Standard briquettes shall develop within the periods specified, tensile strength not less than that shown in the following table.

EXHIBIT C-9 (*continued*):

Neat Cement:

- | | | |
|----|--|------------------------|
| | 24 hours | 175 pounds per-sq. in. |
| | 7 days (1 day in moist air, 6 days in water) | 500 pounds per sq. in. |
| | 28 days (1 day in moist air, 27 days in water) | 600 pounds per sq. in. |
| 10 | Mortar consisting of 1 part cement and 3 parts of Standard Ottawa Sand, by weight: | |
| | 7 days (1 day in moist air, 6 days in water) | 180 pounds per sq. in. |
| | 28 days (1 day in moist air, 27 days in water) | 225 pounds per sq. in. |

- 20 The average of the tensile strengths developed at each age by the briquettes in any set made from one sample will be considered the strength of the sample at that age, excluding any results that are manifestly faulty. The average strength of briquettes at 28 days shall be greater than the average strength at 7 days, and if tests are made after 28 days the strength shall be not less than that at 28 days.

Soundness.

44. Pats of neat cement when tested for constancy of volume or soundness shall remain firm and hard and show no sign of checking, cracking, distortion or desintegration.

30 Setting.

45. Unless otherwise required, the cement shall not develop initial set in less than 30 minutes, and shall develop final set in not less than 1 hour nor more than 10 hours. Quick-setting cement of an approved brand shall, if required, be kept on the work in sufficient quantity to provide for any contingency requiring the use of the same.

Testing.

- 40 46. The cement will be subjected to such tests as the Engineer may deem necessary, and such tests will be made in accordance with the methods recommended by the Committee on Uniform Tests of Cement of the American Society of Civil Engineers, except that the time of setting will usually be determined by means of the Gilmore needles. In case of dispute as to the time of setting, this test will be made by means of the Vicat needle.

EXHIBIT C-9 (*continued*):

Retesting.

47. Any cement which shall have been kept in storage after testing for a sufficient time to warrant it, shall be retested. Any prior acceptance shall be considered void and the acceptance or rejection of the cement shall depend upon the results of the latest tests.

10 Approval of brand may be rescinded.

48. The Engineer may at any time rescind the approval of any brand of cement that develops objectionable qualities.

Samples.

20 49. The Contractor shall notify the Engineer of the arrival of cement on the work, and furnish such facilities as may be required for obtaining samples for testing. Samples will be taken so as fairly represent the material. The number of packages sampled and the quantity to be taken from each will depend upon the importance of the work and the number of tests to be made.

Delivery and storing.

30 50. Cement shall be delivered on the work in barrels or approved bags of uniform size, with the brand and the name of the manufacturer plainly marked thereon; it shall be immediately stored in a dry place and carefully protected from the weather. A sufficient stock of cement shall be kept on the work in advance of the necessity for its use to permit of the making of the required seven day tests. Except by written permission, no cement shall be used before it has been tested and accepted, and any concrete or masonry which may have been made under such permission with cement that is subsequently rejected, shall be removed and replaced by the Contractor, at his own expense, with concrete or masonry made of accepted cement.

Cost to be covered.

40 51. The cost of furnishing, storing and incorporating cement in the work, and the cost of samples required for testing, shall be covered by the contract prices for the structures or classes of work in connection with which the cement is used.

EXHIBIT C-9 (continued) :

MORTAR.

52. All mortar used in the work, unless otherwise specified, shall be composed of 1 volume of cement, as in the original package, and $2\frac{1}{2}$ volumes of sand. Where required, mortar of cement and sand in other proportions or mortar of neat cement shall be used as directed.

10 Sand.

53. Sand shall be composed of grains of clean, sharp quartz, not softer than hard limestone. It shall be moderately coarse and preferably made up of grains of varying size not exceeding one-quarter ($\frac{1}{4}$) inch producing a mass with low percentage of voids. It shall not contain, in all, more than five (5) per cent. by volume of clay, loam, mica, scals, silt, or other objectionable inorganic matter, nor more than one (1) per cent. of organic matter.

20

Tests may also be made of the cement and sand used in the proportions of 1 part cement to 3 parts sand, and these tests must show at least 70 per cent. of the strength of the mortar made with the cement and standard sand, or the sand may be rejected.

Mixing.

54. Mortar shall be mixed in a suitable box or on a tight platform, and never upon the pavement or ground. The cement and sand shall be thoroughly mixed dry, until the mixture has a uniform color. Clean, fresh water shall then be added and the mass worked until a mortar, which is uniform and of the required consistency is produced. The mortar shall be mixed in no greater quantity than is required for the work in hand, and any that has set sufficiently to require retempering shall not be used.

30

Freezing weather.

55. The mixing and use of mortar in freezing weather shall be subject to the same requirements as hereinafter specified for mixing and placing concrete under similar conditions.

40

Cost covered.

56. The cost of all labor and materials required to furnish and place the mortar in the work, as specified, shall be covered by the contract price for the structure or class of work in connection with which the mortar is used.

EXHIBIT C-9 (*continued*):

CONCRETE.

Class A concrete.

57. Class A concrete shall be made of 1 part of cement, 2 parts of sand and 4 parts of broken stone or gravel.

- 10 58. Broken stone for Class A concrete shall be approved trap rock, dense fine-grained blue limestone or granite broken into roughly cubical or pyramidal fragments. Broken stone which contains dust, loam, clay, organic matter or other improper substances shall not be used. Broken stone for Class A concrete shall be the run of the crusher that will pass through a screen with circular openings $1\frac{1}{4}$ inches in diameter and shall be retained on a screen with openings $\frac{1}{8}$ -inch in diameter. Gravel shall be equal in quantity to North Shore Long Island gravel, shall be clean and sound, and shall be of the sizes herein specified
20 for broken stone.

Measuring ingredients.

67. For the purpose of determining the proportions of the materials for concrete, each bag of cement will be considered as containing $\frac{9}{10}$ cubic foot, and the other ingredients shall be measured by an approved method.

Water.

- 30 68. Only clean fresh water shall be used for concrete.

Mixing.

69. Unless permitted to be mixed by hand, concrete shall be mixed in approved mechanical batch mixers, so constructed and operated that the ingredients of the concrete may be accurately measured and thoroughly mixed. Enough water shall be added during the mixing to bring the concrete to the required consistency, which generally shall be such that the concrete may be poured into place without causing the separation of the stones from the mortar. When concrete is mixed by hand the broken
40 stone or gravel shall be spread on a tight platform in a bed about 6 inches deep and shall be thoroughly wetted. The cement and sand shall be mixed dry on a suitable platform, until the mixture has a uniform color. This mixture shall be spread evenly on the bed of wet stone, water added, and the entire mass turned until each piece of stone is entirely coated with mortar and a concrete

EXHIBIT C-9 (*continued*):

produced which is uniform and of the consistency herein specified for machine mixed concrete. When a comparatively dry concrete is required it shall be mixed to such consistency as may be directed.

Placing concrete.

- 10 70. Concrete shall be mixed only in such quantity as is required for the work in hand, and any that has set sufficiently to require retempering shall not be used. Any concrete in which the water has separated from the solid matter shall be satisfactorily remixed before being placed. The concrete shall be so deposited in the work as to prevent the separation of the stone from the mortar. It shall be deposited in as nearly a continuous operation as practicable and shall be tamped or spaded with suitable tools to expel air bubbles and produce a dense and compact mass. When the operation of placing concrete is interrupted
20 the concrete in the work, shall, if required, be confined by suitable temporary forms or bulkheads. When concrete is to surround reinforcing metal, structural steel, or wire netting, it shall be so deposited as to work closely around such material. When a comparatively dry concrete is used it shall be deposited in horizontal layers not exceeding 6 inches in depth and solidly tamped.

Joining old and new concrete.

- 30 71. When fresh concrete is to be laid on or adjoining concrete already set, the surface of the latter shall be thoroughly cleaned, washed, and roughened, and coated with a grout of neat cement before the fresh concrete is deposited.

Forms and centres.

- 40 72. The Contractor shall provide all necessary forms and centres for shaping concrete wherever used. They shall be true to the required shapes and sizes, strong enough and so secured in place as to withstand all operations incidental to placing the concrete, and watertight, and the faces against which the concrete is to be placed shall be satisfactorily smooth and clean. Timber used in forms and centres for exposed faces of concrete shall be seasoned stock. Unless otherwise permitted, those surfaces of forms and centres which will be in contact with concrete shall be coated as directed with an approved lubricant; when no no lubricant is required such surfaces shall be thoroughly wetted just before the concrete is placed.

EXHIBIT C-9 (continued) :

Removal of forms and centres.

73. The forms and centres shall be left in place until the concrete has set sufficiently to permit their removal without danger to the structure, and until so much of the backfilling or embankment as may be directed has been put in place. No forms or centres shall be struck or removed until permission to do so has been given.

Exposed surfaces.

74. Special care shall be used to secure a smooth and uniform finish to the surfaces of concrete which will be exposed in the completed structure. Immediately after the removal of the forms such surfaces, if uneven, shall be rubbed smooth to a uniform and satisfactory finish, all exposed edges of concrete shall be neatly rounded as directed, and if any voids, projections or other imperfections be found, such defects shall at once be corrected by tooling, cutting out and filling with mortar, or otherwise, as directed.

Expansion joints.

75. Expansion joints shall be provided in such manner and at such places as are shown on the plan or as may be directed. All unavoidable joints shall be made as shown on the plan or as directed.

30 **Depositing concrete under water.**

76. Whenever it becomes necessary to place concrete under water, it shall be deposited by means of approved method. Concrete so deposited shall be carefully spread without tamping.

Freezing weather.

40 77. In freezing weather, until the temperature falls to 24 degrees Fahrenheit the water used for concrete shall, if directed, be heated to an approved temperature, and if directed, one per cent. by weight of salt shall be added to the water for each degree Fahrenheit that the temperature of the air is below 32 degrees Fahrenheit. The other materials for the concrete shall be heated sufficiently to remove all frost and ice. No concrete shall be laid when the temperature of the air is below 24 degrees Fahrenheit.

EXHIBIT C-9 (continued):

Protection.

78. Concrete shall be allowed to set for such time as may be directed before being worked or walked upon, or before filling, backfilling or other material is placed upon or against it. It shall not be flooded with water until it has sufficiently set. Concrete shall be carefully protected from injury, from freezing and
10 from the drying effects of the sun and wind by covering it with canvas, bagging, hay or other suitable and approved materials. Such protection shall be placed as soon as the concrete is in condition to receive it, and except in freezing weather, the covering as well as the concrete shall be kept wet for such time as may be directed.

Measurement.

79. The amount of concrete to be paid for as such will be all concrete put in place as shown on the plan or as directed,
20 except such concrete shown on the plan as being part of structures for which there are contract prices and the cost of which is hereinafter specified to be covered by the contract prices for such structures. No deduction will be made on account of the space occupied by spurs for house connections, reinforcing metal, structural steel or waterproofing, but deduction will be made on account of space occupied by pile heads, timber, sewers, basin connections and drain pipes.

Prices to cover.

80. The contract prices for the various classes of concrete shall cover the cost of all labor and materials required to furnish,
30 place and remove all necessary forms and centres, and to furnish, make, place, finish and protect the concrete as specified.

BRICK MASONRY.

Quality of bricks.

81. All bricks used in the work shall be sound and hard
40 burned throughout, and of uniform size and quality. If required the bricks shall be culled immediately after they are brought on the work and all bricks which are warped, cracked or of improper quality shall be at once removed. The proportion of bats permitted will be determined according to the character and location of the work in which they are to be used. When bricks are used as the lining for inverts of sewers they shall be specially selected, and no bats shall be used except for closers.

EXHIBIT C-9 (*continued*):

How laid.

10 83. Bricks shall be satisfactorily wet when being laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The joints shall be not wider than $\frac{3}{8}$ inch, except when the bricks are laid radially, in which case the narrowest part of the joint shall not exceed $\frac{1}{4}$ inch. The bricks shall be laid in a workmanlike manner, true to line, and wherever practicable the joint shall be carefully struck and pointed on the inside. Brickwork shall be laid with a satisfactory bond, and as it progresses shall be racked back in courses, unless otherwise permitted.

Protection.

20 84. All fresh brickwork shall be carefully protected from freezing and from the drying effects of the sun and wind, and if required, it shall be sprinkled with water at such intervals and for such a time as may be directed. Brickwork shall be protected from injuries of all sorts, and all portions which may become damaged or may be found defective shall be repaired, or if directed, be removed and rebuilt.

Freezing weather.

85. In freezing weather bricks shall be heated sufficiently to remove all ice and frost.

30 Price to cover.

86. The cost of all brick masonry shall be covered by the contract price for the structure in connection with which it is used.

STRUCTURAL STEEL.

Quality.

40 98. Structural steel shall be medium steel and rivet steel made by the open hearth process and shall conform to the latest revised Standard Specifications for Structural Steel for Buildings adopted by the American Society for Testing Materials, and such tests as may be required shall be made in accordance therewith and at the places hereinafter specified. The chemical and physical properties of the steel be as follows:

EXHIBIT C-9 (continued) :

| Properties Considered | Medium Steel | Rivet Steel |
|--|---------------------------------|---------------------|
| Phosphorus (maximum) | 0.06 per cent. | 0.06 per cent. |
| Ultimate strength, lbs. per sq. in. | 55,000-65,000 | 48,000-58,000 |
| Yield point (minimum), lbs. per sq. in. | 1/2 ult. tens. str. | 1/2 ult. tens. str. |
| 10 Elongation, per cent. in 8 in. (minimum) | 1,400,000 | 1,400,000 |
| | ult. tens. str. | ult. tens. str. |
| Character of fracture | Silky | Silky |
| Cold bend without fracture . . . | 180° to diam. of 1 thickness | 180° flat |

Finish.

20 99. All finished material shall be free from injurious seams, flaws and cracks, and have a workmanlike finish.

Variation in weight.

30 100. When steel is inspected at the will or shop all pieces (except plates), which vary in weight more than 2½ per cent. from that specified shall be rejected; when steel is not inspected until it is delivered on the work such variation in weight will be sufficient cause for rejection when, in the judgment of the Engineer, the safety of the work will be impaired thereby.

Workmanship.

 101. All structural steel shall be in accordance with the plan and approved shop drawings. All details not shown on the plan, and all workmanship and finish shall be equal to the best current practice in similar work for buildings.

Anchor bolts.

40 102. Anchor bolts and expansion bolts shall be furnished where required and set in place as directed. When holes are drilled in masonry or concrete for such bolts, the holes shall be washed clean and the bolts shall be firmly embedded in a mortar composed of equal parts of cement and sand, unless other material is shown on the plan.

EXHIBIT C-9 (*continued*):

Melt numbers.

103. Test specimens and every finished piece of steel shall be stamped with melt or blow number, except that small pieces may be shipped in bundles securely wired together, with the melt or blow number on a metal tag attached.

10 Tests and inspections.

104. The required tests and inspections of structural steel shall, if directed, be made at the mills and shops by the City's authorized inspector. The Contractor shall notify the City as to the mills and shops which are to supply the steel sufficiently in advance to enable the City to arrange for such tests and inspections and the mills and shops shall afford every facility for making the same.

Mill certificates.

20

105. If it is decided not to make the City's tests and inspections at the mills, then mill certificates showing the properties of each melt of which the steel is made will be accepted for consideration.

Shipping invoices.

106. The Contractor will be required to furnish complete copies of shipping invoices with each shipment of steel.

30 Certificates, etc., for information only.

107. Steel will not be accepted until the required inspector's reports or mill certificates are received. All tests, inspections, reports and certificates are for the information of the Engineer, and he shall not be precluded on account thereof from requiring or making any further tests which he may deem necessary.

Shop drawings.

40

108. The Contractor shall prepare complete and accurate shop drawings of all steel work, and no shop work shall be done until such drawings shall have been approved. The Contractor shall furnish the Engineer with 3 complete sets of prints of the approved shop drawings.

EXHIBIT C-9 (continued) :

Painting.

109. All steel shall be thoroughly cleaned of scale, rust, oil and dirt, and unless otherwise directed, those parts which are not to be bedded in concrete shall be painted with a priming coat of the best red lead and linseed oil or such other paint of equivalent value as may be directed. After erection the metal
10 which will be exposed in the finished work shall be evenly painted with 2 coats of approved paint. No painting shall be done on wet surfaces.

Measurement.

110. The amount of structural steel paid for as such will be all structural steel placed in the work in accordance with the plan or directions, except any excess greater than 2½ per cent. above the weight required, and except such structural steel shown
20 on the plan as being part of structures for which there are contract prices, and the cost of which is hereinafter specified to be covered by the contract prices for such structures.

Price to cover.

111. The contract price for structural steel shall cover the cost of all labor and materials required to furnish, fabricate, erect and paint the same, to furnish all test pieces, to prepare and furnish prints of shop drawings, and to drill holes for and set anchor and expansion bolts, where required, all as specified.
30

STEEL REINFORCEMENT BARS.

Shape.

112. Steel bars for reinforcing concrete shall be of such shape as to afford an approved mechanical bond with the concrete at frequent intervals and to insure intimate contact between the steel and concrete. Plain bars may be used only when shown on the plan.

40 Samples.

113. The Contractor shall indicate the type of bars proposed to be used, and if required shall furnish samples thereof, and he is cautioned not to place the order for the bars until the type has been approved.

EXHIBIT C-9 (continued) :

Size.

114. Each bar shall have a net cross sectional area equivalent to that designated on the plan or required, or it shall be the commercial size of the approved type of bar having a net cross sectional area next larger than that designated or required.

10 **Variation in weight.**

115. Reinforcement bars will be rejected if their actual weight varies more than 5 per cent. from their theoretical weight as shown by the manufacturer's tables. For weighing reinforcement bars the Contractor shall, whenever required, provide an accurate scale of an approved type, with a capacity of not less than 500 pounds.

Quality.

20 116. All steel for reinforcement bars shall be made by the open hearth process and shall conform to the latest revised Standard Specifications for Steel Reinforcement Bars adopted by the American Society for Testing Materials, and such tests as may be required, shall be made in accordance therewith, and at the places hereinafter specified. The chemical and physical properties of the steel shall be as follows :

| 30 | Properties Considered | Structural Steel Grade | | Hard Grade* | | Cold Twisted Bars |
|----|--|------------------------|----------------------|----------------------|----------------------|----------------------|
| | | Plain Bars | Deformed Bars | Plain Bars | Deformed Bars | |
| | Phosphorus, max. | | | | | |
| | Bessemer | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| | Open Hearth | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| | Ultimate Tensile Strength, pounds per sq. in. | 55,000-70,000 | 55,000-70,000 | 80,000 min. | 80,000 min. | Recorded only |
| | Yield Point, minimum pounds per sq. in. | 33,000 | 33,000 | 50,000 | 50,000 | 55,000 |
| | Elongation, minimum per cent. in 8 inches | <u>1,400,000</u> | <u>1,250,000</u> | <u>1,200,000</u> | <u>1,000,000</u> | 5 per cent. |
| | | tens. str. | tens. str. | tens. str. | tens. str. | |
| | Cold bend without fracture : | | | | | |
| 40 | Bars under ¼ in. in diam. or thickness | 180° to diam. of 1t. | 180° to diam. of 1t. | 180° to diam. of 3t. | 180° to diam. of 4t. | 180° to diam. of 2t. |
| | Bars ¼ in. in diam. or thickness and over ... | 180° to diam. of 1t. | 180° to diam. of 2t. | 90° to diam. of 3t. | 90° to diam. of 4t. | 180° to diam. of 3t. |

t : Nominal thickness or diameter of bar. * The hard grade will be used only when specified.

EXHIBIT C-9 (*continued*):

117. Reinforcement bars shall be rolled from billets of new steel; they shall be straight and free from seams, flaws, cracks and imperfections of all kinds.

Tests and inspections.

10 118. The provisions of paragraphs 104, 105 and 107 relating to tests and inspections of structural steel shall also apply to tests and inspections of steel reinforcement bars.

119. Test pieces 18 inches long may be cut from any of the bars delivered on the work, and the failure of any test piece to meet the specified requirements, or the failure of any bar when being bent will be sufficient cause for the rejection of all steel from the melt from which the test piece or bar was made.

Bending sheets.

20 120. Bending sheets for steel reinforcement shall be furnished if required, in which case the reinforcement bars shall not be bent until such bending sheets have been approved.

Delivery and protection.

30 121. Bars shall be delivered in bundles, to each of which shall be securely wired a metal tag with the number of the melt from which the bars were made stamped thereon. The bars shall be protected at all times from mechanical injury and from the weather and when placed in the work they shall be free from dirt, scale-rust, paint and oil. Bars which are not to be embodied in concrete within a short time after being placed in the work shall, if directed, be immediately coated with a thin grout of equal parts of cement and sand.

Cutting and bending.

40 122. The bars shall be bent to the shapes shown on the plan and in conformity with approved templates. When bars are cut and bent on the work, the Contractor shall employ competent men and shall provide the necessary appliances for the purpose.

Placing.

123. All bars shall be as long as can be conveniently used, accurately bent, placed, spaced and jointed as shown or directed, and they shall be securely held in their required positions by approved devices until the concrete has been placed around them.

EXHIBIT C-9 (continued):

Joints.

10 124. Where more than one bar is necessary to complete the required length the joints shall be made by means of approved clamps which will develop the full strength of the bars or by looping the ends of the bars around each other in such a manner as to produce and maintain tension on the joint during construction or by lapping the ends of the bars, as directed, and wiring them together in an approved manner, or by lapping the ends of the bars for a distance of 30 times their nominal diameters for deformed bars, and 40 times their nominal diameters for plain bars, and with a space not less than 2 inches between them. Laps of longitudinal bars below the standard sewer sections shall be 6 inches in length unless otherwise shown on the plan or directed. Joints in longitudinal bars shall be staggered as directed.

20 Measurement.

30 125. The amount of steel reinforcement bars paid for as such will be the weight computed from the lengths and theoretical net sections of the steel reinforcement bars placed in the work in accordance with the plan or directions, except such steel reinforcement bars shown on the plan, as being part of structures for which there are contract prices, and the cost of which is hereinafter specified to be covered by the contract prices for such structures. The amount paid for will not include any waste metal cut from bars nor the lengths of bars used for laps, nor wires, clamps and other devices used for spacing, joining and securing the bars in place, nor lugs, corrugations and irregularities which increase the weight of the bars above the weight of plain steel bars of the same net cross sectional areas, the cost of all of which shall be covered by the contract price for steel reinforcement bars. In computing the weight 1 cubic foot of steel will be considered as weighing 489.6 pounds.

Price to cover.

40 126. The contract price for steel reinforcement bars shall cover the cost of all labor and materials required to furnish, clean, cut, bend, place, join, secure and protect the same, to furnish all test pieces and samples, and to prepare and furnish prints of bending sheets, all as specified.

EXHIBIT C-9 (*continued*):

WROUGHT IRON.

Quality.

10 132. Wrought iron shall be double rolled, tough, fibrous and uniform in quality. It shall be thoroughly welded in rolling and be free from surface defects. It shall have an ultimate tensile strength of at least 48,000 pounds per square inch, an elongation of at least 20 per cent. in 8 inches, and a fracture wholly fibrous. Specimens shall bend cold, with the fiber, through 180 degrees around a diameter equal to the thickness of the piece tested. When nicked and bent the fracture shall be at least 90 per cent. fibrous.

Galvanizing painting.

20 133. When required by the plan exposed wrought iron shall be thoroughly and uniformly galvanized. When not required to be galvanized exposed wrought iron shall be painted as specified in paragraph 109.

Measurement.

134. The cost of all wrought iron shall be covered by the contract price for the structure in connection with which it is used.

IRON CASTINGS.

30 Quality.

136. Iron castings shall be of the best foundry pig iron, gray, tough and free from cold shuts, blow holes and other imperfections. The weight shall be conspicuously painted by the manufacturer with white oil paint on each casting. The castings shall be sound, clean and neatly finished. Where required, castings shall be thoroughly coated with coal tar pitch varnish.

Cost covered.

40 137. The cost of all labor and materials required to furnish coat and place the castings as specified, shall be covered by the contract price for the structure or class of work in connection with which they are used.

EXHIBIT C-9 (*continued*):

TIMBER.

Quality.

10 138. All timber shall be merchantable pine or spruce, unless otherwise specified, and shall be sound and free from shakes, cracks, large or loose knots, and other defects impairing its strength or durability. It shall be squared to the required dimensions throughout its entire length.

Placing.

139. Timber shall be placed where shown on the plan or directed, and where necessary shall be firmly spiked or bolted with approved nails, spikes or bolts of such sizes and lengths, and at such places and in such numbers as shown on the plan or as directed.

Measurement.

20 140. The amount of timber to be paid for as such will be all timber placed in the work in accordance with the plan or directions, except piles and timber sheeting, and except such timber shown on the plan as being part of structures for which there are contract prices, and the cost of which is hereinafter specified to be covered by the contract prices for such structures. The amount paid for will not include timber used for forms, templets, centres, scaffolds, bridges (unless otherwise specified), fences, guard rails or other temporary structures, the cost of all of which shall be covered by all the contract prices for all the items for
30 which there are contract prices. No deduction will be made in the measurement of timber flooring on account of the spaces occupied by the piles.

Price to cover.

141. The contract price for timber shall cover the cost of all labor and materials required to furnish, work, place and secure the same as specified.

40 TIMBER SHEETING.

Quality, placing, etc.

142. Timber sheeting and the rangers and braces for the same shall be of a satisfactory quality of timber and of sufficient size and strength to adequately support the sides of the trenches and excavations. Sheeting shall be driven in such a manner as

EXHIBIT C-9 (continued) :

to avoid cracking and splitting, and if required for the proper prosecution of the work, shall be tongued and grooved.

When paid for.

10 143. Timber sheeting will be paid for as such only when left in place by written order. When sheeting is left in, so much of it below the surface of the ground as may be directed shall be cut off.

Measurement.

20 144. The amount of timber sheeting to be paid for as such will be all timber sheeting, rangers and braces left in place by written order, and will not include sheeting, dangers and braces left in place without such order, not sheeting left in place because concrete is placed against it, nor that part of the sheeting that extended above the ground after having been driven, the cost of all of which shall be covered by all the contract prices for all the items for which there are contract prices. Inclined piling or planking at the bottom of a trench, if used to prevent the caving in of the excavation and in such a position that it cannot be drawn, shall be paid for at the price bid for sheet piling.

Price to cover.

30 145. The contract price for timber sheeting shall cover the cost of all labor and materials required to furnish, place and cut off the sheeting, rangers and braces as specified, and shall also cover the cost of all excavation necessary to place the same.

CONCRETE SEWERS.

Inverts.

Brick lining.

40 154. Inverts of concrete sewers shall be formed between transverse templets and shall be screeded. The templets shall be placed at such intervals as to divide the invert into sections of suitable size for convenient construction, and unless otherwise permitted, the concrete shall be deposited in alternate sections and allowed to set before the remaining sections are built. Unless otherwise shown on the plan, a layer of mortar not less than 1/2-inch thick shall be spread evenly and to a smoothly finished surface upon the concrete of the invert as soon as such concrete is in place. Where the radii of inverts are too short to permit screeding between templets, the inverts shall be shaped by means

EXHIBIT C-9 (continued) :

of suitable forms, which shall be removed as soon as the concrete has a sufficient set, and if required, the surfaces of inverts shall be floated or troweled to a smooth finish. The concrete for inverts shall be deposited continuously for their entire cross sections and for such longitudinal distances as may be convenient. Where shown on the plan, inverts shall be lined with brick masonry, tile or other material, which shall be laid at such times and in such manner as may be directed. Inverts shall be carefully protected from all injury during progress of the work.

TYPE "B"

SPECIFICATION FOR CEMENT CONCRETE PIPE WITH REINFORCED CEMENT.

General dimensions of pipes and minimum test load per lin. ft. of pipe.

154a. Reinforced cement concrete pipe used shall be circular in section with or without flat base and shall conform in dimensions as shown in table.

| | Size | Minimum thickness | Minimum length in feet | Minimum joint length inches | Minimum test load per lin ft. of pipe |
|----|------|-------------------|------------------------|-----------------------------|---------------------------------------|
| | 24" | 3 " | 4' | 3 " | 3350 Lbs. |
| | 27" | 3½" | 4' | 3 " | 3700 " |
| | 30" | 3½" | 4' | 3 " | 4400 " |
| | 33" | 4 " | 4' | 3 " | 4600 " |
| 30 | 36" | 4 " | 4' | 4 " | 4800 " |
| | 39" | 4 " | 4' | 4 " | 5200 " |
| | 42" | 4½" | 4' | 5½" | 5600 " |
| | 45" | 4½" | 4' | 5½" | 6100 " |
| | 49" | 5 " | 4' | 5½" | 6600 " |
| | 51" | 5 " | 4' | 5½" | 7050 " |
| | 54" | 5½" | 4' | 5½" | 7500 " |
| | 57" | 5½" | 4' | 5½" | 7750 " |
| | 60" | 6 " | 4' | 5½" | 8000 " |
| | 63" | 6 " | 4' | 5½" | 8400 " |
| 40 | 66" | 6½" | 4' | 5½" | 8800 " |
| | 72" | 7 " | 4' | 5½" | 9400 " |
| | 78" | 8 " | 4' | 5½" | 10400 " |
| | 84" | 8 " | 4' | 5½" | 11200 " |
| | 90" | 8½" | 4' | 5½" | 12000 " |
| | 96" | 8½" | 4' | 5½" | 12800 " |
| | 102" | 9 " | 4' | 5½" | 13600 " |
| | 108" | 9 " | 4' | 5½" | 14400 " |

EXHIBIT C-9 (continued) :

Testing pipe.

Reinforced concrete pipe shall not have less thickness of concrete, less length of pipe or joint than specified above, and two (2) pipes, for each size of sewer (reinforced concrete) shall be selected at random for a load test. These pipes shall be tested at the age of twenty-one (21) days and the total load specified per lineal foot shall be applied on the upper half of the sewer. The lower half of the pipe shall be supported in a cradle covering an arc 180 degrees. The pipe shall sustain these loads per lineal foot without hair-cracks of any kind whatsoever. Failure to fulfill the above requirements in the manner set forth will be sufficient cause for the rejection of the pipe. Testing of pipe shall be done by the contractor at his own expense and under the supervision and to the satisfaction of the Engineer-in-Charge of Engineering-Construction.

20 Material of pipe, cement, sand, stone or gravel.

Reinforced concrete pipe shall be constructed at the site of the work, in a shed if the weather requires, and the pipe shall be made by a manufacturer of established reputation, who shall have had previous experience in the manufacture of reinforced concrete pipe. The cement, sand, stone or gravel shall conform to the specifications of the Division of Sewers, Bureau of Engineering Construction. The forms shall be of steel and the reinforcing steel shall be held at all times against displacement in tamping. Concrete shall be an accurate 1 : 2 : 4 mix. Each pipe shall be stamped as made with date of manufacture.

30 Joints.

The pipe shall be of the bell and spigot type, the bell not to project beyond the body of the pipe, but to be flush with it. No variation over one-half ($\frac{1}{2}$) per cent from the hereinbefore mentioned dimensions will be permitted.

Jointing.

40 All joints to be made of 1 : 2 Portland cement mortar. The mortar shall be thoroughly trowelled in the recess in the interior of the pipe up to the spring line making a continuous invert. After this has been done, steel forms especially designed for the purpose shall be placed over and around the entire joint, and the mortar for sealing the arch portion grouted or poured through an opening in the crown of the pipe. Joints must be water-tight.

EXHIBIT C-9 (*continued*):

Laying pipe.

No pipe not marked with date of manufacture shall be laid or accepted. No pipe shall be laid in the trench which has not been seasoned for twenty-one (21) days, unless otherwise specifically ordered by the Engineer-in-Charge, Engineering-Construction.

10 Steel for reinforcement.

Reinforcing steel may be either expanded metal deformed bars, or wire mesh, such as American Steel and Wire Company's reinforcing shall be at distances not less than one (1") inch from the surface.

Spurs.

20 Reinforced concrete pipe shall have openings to receive spur and branch connection wherever required by the plans. The openings shall be made in a manner satisfactory to the Engineer-in-Charge of Engineering-Construction.

Disposal of water from trenches.

The provisions of paragraph No. 12 of the specifications shall be in full force and effect even though reinforced concrete or Clinton Wire Cloth. For all sizes of reinforced concrete pipe, pipe shall be furnished on this contract.

30 Rejection of defective pipe.

Pipe damaged from handling or any cause whatsoever, whether in or out of the trench, shall be replaced, and removed from site of the work at the expense of the contractor.

Side walls.

155. Concrete in the side walls of sewers shall be deposited continuously to the height directed and for such longitudinal distances as may be convenient.

40 Roof.

156. Concrete in the roofs of sewers shall be deposited continuously for the full depths and widths of the roofs and for such longitudinal distances as may be convenient. The outer surfaces of roofs shall be finished with an excess of mortar and left true and smooth. They shall be covered and protected as speci-

EXHIBIT C-9 (continued) :

fied in paragraph 78, and such covering shall remain thereon until the backfilling or embankment is placed.

Bulkheads.

10 157. While being deposited the concrete for sewers shall be confined by temporary, vertical bulkheads placed at such intervals longitudinally as may be required for convenient working. The bulkheads shall be so designed as to give an approved shape to the end of the section of concrete under construction, shall be satisfactorily secured in place before the concrete is deposited, and shall remain in place until the concrete has set sufficiently to hold its shape.

Reinforcement.

20 158. Where shown on the plan concrete sewers shall be reinforced with metal of the dimensions and shapes shown, and of the quality and in the manner hereinbefore specified.

Minimum length of invert.

159. Unless otherwise permitted or ordered, not less than 16 feet of foundation or invert for concrete sewer shall be built at one operation.

Connections.

30 160. Connections and branches for lateral sewers and receiving basins shall be built in where shown on the plan or where directed. Such connections and branches shall be closed with bulkheads of brick masonry 8 inches thick unless otherwise shown on the plan. All necessary openings and bulkheads for branch sewers shall be built in concrete sewers where shown on the plan or where directed.

Measurements.

40 161. The lengths of concrete sewers will be determined by horizontal measurements, along their centre lines. No deductions will be made on account of openings at branches and manholes. The measurement of a branch concrete sewer will be made from the inner surface of the wall of the main sewer through which it enters. A reducer will be paid for at the contract price for the sewer at the larger end thereof.

EXHIBIT C-9 (*continued*):

Prices to cover.

- 10 162. The contract prices for concrete sewers shall cover the cost of all necessary excavation (except rock, when there is a contract price for rock excavation); of furnishing, maintaining and removing all forms, centres, templates and temporary bulkheads; of all openings and bulkheads; of all backfilling; of all embankments required; and of all labor and materials required to construct concrete sewers as shown by the normal sections on the plan and as specified.

VITRIFIED PIPE SEWERS.

Vitrified pipe.

- 20 168. Vitrified pipe sewers shall be built of shale or clay hub and spigot pipes with deep and wide sockets. They shall be thoroughly and perfectly burned, without warps, cracks or other imperfections, and shall be fully and smoothly salt-glazed over the entire inner and outer surfaces, except that the inside of the hub and the outside of the spigot may be unglazed for two-thirds the depth of the hub. On all other portions of the pipe the glazing shall completely cover and form an integral part of the pipe body. If not left unglazed the inside of the hub and the outside of the spigot shall be scored in 3 parallel lines extending completely around the circumference. When it is broken, vitrified pipe shall show dense and solid material, without serious cracks or laminations; it shall be of such toughness that it can be worked with a chisel and hammer, and when struck with a hammer, it shall have a metallic ring.
- 30

Identification marks.

169. Each pipe shall have clearly impressed on its outer surface the name of the manufacturer and of the factory in which it was made.

Shape and dimensions.

- 40 170. The sizes of the pipes are designated by their interior diameters. Each pipe shall be a cylinder with a circular section, and shall have a uniform thickness. The minimum lengths, thicknesses, depths of hubs and annular spaces for the respective sizes of pipe shall be as follows:

EXHIBIT C-9 (continued) :

| | Size | Length | Thickness | Depth of Socket | Annular Space |
|----|---------|---------|-----------|-----------------|---------------|
| | 6..... | 2 feet | 5/8 inch | 2 1/2 inches | 5/8 inch |
| | 8..... | 3 " | 3/4 " | 2 3/4 " | 5/8 " |
| | 10..... | 3 " | 7/8 " | 2 3/4 " | 5/8 " |
| | 12..... | 3 " | 1 " | 3 " | 5/8 " |
| 10 | 15..... | 3 " | 1 1/4 " | 3 " | 5/8 " |
| | 18..... | 3 " | 1 1/2 " | 3 1/4 " | 5/8 " |
| | 20..... | 3 " | 1 2/3 " | 3 1/2 " | 5/8 " |
| | 22..... | 3 " | 1 5/6 " | 3 3/4 " | 5/8 " |
| | 24..... | 3 " | 2 inches | 4 " | 5/8 " |
| | 27..... | 2 1/2 " | 2 1/4 " | 4 " | 3/4 " |
| | 30..... | 2 1/2 " | 2 1/2 " | 4 " | 3/4 " |
| | 33..... | 2 1/2 " | 2 5/8 " | 5 " | 1 1/4 " |
| | 36..... | 2 1/2 " | 2 3/4 " | 5 " | 1 1/4 " |
| | 42..... | 2 1/2 " | 3 1/2 " | 5 " | 1 1/4 " |

20 Curves, bends, etc.

171. Where curved pipes are required they shall be furnished in either one-eighth or one-quarter bends of their respective sizes. Curved pipe, bends, siphons, and special pipe of the sizes and forms shown on the plan shall be furnished and laid, and unless otherwise provided they will be paid for at the contract prices for the corresponding sizes of vitrified pipe sewers.

Samples for testing.

30 172. Any or all of the following tests may be applied to samples selected from the pipe delivered on the work. For the purposes of making such tests as may be required the Contractor shall furnish and deliver when and where directed one length of pipe for each 200 feet of pipe sewer to be laid.

Crushing tests.

40 173. When supported at the bottom upon a knife edge one inch in width in such manner that an even bearing is provided throughout the whole length, exclusive of the bell, and pressure is applied at the crown uniformly through a similar knife edge, the various sizes of pipe shall withstand the following pressures:

EXHIBIT C-9 (continued) :

| | | Diameter | Pressure |
|----|----------|----------|-----------------------|
| | 6 inches | ..... | 900 lbs. per lin. ft. |
| | 8 " | ..... | 900 " " " " |
| | 10 " | ..... | 1,000 " " " " |
| | 12 " | ..... | 1,050 " " " " |
| | 15 " | ..... | 1,250 " " " " |
| 10 | 18 " | ..... | 1,400 " " " " |
| | 20 " | ..... | 1,550 " " " " |
| | 22 " | ..... | 1,750 " " " " |
| | 24 " | ..... | 1,950 " " " " |
| | 27 " | ..... | 2,150 " " " " |
| | 30 " | ..... | 2,350 " " " " |
| | 33 " | ..... | 2,500 " " " " |
| | 36 " | ..... | 2,800 " " " " |
| | 42 " | ..... | 3,200 " " " " |

20 Drop weight test.

174. When supported on a dry sand bed 2 inches deep, all pipe shall withstand without cracking the impact from 2 blows of a cast iron ball weighing 8 pounds falling 18 inches. Spurs shall resist without fracture the impact from 2 blows of such a ball falling 6 inches and striking on the extreme end of the hub of the spur.

Hydrostatic test.

30 175. When subjected to an internal hydrostatic pressure of 8 pounds per square inch, vitrified pipe shall show no percolation.

Absorption test.

176. After having been thoroughly dried and then immersed in water for 24 hours, sample pieces of pipe with all broken edges shall not absorb more than 4 per cent. of their weight of water.

40 Factory rejection.

177. 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 where the materials used are such as produce inferior pipe, as indicated by repeated failure to comply with the tests herein specified.

EXHIBIT C-9 (continued):

Cradles.

178. In earth trenches pipe sewers shall be laid in concrete cradles when required by the plan.

Without cradle.

10 179. When the sewer is to be laid without a cradle the trench shall be excavated as specified in paragraph 18 and the earth forming the bed carefully freed of stones. The pipe shall then be evenly bedded therein and the backfilling placed and firmly tamped in such a manner as to avoid disturbing the sewer.

Concrete cradle.

20 180. When the sewer is to be laid in a concrete cradle, the concrete for the full width of the cradle shall be deposited continuously to the height of the outside bottom of the pipe. Before the concrete has set the pipe shall be evenly bedded therein and the remainder of the concrete immediately deposited and carefully tamped in such a manner as to avoid disturbing the sewer.

How laid.

30 182. All pipes shall be laid with ends abutting and true to line and grade. The pipes shall be fitted together and matched so that when laid in the work they will form a sewer with a smooth and uniform invert. Unless otherwise permitted or directed, not less than 12 feet of pipe sewer shall be laid in one operation.

183. Unless otherwise shown on the plan, the joints of vitrified pipe sewers shall be made as hereinafter specified in paragraph 185.

Gasket and mortar joints.

40 185. Gasket and mortar joints shall be made in the following manner: A closely twisted hemp or oakum gasket of suitable diameter, in no case less than $\frac{3}{4}$ -inch, and in one piece of sufficient length to pass around the pipe and lap at the top, shall be solidly rammed into the annular space between the pipes with a suitable calking tool. Before being placed, the gasket shall, if desired, be saturated with neat cement grout. The remainder of the space shall then be completely filled with plastic mortar mixed 1 to $1\frac{1}{2}$, and the joint wiped inside and finished to a smooth bevel outside.

EXHIBIT C-9 (*continued*) :

Inspection of joints.

186. Unless otherwise permitted, at least 4 finished joints shall be left exposed for inspection throughout the working day, and the necessary staging for the protection of the exposed sewers and for the handling of excavated material shall be provided. A suitable ladder affording easy access for such inspection shall
10 be furnished at every trench open for the proposed sewer.

Subgrade to be tested.

187. No pipe or the cradle therefor shall be laid or placed until the subgrade of the trench shall have been tested and found correct.

Sewer to be kept clean.

188. The interior of the sewer shall, as the work progresses, be cleared of all dirt, cement and superfluous materials of every description.
20

Backfilling.

189. Immediately after the sewer is laid the trench shall be backfilled as provided in paragraphs 30 to 38 inclusive and 186. No walking on or working upon the completed sewer (except as may be necessary in tamping the backfilling) will be permitted until the trench has been backfilled to a height of at least 2 feet over the top of the sewer.
30

Temporary covers.

190. The exposed ends of pipe sewers shall be provided with approved temporary covers fitted to the pipe so as to exclude earth and other materials.

Branch pipes.

191. Branch pipes and connection pipes shall be of the same quality and dimensions, and laid in the same manner as specified for vitrified pipe sewers. Dead ends of pipes shall be closed with bulkheads of brick masonry 8 inches in thickness.
40

Connection with existing work.

192. Wherever the proposed sewer is to connect with an existing manhole in which there is a branch pipe which is damaged or of unsuitable size or in improper position, such pipe shall

EXHIBIT C-9 (*continued*):

be removed and be replaced with a pipe of suitable size or be reset in the proper position. The pipe so substituted or reset will be paid for at the contract price, for the corresponding size of pipe sewer.

Pipes cut to fit masonry.

- 10 193. The ends of pipes which enter masonry shall be neatly cut to fit the face of the masonry. When directed, such cutting shall be done before the pipes are built in.

Measurement.

194. The length of pipe sewers to be paid for will be determined by horizontal measurements along their center lines, and no deductions will be made on account of openings at manholes.

Prices to cover.

- 20 195. The contract prices for vitrified pipe sewers shall cover the cost of all necessary excavation (except rock); of all necessary trimmings, fitting a building into masonry; of all bulkheads; of all backfilling; of all embankments required; of all samples furnished; and of all labor and materials required to furnish and lay the sewers complete in place, as shown on the plan and as specified.

BASIN CONNECTIONS.

- 30 206. The connections between receiving basins or inlet basins and sewers or manholes shall be of 12-inch vitrified pipe, unless otherwise shown on the plan. The pipes shall be of the same quality and dimensions, and laid in the same manner as hereinbefore specified for vitrified pipe sewers.

Measurement.

207. The lengths of basin connections to be paid for will be determined by measurements along their axes.

- 40 Prices to cover.

208. The contract price for basin connections shall cover the cost of all necessary excavation (except rock); of all necessary trimming, fitting and building into concrete, or masonry; of all backfilling; of all embankments required; and of all labor and materials required to furnish and lay the basin connections complete in place, as specified.

EXHIBIT C-9 (*continued*):

SPURS FOR HOUSE CONNECTIONS.

213. Spurs for house connections shall be of vitrified pipe 6 inches in diameter, equal in quality and dimensions to that specified for vitrified pipe sewers.

In concrete sewers.

10 214. In concrete sewers spurs shall be built in as shown on the plan or as directed. They shall be hub and spigot pipes with the spigot end molded or cut to fit flush with the inner surface of the sewer, and of sufficient length to reach the exterior of the sewer.

In pipe sewers.

20 215. Pipes having 6-inch spurs with hubs molded thereon shall be furnished and laid in pipe sewers where shown on the plan or directed. Such pipes will be paid for at the contract prices for vitrified pipe sewers, and the spurs will be paid for in addition at the contract price for spurs.

Covers.

216. The ends of all spurs not connected with drains shall be closed with approved covers. If required such covers shall be cemented in place, and when directed the covers shall be so cemented in place, and when directed the covers shall be so cemented before the pipes are lowered into the trench.

30 Price to cover.

217. The contract price for spurs shall cover the cost of all labor and materials required to furnish and place the same as specified, and the cost of furnishing and cementing the covers for the same.

DRAINS FOR HOUSE CONNECTIONS.

40 218. Where shown on the plan or where directed, drains for house connections shall be built from the spurs in such a manner and for such distance as may be shown or directed.

Depth at curb.

219. House connections drains shall be laid with a minimum gradient of $\frac{1}{4}$ inch to a foot, and wherever possible the

EXHIBIT C-9 (*continued*) :

depth from curb grade to the inner bottom of the drain at curb line shall be at least 8 feet.

Material.

220. Unless otherwise shown on the plan, drains for house connections shall be of vitrified pipe of the quality and dimensions specified for vitrified pipe sewers. The ends of the drains shall be closed with approved covers.

How laid.

221. All the requirements, as hereinbefore specified, relating to excavation, laying and backfilling of vitrified pipe sewers shall apply, as far as they are applicable, to drains for house connections.

Measurement.

222. The lengths of pipe drains for house connections to be paid for will be determined by measurement along their axes.

Price to cover.

223. The contract price for drains for house connections shall cover the cost of all necessary excavation (except rock); the cost of all backfilling; the cost of all covers, bends and specials required; and the cost of all labor and materials required to furnish and lay the drains for house connections complete in place, as specified.

RISERS.

224. Where shown on the plan or where directed risers for house connections shall be built from the spurs in such a manner and to such height as may be shown or directed. Unless otherwise shown on the plan they shall be of vitrified pipe of the quality and dimensions hereinbefore specified for vitrified pipe sewers. They shall be supported and surrounded by concrete as shown, and each shall be closed with an approved cover.

Measurement.

225. The lengths of risers to be paid for will be determined by measurements along their axes.

EXHIBIT C-9 (*continued*):

Price to cover.

226. The contract price for risers shall cover the cost of all necessary excavation (except rock); the cost of all concrete used in connection with the risers; the cost of all backfilling; the cost of all covers, bends and specials required; and the cost of all labor and materials required to construct the risers complete in place, as specified.

MANHOLES.

227. The masonry or concrete for manholes shall be built to within 13 inches of the established grade of the street or to within such distances of the existing surface of the ground as directed. When not built up to within 13 inches of the established grade of the street, the masonry or concrete shall, if directed, be covered with bluestones not less than 5 inches thick, or with an approved reinforced concrete slab to support the head.

Brick manholes.

228. Brick manholes shall be formed by means of templates placed at top and bottom with not less than 8 lines drawn between them, and they shall be smoothly and evenly plastered on the outside with a layer of mortar $\frac{1}{2}$ -inch thick. When manholes extend above the existing surface of the ground, the entire exposed surface shall be coated with 2 coats of whitewash.

Concrete manholes.

229. Concrete manholes shall be built of the materials, sizes and dimensions shown on the plan.

Steps.

230. Galvanized wrought iron steps of the size and shape down on the plan shall be firmly built into the manholes at vertical intervals of about 16 inches.

Head and cover.

231. The manhole head and cover shall be of cast iron, and unless otherwise shown on the plan, each head, exclusive of cover, shall weigh not less than 475 pounds and each cover shall weigh not less than 135 pounds. The weight of each head and cover shall be conspicuously painted thereon by the manufacturer with white oil paint. The head shall be set on the masonry or concrete in a full bed of stiff mortar.

EXHIBIT C-9 (*continued*) :

Dust pans.

232. Where shown on the plan, dust pans and protective gratings of the materials, forms and dimensions shown shall be furnished and fitted in the manholes.

Price to cover.

- 10 233. The contract price for manholes shall cover the cost of all necessary excavation (except rock); of all backfilling; of all plastering; of all whitewashing; of all bluestones; of all concrete slabs; of all steps; of dust pans and protective gratings, when required; and of all labor and materials required to construct the same complete, in place, as shown on the plan and specified.

RECEIVING BASINS.

20 Brick basins.

234. Brick receiving basins shall be formed by means of templates placed at top and bottom with not less than 10 vertical lines drawn between them. If required, the mouths of receiving basins shall be closed with bulkheads of brick masonry and such bulkheads shall be removed when directed.

- 30 235. Where the walls of brick receiving basins are not built of two rings of brickwork with a mortar layer between, the inside of the brickwork shall be smoothly and evenly plastered with a layer of mortar $\frac{1}{2}$ -inch thick.

236. Where the wall of the receiving basin consists of two rings of brickwork, with a mortar layer between, the outer ring shall be carried up not less than 1 foot in advance of the inner ring, and the inner surface of the former shall be plastered with two coats of mortar. The second coat of mortar shall be applied before the first is set, and the total thickness of the mortar layer shall be 1 inch.

40 Concrete basins.

237. Concrete receiving basins shall, if required, be built in such a manner that the bottom and sidewalls shall be formed in one continuous operation. Concrete basins shall be coated with a grout of neat cement on the inside.

EXHIBIT C-9 (continued):

Concrete heads.

238. Where concrete cover slabs of receiving basins or their inlets are built in or adjoin concrete sidewalks the new work shall be made to correspond in pattern and color with the existing sidewalk.

10 Steps.

239. When galvanized wrought iron steps are required by the plan they shall be firmly built into the receiving basins at vertical intervals of about 18 inches.

Trap.

20 An iron hood or trap, of the size and dimensions shown on the plan, must be furnished by the Contractor for each receiving basin, and is to be built into the basin as shown on the plan.

Pavement at inlet to receiving basins.

241. The pavements adjoining the inlets to receiving basins shall be restored and adjusted to the extent and in the manner directed, and in accordance with paragraphs 255 to 260 inclusive. In unpaved streets and in macadamized streets, where the inlets to the receiving basins are approximately at the surface of the street, a space of 2½ feet adjoining such inlets shall, if required, be paved with approved paving blocks.

30 Price to cover.

242. The contract price for receiving basins shall cover the cost of all necessary excavation (except rock); of all back-filling; of all pavement required at the inlets to the basins; of the temporary brick bulkheads in the mouths of the basins when required; and of all labor and materials required to construct the receiving basins complete in place, as shown on the plan and specified.

40 INLET BASINS.

243. Inlet basins and the heads and covers therefor shall be of the materials, forms and dimensions shown on the plan. If required, the mouths of inlet basins shall be closed with bulkheads of brick masonry and such bulkheads shall be removed when directed.

EXHIBIT C-9 (continued):

Price to cover.

244. The contract price for inlet basins shall cover the cost of all necessary excavation (except rock); of all backfilling: of the temporary brick bulkheads in the mouths of the inlet basins, when required; and of all labor and materials required to construct the inlet basins complete, in place as shown on the plan and specified.

EMBANKMENT.

Quality.

247. Where indicated on the plan, embankment shall be made of the form and dimensions shown. It shall consist of clean steam ashes or filling of the quality specified in paragraph 31, which shall contain no stone over 6 inches in its largest dimension. When the material forming the embankment contains stones, the latter shall be so distributed through the mass that all interstices are filled with fine material, and the material within 2 feet of the sewer shall be free of stones. When embankment is used as foundation it shall consist entirely of filling of the quality specified in paragraph 30.

How made.

248. The embankment shall be deposited and spread in horizontal layers to such an extent and at such times as may be directed. If required, such portion of the embankment as may be deemed necessary shall be made prior to the construction of the sewer or its foundation and any excavation that may be necessary for the building of the sewer and its foundation shall be made therein. When embankment is used as a foundation, the ground on which it is to be made shall be prepared by grubbing and clearing, and removing all improper material. Embankment used as foundation shall be deposited in uniform horizontal layers not exceeding 1 foot in depth, and each layer shall be deposited in uniform horizontal layers not exceeding 1 foot in depth, and each layer shall be thoroughly compacted by rolling or tamping or both; such embankment shall not be built upon until the expiration of days after its completion.

Approaches.

249. Where the embankment obstructs or interferes in any way with any public or private roadway the Contractor shall furnish and place all material necessary to provide suitable ap-

EXHIBIT C-9 (continued) :

proaches, of such widths and to such extent as shown on the plan or as directed.

250. All embankments and approaches shall be maintained at their full dimensions until the completion of this contract.

Cost covered.

- 10 251. The cost of all labor and materials required to prepare the ground, to make the embankment and approaches as specified, to make all necessary excavations and backfilling therein, and to maintain the embankments and approaches at their designated dimensions until the completion of this contract, shall be covered by the contract price for displaced material for sewer embankment.

RESTORATION OF SURFACE AND CLEANING UP.

Restoration of unpaved roadways, sidewalks, etc.

- 20 254. At such time as may be directed, all unpaved roadways, gutters and sidewalks affected by the work done under this contract shall be restored by the Contractor to the same condition in which they were at the time of the opening of bids for this contract.

Pavements, etc., restored by Contractor.

- 30 256. If required by the plan, roadway and sidewalk pavements, cross-walks, curbs, etc., shall be satisfactorily restored and adjusted by the Contractor at such times as may be directed. Sidewalk pavements shall be restored in whole flags, squares or sections which shall correspond in quality and appearance with the original or adjoining flags, squares or sections. All work and materials used in such restoration and adjustment shall conform in all respects to the standard specifications now in use by the President for similar work and materials.

Temporary restoration.

- 40 258. At such times as may be directed roadway and sidewalk pavements, crosswalks, curbs, etc., which have been removed, whether under guarantee or not, shall be temporarily restored by the Contractor to the satisfaction of the Engineer.

When new pavement is laid.

260. If pavement, sidewalks, crosswalks, curbs, etc., are laid where none existed at the time the bids for this contract were opened, the Contractor shall excavate and remove such portions of the pavements, sidewalks, crosswalks, curbs, etc., and their

EXHIBIT C-9 (*continued*) :

foundations as may be necessary for the prosecution of the work, but he will not be required to make a permanent restoration of them.

Trenches flooded.

- 10 261. Before laying any pavements, sidewalks, crosswalks, curbs, etc., the trenches shall, if required, be flooded with water, as directed, and all resulting holes or depressions shall be filled and tamped solid.

Unnecessary cross gutters.

262. All cross gutters rendered unnecessary by the work under this contract shall be removed and the entire street intersection or so much thereof as may be necessary shall be regraded and repaved as herein specified.

Cleaning up.

- 20 263. At such times as may be directed the Contractor shall remove from the streets, all materials which were placed thereon by him as a consequence of performing this work and which are not required by the contract to be left as part of the finished work. The entire work and portions of the streets affected thereby shall be left in a satisfactory condition. The sidewalks and crosswalks shall be swept clean of all material which may have come thereon by reason of the work under this contract, and if required, they shall be sprinkled with water during the sweeping.

- 30 Cost to be covered.

264. The cost of all the labor required to be done and all the materials required to be furnished in the performance of all the work specified in paragraphs 254 to 263 inclusive, shall be covered by all the contract prices for all the items for which there are contract prices.

NOTICE TO DISBURSING CLERK

40

DO NOT PAY

this warrant until January 30, 1919.

J. P. McINERNEY,
Auditor of Accounts.

Claimant: Sigretto & Co.

Amount: \$24,923.23

EXHIBIT C-170:

EXHIBIT C-170.

(*Bid of Joseph Di Cola or estimate for the construction of a sewer and appurtenances in: Collins Avenue from Mt. Olivet Avenue to Adriatic Street; Adriatic Street from Collins Avenue to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue to Woodbine Street, Second Ward of the Borough of Queens.*)

No. 6

THE CITY OF NEW YORK

Office of the

PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

20 Sealed Bids or Proposals for the herein named work will be received at the office of the President of the Borough of Queens, Borough Hall, Fifth Street and Jackson Avenue, Long Island City, Borough of Queens, in The City of New York, until 11 o'clock A. M.

ON AUG. 16, 1916.

30 The time allowed for the completion of the work and the full performance of the contract is 250 CONSECUTIVE WORKING DAYS.

The liquidated damages for each day in excess of the allowed time, as stipulated in the contract, is *ten dollars per day*.

The amount of SECURITY or surety bond required will be (\$56,000.00).

40 NOTE.—All bids must be submitted upon the proper blank form of bid and in the sealed envelope prepared and furnished by the Borough President, and must be made out as required. Any bid which fails to name a price, both *in writing* and *in figures* per unit of measurement for each and every item of the proposed work where quantities are given, or is incomplete, conditional, obscure, or irregular, may be held to be informal and may be rejected, and in case of any discrepancy between the price written in the bid and that given in figures, the price in writing will be considered as the bid. The writing must be in ink.

EXHIBIT C-170 (*continued*):

BID OR ESTIMATE

For the construction of a sewer and appurtenances in:
COLLINS AVENUE from Mt. Olivet Avenue to Adriatic Street;
ADRIATIC STREET from Collins Avenue to Fresh Pond Road;
FRESH POND ROAD from Mt. Olivet Avenue to Woodbine
Street, Second Ward of the Borough of Queens.

10 Made by the firm of Joseph Di Cola and John S. Martino, 953
St. Marks Ave., Brooklyn, N. Y.

NAME AND ADDRESS OF EACH AND EVERY MEMBER
OF THE FIRM OR PRINCIPAL OFFICERS OF
THE CORPORATION.

Name: Joseph Di Cola

Address: 174-8th St., Brooklyn, N. Y.

20 Name: John S. Martino

Address: 953 St. Marks Ave., Brooklyn, N. Y.

NOTE.—The *bidder's name and residence or address* must
be inserted herebelow, and in case of a firm, *the name and ad-
dress of each and every member of the firm must be inserted.*

In case a bid shall be submitted by or in behalf of any
corporation, the complete legal name and address of such *cor-
poration* must be written herebelow, together with the name,
30 address and title of the principal officers of the corporation.

The party named above (of lawful age), as *Bidder, de-
clares: That* the only person or persons interested in this bid or
proposal as principal or principals is or are named above, and
that no other person than herein above named has any interest
in this bid or in the contract proposed to be taken; *that* this bid
is made without any connection with any other person or persons
making a bid for the same work or purpose; *that* the bid is in all
respects fair and without collusion or fraud, and *that* no member
40 of the Board of Aldermen, no head of a department, no chief of
a bureau, deputy thereof, or clerk therein, nor any officer or em-
ployee of The City of New York, is, shall be or become, directly
or indirectly, interested as contracting party, partner, stock-
holder, surety or otherwise in the performance of the contract,
or in the supplies, work or business to which it relates, or in any
portion of the profits thereof, *that* he has examined the form of
contract and specifications approved by the Corporation Coun-

EXHIBIT C-170 (continued) :

10 sel, and any plans therein referred to, and that he has visited the site of the proposed work and has made himself familiar with all the existing conditions; and he proposes and agrees, if this bid be accepted, that he will contract, in the form so approved, to provide, furnish and deliver all necessary work, labor, services, materials or supplies, machinery, tools, plant, and appliances, and to perform and complete all the work mentioned in said approved form of contract and specifications, and in strict accordance with the terms and conditions thereof, and that he will accept in full payment therefor the following named sums or prices :

20 The Engineer's estimate of the quantities as advertised and the nature and extent of the work and materials or supplies required, though stated with as much accuracy as is practicable in advance, are *approximate* only and are given to form a basis of comparison for testing bids and are not guaranteed to be accurate and are not considered as a binding feature of the contract. *Before bidding, Contractors must satisfy by personal examination of the Plans, Specifications, Contract, and location of the proposed work, and by such other means as they may prefer, as to the accuracy of the foregoing statement, and they must determine for themselves, and allow for all difficulties which may be encountered in the prosecution of the work.*

- 30
- | | | |
|----|-------|--|
| 1: | 901 | Linear Feet 7'6" Reinforced concrete sewer, Per Linear Foot, Twenty four and 53/100 Dollars (\$24 53/100). |
| 2: | 2,055 | Linear Feet 7'0" Reinforced concrete sewer, Per Linear Foot, Twenty four and 50/100 Dollars (\$24 50/100). |
| 3: | 62 | Linear Feet 5'0" Reinforced concrete sewer, Per Linear Foot, Twenty and 19/100 Dollars (\$20 19/100). |
| 4: | 303 | Linear Feet 3'9" Plain concrete sewer, Per Lin. Foot, Twelve and 25/100 Dollars (\$12 25/100). |
| 5: | 354 | Linear Feet 3'6" Plain concrete sewer, Per Lin. Foot, Nine and 67/100 Dollars (\$9 67/100). |
| 40 | 6: | 488 Linear Feet 3'0" Plain concrete sewer, Per Lin. Foot, Six and 54/100 Dollars (\$6 54/100). |
| | 7: | 516 Linear Feet 2'6" Plain concrete sewer, Per Lin. Foot, Six and 46/100 Dollars (\$6 46/100). |
| | 8: | 265 Linear Feet 24-inch Vitrified pipe sewer, Per Linear Foot, Four 00/100 Dollars (\$4 00/100). |

EXHIBIT C-170 (continued):

| | | | |
|----|-----|-------|---|
| | 9: | 375 | Linear Feet 22-inch Vitrified pipe sewer, Per Linear Foot, Three and 90/100 Dollars (\$3 90/100). |
| | 10: | 265 | Linear Feet 20-inch Vitrified pipe sewer, Per Linear Foot, Two and 80/100 Dollars (\$2 80/100). |
| | 11: | 9 | Linear Feet 18-inch Vitrified pipe sewer, Per Linear Foot, One and 80/100 Dollars (\$1 80/100). |
| 10 | 12: | 3 | Linear Feet 15-inch Vitrified pipe sewer, Per Linear Foot, Two Dollars (\$2 00/100). |
| | 13: | 222 | Linear Feet 12-inch Vitrified pipe sewer, Per Linear Foot, One and 50/100 Dollars (\$1 50/100). |
| | 14: | 85 | Six-inch spurs, 24 inches long, on concrete sewer, Each, One Cent (\$0.01). |
| | 15: | 18 | Six-inch spurs on 24-inch Vitrified pipe sewer, Each, One and 75/100 Dollars (\$1 75/100). |
| | 16: | 33 | Six-inch spurs on 22-inch Vitrified pipe sewer, Each, One and 65/100 Dollars (\$1 65/100). |
| 20 | 17: | 18 | Six-inch spurs on 20-inch Vitrified pipe sewer, Each, One and 55/100 Dollars (\$1 55/100). |
| | 18: | 18 | Six-inch spurs on 12-inch Vitrified pipe sewer, Each, One and 00/100 Dollars, (\$1 00/100). |
| | 19: | 1,257 | Feet of Risers for house connections, including Y's, per Foot, Sixty five Cents (\$0.65). |
| | 20: | 39 | Manholes, Complete, Each, Seventy 00/100 Dollars (\$70 00/100). |
| | 21: | 47 | Basin manholes, (New type), Complete, Each, Seventy five 00/100 Dollars (\$75 00/100). |
| 30 | 22: | 68 | Inlets, (New type), Complete, Each, Thirty 00/100 Dollars (\$30 00/100). |
| | 23: | 1,665 | Linear Feet 12-inch Vitrified pipe for basin connections, Per Linear Foot, One and 10/100 Dollars (\$1 10/100). |
| | 24: | 1,100 | Linear Feet 10-inch Vitrified pipe for basin connections, Per Linear Foot, One 00/100 Dollars (\$1.00). |
| | 25: | 1,540 | Linear Feet 6" Vitrified pipe for house connections, Per Linear Foot, Seventy five Cents (\$0.75). |
| 40 | 26: | 1 | Chamber at Collins Ave. and Adriatic Street, Complete, Seven hundred fifty one and 40/100 Dollars (\$751 40/100). |
| | 27: | 1 | Chamber at Fresh Pond Road and Adriatic Street, Complete, Six hundred and seventy five Dollars (\$675 00/100). |
| | 28: | 1 | Chamber at Fresh Pond Road and Winifred Street, Complete, Five hundred and thirty five Dollars (\$535 00/100). |

EXHIBIT C-170 (continued) :

- 29: 1 Chamber at Fresh Pond Road and Metropolitan Avenue, Complete, Five hundred and fifty Dollars (\$550 00/100).
- 30: 1 Chamber at Fresh Pond Road and Ralph St., Complete, Three hundred and fifteen Dollars (\$315.00).
- 31: 1 Drop Chamber at Fresh Pond Road, near Adriatic Street, Complete, One hundred and fifty 00/100 Dollars (\$150 00/100).
- 10 32: 5,000 Feet B. M. Timber for bracing and sheet piling, Per 1,000 Feet, Thirty 00/100 Dollars (\$30 00/100).
- 33: 5,000 Feet B. M. Timber for foundation, furnished and laid, Per 1,000 Feet, Thirty five 00/100 Dollars (\$35 00/100).
- 34: 500 Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Five cents (\$0.05).
- 20 35: 500 Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Five cents (\$0.05).
- 36: 40 Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, per Cubic Yard, Six 00/100 Dollars (\$6.00).
- 37: 7,900 Cubic Yards Displaced Material for sewer embankment, in place, Per Cubic Yard, One Cent (\$0.01).
- 38: 2,350 Linear Feet of Wooden Fence, Per Linear Foot, Twenty eights Cents (\$0.28).

30 No bid will be allowed to be withdrawn, for any reason whatever, after it has been received and deposited with the President. The President expressly reserves the right to reject all bids if he shall deem it for the public interest so to do. No bid will be accepted from, nor contract awarded to, any person who is in arrears to The City of New York upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

40 No bid or proposal will be received, considered and deposited unless, as a condition precedent to the reception or consideration of any proposal it be accompanied by either a certified check upon one of the State or National Banks of The City of New York, drawn and made payable to the order of the Comptroller of The City of New York, or money to the amount of *five per centum* (5%) of the amount of the security or surety bond required for the faithful performance of the contract. Such check or money

EXHIBIT C-170 (continued):

must not be inclosed in the sealed envelope containing the proposal, but must be either inclosed in a separate envelope addressed to the Borough President, or submitted personally upon the presentation of the bid or proposal and handed to the officer or clerk of the Department who has charge of the proposal box, and who will give a proper voucher for the deposit, and no bid can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that made by the bidder to whom the contract shall be awarded, will be returned to the person or persons making the same within three (3) days after the decision as to who shall receive the contract. If the bidder to whom the contract shall have been awarded shall refuse or neglect to execute the same within five days after due notice that the contract has been awarded to him, and that the adequacy and sufficiency of the surety offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York as liquidated damages for such neglect or refusal; but if he shall execute the contract and furnish the said security within the time aforesaid, the amount of the deposit shall be returned to him.

Each and every person bidding must sign here.

NOTE.—*Each and every person bidding and named above must sign here.* In the case of a firm, give the name of each and every partner in full.

Joseph di Cola [L. S.]

In case a bid shall be submitted by or in behalf of a corporation, it must be signed in the full legal name of such corporation by some authorized officer or agent thereof, who shall subscribe his name and office. If practicable, the seal of the corporation must be affixed.

John S. Martino [L. S.]

..... [L. S.]

The following affidavit must be similarly signed and sworn to:

..... [L. S.]

THE CITY AND STATE OF NEW YORK,
COUNTY OF QUEENS, ss.

EXHIBIT C-170 (continued) :

EXHIBIT C-171 :

The above-named bidder(s), being severally duly sworn, say, each for himself, that the several matters stated in the above bid are in all respects true.

Signature(s) of Bidder(s)

Joseph di Cola

10

Subscribed and sworn to before me, this 14th day of Aug. 1916. John S. Martino

.....
.....

WILLIAM P. BUCKLEY,
Commissioner of Deeds.

20

EXHIBIT C-171.

(Bid of Joseph L. Sigretto or estimate for the construction of a sewer and appurtenances in: Collins Avenue from Mt. Olivet Avenue to Adriatic Street; Adriatic Street from Collins Avenue to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue to Woodbine Street, Second Ward of the Borough of Queens.)

No. 6

30

THE CITY OF NEW YORK

Office of the

PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

40 Sealed Bids or Proposals for the herein named work will be received at the office of the President of the Borough of Queens, Borough Hall, Fifth Street and Jackson Avenue, Long Island City, Borough of Queens, in The City of New York, until 11 o'clock A. M.

ON AUG. 16, 1916.

The time allowed for the completion of the work and the full performance of the contract is 250 CONSECUTIVE WORKING DAYS.

EXHIBIT C-171 (*continued*):

The liquidated damages for each day in excess of the allowed time, as stipulated in the contract, is *ten dollars per day*.

The amount of SECURITY or surety bond required will be (\$56,000.00).

10 NOTE.—All bids must be submitted upon the proper blank form of bid and in the sealed envelope prepared and furnished by the Borough President, and must be made out as required. Any bid which fails to name a price, both *in writing* and *in figures* per unit of measurement for each and every item of the proposed work where quantities are given, or is incomplete, conditional, obscure, or irregular, may be held to be informal and may be rejected, and in case of any discrepancy between the price written in the bid and that given in figures, the price in writing will be considered as the bid. The writing must be in ink.

BID OR ESTIMATE

20

For the construction of a sewer and appurtenances in:
COLLINS AVENUE from Mt. Olivet Avenue to Adriatic Street;
ADRIATIC STREET from Collins Avenue to Fresh Pond Road;
FRESH POND ROAD from Mt. Olivet Avenue to Woodbine
Street, Second Ward of the Borough of Queens.

Made by the firm or corporation of Joseph L. Sigretto,
Address: 1455 Woodhaven Ave., Woodhaven, L. I.

30 NAME AND ADDRESS OF EACH AND EVERY MEMBER
OF THE FIRM OR PRINCIPAL OFFICERS OF
THE CORPORATION.

Name: Joseph L. Sigretto
Address: 1455 Woodhaven Ave., Woodhaven, L. I.

NOTE.—The *bidder's name and residence or address* must be inserted herebelow, and in case of a firm, *the name and address of each and every member of the firm must be inserted*.

40 In case a bid shall be submitted by or in behalf of any corporation, the complete legal name and address of such *corporation* must be written herebelow, together with the name, address and title of the principal officers of the corporation.

The party named above (of lawful age), as *Bidder, declares: That* the only person or persons interested in this bid or proposal as principal or principals is or are named above, and that no other person than herein above named has any interest

EXHIBIT C-171 (*continued*):

10 in this bid or in the contract proposed to be taken; *that* this bid is made without any connection with any other person or persons making a bid for the same work or purpose; *that* the bid is in all respects fair and without collusion or fraud, and *that* no member of the Board of Aldermen, no head of a department, no chief of a bureau, deputy thereof, or clerk therein, nor any officer or employee of The City of New York, is, shall be or become, directly
or indirectly, interested as contracting party, partner, stockholder, surety or otherwise in the performance of the contract, or in the supplies, work or business to which it relates, or in any portion of the profits thereof, *that* he has examined the form of contract and specifications approved by the Corporation Counsel, and any plans therein referred to, and that he has visited the site of the proposed work and has made himself familiar with all the existing conditions; and he proposes and agrees, if this
20 bid be accepted, that he will contract, in the form so approved, to provide, furnish and deliver all necessary work, labor, services, materials or supplies, machinery, tools, plant, and appliances, and to perform and complete all the work mentioned in said approved form of contract and specifications, and in strict accordance with the terms and conditions thereof, and that he will accept in full payment therefor the following named sums or prices:

30 The Engineer's estimate of the quantities as advertised and the nature and extent of the work and materials or supplies required, though stated with as much accuracy as is practicable in advance, are *approximate* only and are given to form a basis of comparison for testing bids and are not guaranteed to be accurate and are not considered as a binding feature of the contract. *Before bidding, Contractors must satisfy by personal examination of the Plans, Specifications, Contract, and location of the proposed work, and by such other means as they may prefer, as to the accuracy of the foregoing statement, and they must determine for themselves, and allow for all difficulties which may be encountered in the prosecution of the work.*

- 40
- | | | |
|----|-------|---|
| 1: | 901 | Linear Feet 7'6" Reinforced concrete sewer, Per Linear Foot, Thirty and 00/100 Dollars (\$30 00/100). |
| 2: | 2,055 | Linear Feet 7'0" Reinforced concrete sewer, Per Linear Foot, Thirty and 00/100 Dollars (\$30 00/100). |
| 3: | 62 | Linear Feet 5'0" Reinforced concrete sewer, Per Linear Foot, Nineteen and 00/100 Dollars (\$19.00). |
| 4: | 303 | Linear Feet 3'9" Plain concrete sewer, Per Lin. Foot, Fifteen and 00/100 Dollars (\$15 00/100). |

EXHIBIT C-171 (continued) :

| | | | |
|-----|-----|---|---|
| | 5: | 354 | Linear Feet 3'6" Plain concrete sewer, Per Lin. Foot, Twelve and 00/100 Dollars (\$12 00/100). |
| | 6: | 488 | Linear Feet 3'0" Plain concrete sewer, Per Lin. Foot, Eight and 25/100 Dollars (\$8 25/100). |
| | 7: | 516 | Linear Feet 2'6" Plain concrete sewer, Per Lin. Foot, Seven and 50/100 Dollars (\$7 50/100). |
| 10 | 8: | 265 | Linear Feet 24-inch Vitrified pipe sewer, Per Linear Foot, Three and 50/100 Dollars (\$3 50/100). |
| | 9: | 375 | Linear Feet 22-inch Vitrified pipe sewer, Per Linear Foot, Four and 00/100 Dollars (\$4 00/100). |
| 10: | 265 | Linear Feet 20-inch Vitrified pipe sewer, Per Linear Foot, Two and 25/100 Dollars (\$2 25/100). | |
| | 11: | 9 | Linear Feet 18-inch Vitrified pipe sewer, Per Linear Foot, Two and 00/100 Dollars (\$2 00/100). |
| | 12: | 3 | Linear Feet 15-inch Vitrified pipe sewer, Per Linear Foot, Two and 00/100 Dollars (\$2 00/100). |
| 20 | 13: | 222 | Linear Feet 12-inch Vitrified pipe sewer, Per Linear Foot, One and 70/100 Dollars (\$1 70/100). |
| | 14: | 85 | Six-inch spurs, 24" long, on concrete sewer, Each, Thirty Cents (\$0 30/100). |
| | 15: | 18 | Six-inch spurs on 24-inch Vitrified pipe sewer, Each, Five and 00/100 (\$5 00/100). |
| | 16: | 33 | Six-inch spurs on 22-inch Vitrified pipe sewer, Each, Five and 00/100 Dollars (\$5 00/100). |
| | 17: | 18 | Six-inch spurs on 20-inch Vitrified pipe sewer, Each, Five and 00/100 Dollars (\$5 00/100). |
| 30 | 18: | 18 | Six-inch spurs on 12-inch Vitrified pipe sewer, Each, Five and 00/100 Dollars (\$5 00/100). |
| | 19: | 1,257 | Feet of Risers for house connections, including Y's, Per Foot, One and 00/100 Dollars (\$1 00/100). |
| | 20: | 39 | Manholes, Complete, Each, One Hundred and Fifty and 00/100 Dollars (\$150 00/100). |
| | 21: | 47 | Basin Manholes, (New type), Complete, Each, Seventy Five and 00/100 Dollars (\$75 00/100). |
| | 22: | 68 | Inlets, (New type), Complete, Each, Thirty and 00/100 Dollars (\$30 00/100). |
| 40 | 23: | 1,665 | Linear Feet 12-inch Vitrified pipe for basin connections, Per Linear Foot, One and 50/100 Dollars (\$1 50/100). |
| | 24: | 1,100 | Linear Feet 10-inch Vitrified pipe for basin connections, Per Linear Foot, One and 25/100 Dollars (\$1 25/100). |
| | 25: | 1,540 | Linear Feet 6" Vitrified pipe for house connections. Per Linear Foot, Seventy Five Cents (\$0 75/100). |

EXHIBIT C-171 (continued) :

- 26: 1 Chamber at Collins Ave. and Adriatic Street, Complete, One Thousand Five Hundred and 00/100 Dollars (\$1500 00/100).
- 27: 1 Chamber at Fresh Pond Road and Adriatic Street, Complete, One Thousand Five Hundred and 00/100 Dollars (\$1500 00/100).
- 10 28: 1 Chamber at Fresh Pond Road and Winifred Street, Complete, One Thousand Five Hundred and 00/100 Dollars (\$1500 00/100).
- 29: 1 Chamber at Fresh Pond Road and Metropolitan Avenue, Complete, One Thousand Five Hundred and 00/100 Dollars (\$1500 00/100).
- 30: 1 Chamber at Fresh Pond Road and Ralph St., Complete, One Hundred and Fifty and 00/100 Dollars (\$150 00/100).
- 31: 1 Drop Chamber at Fresh Pont Road, near Adriatic Street, Complete, Three Hundred and 00/100 Dollars (\$300 00/100).
- 20 32: 5,000 Feet B. M. Timber for bracing and sheet piling, Per 1,000 Feet, One Cent (\$0 01/100).
- 33: 5,000 Feet B. M. Timber for foundation, furnished and laid, per 1,000 Feet, Fifty and 00/100 Dollars (\$50 00/100).
- 34: 500 Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Five Cents (\$0 05/100).
- 30 35: 500 Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Five Cents (\$0 05/100).
- 36: 40 Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, Per Cubic Yard, Six and 00/100 Dollars (\$6 00/100).
- 37: 7,900 Cubic Yards Displaced Material for sewer embankment, in place, Per Cubic Yard, Twenty Five Cents (\$0 25/100).
- 40 38: 2,350 Linear Feet of Wooden Fence, Per Linear Foot, Fifty Cents (\$0 50/100).

No bid will be allowed to be withdrawn, for any reason whatever, after it has been received and deposited with the President. The President expressly reserves the right to reject all bids if he shall deem it for the public interest so to do. No bid will be accepted from, nor contract awarded to, any person who is in arrears to The City of New York upon debt or contract, or

EXHIBIT C-171 (*continued*):

who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

10 No bid or proposal will be received, considered and deposited unless, as a condition precedent to the reception or consideration of any proposal it be accompanied by either a certified check upon one of the State or National Banks of The City of New York, drawn and made payable to the order of the Comptroller of The City of New York, or money to the amount of *five per centum* (5%) of the amount of the security or surety bond required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the proposal, but must be either inclosed in a separate envelope addressed to the Borough President, or submitted personally upon the presentation of the bid or proposal and handed to the officer or clerk of the Department who has charge of the proposal box, and who will give a proper voucher for the deposit, and no bid can
20 be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that made by the bidder to whom the contract shall be awarded, will be returned to the person or persons making the same within three (3) days after the decision as to who shall receive the contract. If the bidder to whom the contract shall have been awarded shall refuse or neglect to execute the same within five days after due notice that the contract has been awarded to him, and that the adequacy and sufficiency of the surety offered has been approved by the Comptroller, the
30 amount of the deposit made by him shall be forfeited to and retained by The City of New York as liquidated damages for such neglect or refusal; but if he shall execute the contract and furnish the said security within the time aforesaid, the amount of the deposit shall be returned to him.

Each and every person bidding must sign here.

40 NOTE.—*Each and every person bidding* and named above must [L. S.]
sign here. In the case of a firm, give the name of each and every partner in full.

In case a bid shall be submitted by or in behalf of a corporation, it must be signed in the full legal name of such corporation by some Joseph L. Sigretto [L. S.]

EXHIBIT C-171 (*continued*):

EXHIBIT C-172:

authorized officer or agent there-[L. S.]
of, who shall subscribe his name
and office. If practicable, the seal
of the corporation must be affixed.

10 The following affidavit must be[L. S.]
similarly signed and sworn to:

THE CITY AND STATE OF NEW YORK,
COUNTY OF QUEENS, *ss.*

The above-named bidder(s), being severally duly sworn,
say, each for himself, that the several matters stated in the above
bid are in all respects true.

Signature(s) of Bidder(s)

20 *Subscribed and sworn to before* Joseph L. Sigretto
me, this 16th day of Aug. 1916.

WILLIAM P. BUCKLEY,
Commissioner of Deeds.

EXHIBIT C-172.

30 (*Bid of Peace Bros. or estimate for the construction of
a sewer and appurtenances in: Collins Avenue from Mt. Olivet
Avenue to Adriatic Street; Adriatic Street from Collins Avenue
to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue
to Woodbine Street, Second Ward of the Borough of Queens.*)

No. 6

THE CITY OF NEW YORK

Office of the

40

PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

Sealed Bids or Proposals for the herein named work will
be received at the office of the President of the Borough
of Queens, Borough Hall, Fifth Street and Jackson Avenue, Long

EXHIBIT C-172 (*continued*):

Island City, Borough of Queens, in The City of New York, until 11 o'clock A. M.

ON AUG. 16, 1916.

10 The time allowed for the completion of the work and the full performance of the contract is 250 CONSECUTIVE WORKING DAYS.

The liquidated damages for each day in excess of the allowed time, as stipulated in the contract, is *ten dollars per day*.

The amount of SECURITY or surety bond required will be (\$56,000.00).

20 NOTE.—All bids must be submitted upon the proper blank form of bid and in the sealed envelope prepared and furnished by the Borough President, and must be made out as required. Any bid which fails to name a price, both *in writing* and *in figures* per unit of measurement for each and every item of the proposed work where quantities are given, or is incomplete, conditional, obscure, or irregular, may be held to be informal and may be rejected, and in case of any discrepancy between the price written in the bid and that given in figures, the price in writing will be considered as the bid. The writing must be in ink.

BID OR ESTIMATE

30 For the construction of a sewer and appurtenances in :
COLLINS AVENUE from Mt. Olivet Avenue to Adriatic Street;
ADRIATIC STREET from Collins Avenue to Fresh Pond Road;
FRESH POND ROAD from Mt. Olivet Avenue to Woodbine Street, Second Ward of the Borough of Queens.

Made by the firm of Peace Bros.
Address 21 Main St., Hushing.

NAME AND ADDRESS OF EACH AND EVERY MEMBER
OF THE FIRM OR PRINCIPAL OFFICERS OF
40 THE CORPORATION.

Name: Harry B. Peace,
Address: Hushing, L. I.

Name: Harvey W. Peace,
Address: Hushing, L. I.

EXHIBIT C-172 (*continued*):

NOTE.—The *bidder's name and residence or address* must be inserted herebelow, and in case of a firm, *the name and address of each and every member of the firm must be inserted.*

10 In case a bid shall be submitted by or in behalf of any corporation, the complete legal name and address of such *corporation* must be written herebelow, together with the name, address and title of the principal officers of the corporation.

20 The party named above (of lawful age), as *Bidder, declares: That* the only person or persons interested in this bid or proposal as principal or principals is or are named above, and that no other person than herein above named has any interest in this bid or in the contract proposed to be taken; *that* this bid is made without any connection with any other person or persons making a bid for the same work or purpose; *that* the bid is in all respects fair and without collusion or fraud, and *that* no member of the Board of Aldermen, no head of a department, no chief of a bureau, deputy thereof, or clerk therein, nor any officer or employee of The City of New York, is, shall be or become, directly or indirectly, interested as contracting party, partner, stockholder, surety or otherwise in the performance of the contract, or in the supplies, work or business to which it relates, or in any portion of the profits thereof, *that* he has examined the form of contract and specifications approved by the Corporation Counsel, and any plans therein referred to, and that he has visited the site of the proposed work and has made himself familiar with all the existing conditions; and he proposes and agrees, if this bid be accepted, that he will contract, in the form so approved, to provide, furnish and deliver all necessary work, labor, services, materials or supplies, machinery, tools, plant, and appliances, and to perform and complete all the work mentioned in said approved form of contract and specifications, and in strict accordance with the terms and conditions thereof, and that he will accept in full payment therefor the following named sums or prices:

40 The Engineer's estimate of the quantities as advertised and the nature and extent of the work and materials or supplies required, though stated with as much accuracy as is practicable in advance, are *approximate* only and are given to form a basis of comparison for testing bids and are not guaranteed to be accurate and are not considered as a binding feature of the contract. *Before bidding, Contractors must satisfy by personal examination of the Plans, Specifications, Contract, and location*

EXHIBIT C-172 (continued):

of the proposed work, and by such other means as they may prefer, as to the accuracy of the foregoing statement, and they must determine for themselves, and allow for all difficulties which may be encountered in the prosecution of the work.

| | | | |
|----|-----|-------|---|
| | 1: | 901 | Linear Feet 7'6" Reinforced concrete sewer, Per Linear Foot, Thirty six Dollars (\$36.00). |
| 10 | 2: | 2,055 | Linear Feet 7'0" Reinforced concrete sewer, Per Linear Foot, Thirty five Dollars (\$35.00). |
| | 3: | 62 | Linear Feet 5'0" Reinforced concrete sewer, Per Linear Foot, Seventeen Dollars (\$17.00). |
| | 4: | 303 | Linear Feet 3'9" Plain concrete sewer, Per Lin. Foot, Fifteen Dollars (\$15.00). |
| | 5: | 354 | Linear Feet 3'6" Plain concrete sewer, Per Lin. Foot, Thirteen Dollars (\$13.00). |
| | 6: | 488 | Linear Feet 3'0" Plain concrete sewer, Per Lin. Foot, Ten Dollars (\$10.00). |
| 20 | 7: | 516 | Linear Feet 2'6" Plain concrete sewer, Per Lin. Foot, Eight Dollars (\$8.00). |
| | 8: | 265 | Linear Feet 24-inch Vitrified pipe sewer, Per Linear Foot, Three and 75/100 Dollars (\$3.75). |
| | 9: | 375 | Linear Feet 22-inch Vitrified pipe sewer, Per Linear Foot, Three and 50/100 Dollars (\$3.50). |
| | 10: | 265 | Linear Feet 20-inch Vitrified pipe sewer, Per Linear Foot, Three and 25/100 Dollars (\$3.25). |
| | 11: | 9 | Linear Feet 18-inch Vitrified pipe sewer, Per Linear Foot, Three Dollars (\$3.00). |
| 30 | 12: | 3 | Linear Feet 15-inch Vitrified pipe sewer, Per Linear Foot, Three Dollars (\$3.00). |
| | 13: | 222 | Linear Feet 12-inch Vitrified pipe sewer, Per Linear Foot, Two Dollars (\$2.00). |
| | 14: | 85 | Six-inch spurs, 24 inches long, on concrete sewer, Each, One Dollar (\$1.00). |
| | 15: | 18 | Six-inch spurs on 24-inch Vitrified pipe sewer, Each, Three Dollars (\$3.00). |
| | 16: | 33 | Six-inch spurs on 22-inch Vitrified pipe sewer, Each, Two and 50/100 Dollars (\$2.50). |
| 40 | 17: | 18 | Six-inch spurs on 20-inch Vitrified pipe sewer, Each, Two Dollars (\$2.00). |
| | 18: | 18 | Six-inch spurs on 12-inch Vitrified pipe sewer, Each, One Dollar (\$1.00). |
| | 19: | 1,257 | Feet of Risers for house connections, including Y's, Per Foot, Fifty Cents (\$0.50). |
| | 20: | 39 | Manholes, Complete, Each, Seventy Dollars (\$70.00). |

EXHIBIT C-172 (continued):

| | | | |
|----|-----|-------|---|
| | 21: | 47 | Basin Manholes, (New type), Complete, Each, One hundred Dollars (\$100.00). |
| | 22: | 68 | Inlets, (New type), Complete, Each, Thirty Dollars (\$30.00). |
| | 23: | 1,665 | Linear Feet 12-inch Vitrified pipe for basin connections, Per Linear Foot, Two Dollars (\$2.00). |
| 10 | 24: | 1,100 | Linear Feet 10-inch Vitrified pipe for basin connections, Per Linear Foot, One and 50/100 Dollars (\$1.50). |
| | 25: | 1,540 | Linear Feet 6" Vitrified pipe for house connections, Per Linear Foot, Seventy five Cents (\$0.75). |
| | 26: | 1 | Chamber at Collins Ave. and Adriatic Street, Complete, Fifteen hundred Dollars (\$1500). |
| | 27: | 1 | Chamber at Fresh Pond Road and Adriatic Street, Complete, Fourteen hundred Dollars (\$1400). |
| 20 | 28: | 1 | Chamber at Fresh Pond Road and Winifred Street, Complete, Twelve hundred Dollars (\$1200). |
| | 29: | 1 | Chamber at Fresh Pond Road and Metropolitan Avenue, Complete, Eleven hundred Dollars (\$1100). |
| | 30: | 1 | Chamber at Fresh Pond Road and Ralph St., Complete, Seven hundred Dollars (\$7.00). |
| | 31: | 1 | Drop Chamber at Fresh Pont Road, near Adriatic Street, Complete, Six hundred Dollars (\$600.00). |
| | 32: | 5,000 | Feet B. M. Timber for bracing and sheet piling, Per 1,000 Feet, Twenty Dollars (\$20.00). |
| 30 | 33: | 5,000 | Feet B. M. Timber for foundation, furnished and laid, per 1,000 Feet, Forty Dollars (\$40.00). |
| | 34: | 500 | Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Ten Cents (\$0.10). |
| | 35: | 500 | Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Five Cents (\$0.05). |
| 40 | 36: | 40 | Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, Per Cubic Yard, One Cent (\$0.01). |
| | 37: | 7,900 | Cubic Yards Displaced Material for sewer embankment, in place, Per Cubic Yard, Sixty Cents (\$0.60). |
| | 38: | 2,350 | Linear Feet of Wooden Fence, Per Linear Foot, Fifty Cents (\$0.50). |

EXHIBIT C-172 (*continued*):

No bid will be allowed to be withdrawn, for any reason whatever, after it has been received and deposited with the President. The President expressly reserves the right to reject all bids if he shall deem it for the public interest so to do. No bid will be accepted from, nor contract awarded to, any person who is in arrears to The City of New York upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

No bid or proposal will be received, considered and deposited unless, as a condition precedent to the reception or consideration of any proposal it be accompanied by either a certified check upon one of the State or National Banks of The City of New York, drawn and made payable to the order of the Comptroller of The City of New York, or money to the amount of *five per centum* (5%) of the amount of the security or surety bond required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the proposal, but must be either inclosed in a separate envelope addressed to the Borough President, or submitted personally upon the presentation of the bid or proposal and handed to the officer or clerk of the Department who has charge of the proposal box, and who will give a proper voucher for the deposit, and no bid can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that made by the bidder to whom the contract shall be awarded, will be returned to the person or persons making the same within three (3) days after the decision as to who shall receive the contract. If the bidder to whom the contract shall have been awarded shall refuse or neglect to execute the same within five days after due notice that the contract has been awarded to him, and that the adequacy and sufficiency of the surety offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York as liquidated damages for such neglect or refusal; but if he shall execute the contract and furnish the said security within the time aforesaid, the amount of the deposit shall be returned to him.

EXHIBIT C-172 (continued):

Each and every person bidding must sign here.

NOTE.—*Each and every person bidding and named above must sign here. In the case of a firm, give the name of each and every partner in full.* Harry B. Peace [L. S.]

In case a bid shall be submitted by or in behalf of a corporation, it must be signed in the full legal name of such corporation by some authorized officer or agent thereof, who shall subscribe his name and office. If practicable, the seal of the corporation must be affixed. Harvey W. Peace [L. S.]
..... [L. S.]

The following affidavit must be similarly signed and sworn to: [L. S.]

THE CITY AND STATE OF NEW YORK,
COUNTY OF QUEENS, ss.

The above-named bidder(s), being severally duly sworn, say, each for himself, that the several matters stated in the above bid are in all respects true.

Signature(s) of Bidder(s)
Harry B. Peace
Subscribed and sworn to before me, this ninth day of Aug. 1916. Harvey W. Peace
.....

EELIHN F. HARRIS,
Notary Public, Queens County.

EXHIBIT C-173:

EXHIBIT C-173.

(*Bid of John C. Schrade or estimate for the construction of a sewer and appurtenances in: Collins Avenue from Mt. Olivet Avenue to Adriatic Street; Adriatic Street from Collins Avenue to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue*
10 *to Woodbine Street, Second Ward of the Borough of Queens.*)

No. 6

THE CITY OF NEW YORK

Office of the

PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

20 Sealed Bids or Proposals for the herein named work will be received at the office of the President of the Borough of Queens, Borough Hall, Fifth Street and Jackson Avenue, Long Island City, Borough of Queens, in The City of New York, until 11 o'clock A. M.

ON AUG. 16, 1916.

The time allowed for the completion of the work and the full performance of the contract is 250 CONSECUTIVE WORK-
30 ING DAYS.

The liquidated damages for each day in excess of the allowed time, as stipulated in the contract, is *ten dollars per day*.

The amount of SECURITY or surety bond required will be (\$56,000.00).

NOTE.—All bids must be submitted upon the proper blank form of bid and in the sealed envelope prepared and furnished by the Borough President, and must be made out as required. Any
40 bid which fails to name a price, both *in writing* and *in figures* per unit of measurement for each and every item of the proposed work where quantities are given, or is incomplete, conditional, obscure, or irregular, may be held to be informal and may be rejected, and in case of any discrepancy between the price written in the bid and that given in figures, the price in writing will be considered as the bid. The writing must be in ink.

EXHIBIT C-173 (continued) :

BID OR ESTIMATE

For the construction of a sewer and appurtenances in :
COLLINS AVENUE from Mt. Olivet Avenue to Adriatic Street;
ADRIATIC STREET from Collins Avenue to Fresh Pond Road;
FRESH POND ROAD from Mt. Olivet Avenue to Woodbine
Street, Second Ward of the Borough of Queens.

10 Made by the firm or corporation of John C. Schrade,
Address: Floral Court & Undine Ave., Rockaway Beach, N. Y.

NAME AND ADDRESS OF EACH AND EVERY MEMBER
OF THE FIRM OR PRINCIPAL OFFICERS OF
THE CORPORATION.

Name: John C. Schrade,
Address: Floral Court & Undine Ave., Rockaway Beach, N. Y.

20 NOTE.—The *bidder's name and residence or address* must
be inserted herebelow, and in case of a firm, *the name and ad-
dress of each and every member of the firm must be inserted.*

In case a bid shall be submitted by or in behalf of any
corporation, the complete legal name and address of such *cor-
poration* must be written herebelow, together with the name,
address and title of the principal officers of the corporation.

30 The party named above (of lawful age), as *Bidder, de-
clares: That* the only person or persons interested in this bid or
proposal as principal or principals is or are named above, and
that no other person than herein above named has any interest
in this bid or in the contract proposed to be taken; *that* this bid
is made without any connection with any other person or persons
making a bid for the same work or purpose; *that* the bid is in all
respects fair and without collusion or fraud, and *that* no member
of the Board of Aldermen, no head of a department, no chief of
a bureau, deputy thereof, or clerk therein, nor any officer or em-
ployee of The City of New York, is, shall be or become, directly
40 or indirectly, interested as contracting party, partner, stock-
holder, surety or otherwise in the performance of the contract,
or in the supplies, work or business to which it relates, or in any
portion of the profits thereof, *that* he has examined the form of
contract and specifications approved by the Corporation Coun-
sel, and any plans therein referred to, and that he has visited
the site of the proposed work and has made himself familiar with
all the existing conditions: and he proposes and agrees, if this
bid be accepted, that he will contract, in the form so approved,

EXHIBIT C-173 (continued):

to provide, furnish and deliver all necessary work, labor, services, materials or supplies, machinery, tools, plant, and appliances, and to perform and complete all the work mentioned in said approved form of contract and specifications, and in strict accordance with the terms and conditions thereof, and that he will accept in full payment therefor the following named sums or prices:

10 The Engineer's estimate of the quantities as advertised and the nature and extent of the work and materials or supplies required, though stated with as much accuracy as is practicable in advance, are *approximate* only and are given to form a basis of comparison for testing bids and are not guaranteed to be accurate and are not considered as a binding feature of the contract. *Before bidding, Contractors must satisfy by personal examination of the Plans, Specifications, Contract, and location*

20 *of the proposed work, and by such other means as they may prefer, as to the accuracy of the foregoing statement, and they must determine for themselves, and allow for all difficulties which may be encountered in the prosecution of the work.*

- 1: 901 Linear Feet 7'6" Reinforced concrete sewer, Per
 Linear Foot, Thirty-three and 65/100 Dollars (\$33
 65/100).
- 2: 2,055 Linear Feet 7'0" Reinforced concrete sewer, Per
 Linear Foot, Twenty-nine and 80/100 Dollars (\$29
 80/100).
- 30 3: 62 Linear Feet 5'0" Reinforced concrete sewer, Per
 Linear Foot, Nineteen and 25/100 Dollars (\$19
 25/100).
- 4: 303 Linear Feet 3'9" Plain concrete sewer, Per Lin.
 Foot, Eleven and 70/100 Dollars (\$11 70/100).
- 5: 354 Linear Feet 3'6" Plain concrete sewer, Per Lin.
 Foot, Ten and 15/100 Dollars (\$10 15/100).
- 6: 488 Linear Feet 3'0" Plain concrete sewer, Per Lin.
 Foot, Six and 80/100 Dollars (\$6 80/100).
- 7: 516 Linear Feet 2'6" Plain concrete sewer, Per Lin.
 Foot, Five and 55/100 Dollars (\$5 55/100).
- 40 8: 265 Linear Feet 24-inch Vitrified pipe sewer, Per Linear
 Foot, Three and 90/100 Dollars (\$3 90/100).
- 9: 375 Linear Feet 22-inch Vitrified pipe sewer, Per Linear
 Foot, Four and 15/100 (\$4 15/100).
- 10: 265 Linear Feet 20-inch Vitrified pipe sewer, Per Linear
 Foot, Three Dollars (\$3.00).
- 11: 9 Linear Feet 18-inch Vitrified pipe sewer, Per Linear
 Foot, Two and 50/100 Dollars (\$2 50/100).

EXHIBIT C-173 (continued) :

| | | | |
|----|-----|-------|---|
| | 12: | 3 | Linear Feet 15-inch Vitrified pipe sewer, Per Linear Foot, Two Dollars (\$2.00). |
| | 13: | 222 | Linear Feet 12-inch Vitrified pipe sewer, Per Linear Foot, One and 75/100 Dollars (\$1 75/100). |
| | 14: | 85 | Six-inch spurs, 24 inches long, on concrete sewer, Each, Fifty Cents (\$0.50). |
| 10 | 15: | 18 | Six-inch spurs on 24-inch Vitrified pipe sewer, Each, Three and 25/100 Dollars (\$3 25/100). |
| | 16: | 33 | Six-inch spurs on 22-inch Vitrified pipe sewer, Each, Three Dollars (\$3.00). |
| | 17: | 18 | Six-inch spurs on 20-inch Vitrified pipe sewer, Each, Two and 50/100 Dollars (\$2 50/100). |
| | 18: | 18 | Six-inch spurs on 12-inch Vitrified pipe sewer, Each, One Dollar (\$1.00). |
| | 19: | 1,257 | Feet of Risers for house connections, including Y's. per Foot, Two Dollars (\$2.00). |
| 20 | 20: | 39 | Manholes, Complete, Each, One hundred twenty-five Dollars (\$125.00). |
| | 21: | 47 | Basin manholes, (New type), Complete, Each, One hundred Dollars (\$100.00). |
| | 22: | 68 | Inlets, (New type), Complete, Each, Sixty Dollars (\$60.00). |
| | 23: | 1,665 | Linear Feet 12-inch Vitrified pipe for basin connections, Per Linear Foot, One and 25/125 Dollars (\$1 25/100). |
| | 24: | 1,100 | Linear Feet 10-inch Vitrified pipe for basin connections, Per Linear Foot, Seventy-five cents Dollars (\$0.75). |
| 30 | 25: | 1,540 | Linear Feet 6" Vitrified pipe for house connections, Per Linear Foot, One Dollar (\$1.00). |
| | 26: | 1 | Chamber at Collins Ave. and Adriatic Street, Complete, Eight hundred fifty Dollars (\$850.00). |
| | 27: | 1 | Chamber at Fresh Pond Road and Adriatic Street, Complete, Eight hundred fifty Dollars (\$850.00). |
| | 28: | 1 | Chamber at Fresh Pond Road and Winifred Street, Complete, Eight hundred fifty Dollars (\$850.00). |
| 40 | 29: | 1 | Chamber at Fresh Pond Road and Metropolitan Avenue, Complete, Six hundred fifty Dollars (\$650.00). |
| | 30: | 1 | Chamber at Fresh Pond Road and Ralph St., Complete, Two hundred fifty Dollars (\$250.00). |
| | 31: | 1 | Drop Chamber at Fresh Pont Road, near Adriatic Street, Complete, Eight hundred fifty Dollars (\$850.00). |

EXHIBIT C-173 (*continued*):

- 32: 5,000 Feet B. M. Timber for bracing and sheet piling, Per 1,000 Feet, Thirty-five Dollars (\$35.00).
33: 5,000 Feet B. M. Timber for foundation, furnished and laid, Per 1,000 Feet, Forty Dollars (\$40.00).
34: 500 Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Fifteen Cents (\$0 15/100).
10 35: 500 Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Ten Cents (\$0 10/100).
36: 40 Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, Per Cubic Yard, Eight Dollars (\$8.00).
37: 7,900 Cubic Yards Displaced Material for sewer embankment, in place, Per Cubic Yard, Thirty-five Cents (\$0 35/100).
20 38: 2,350 Linear Feet of Wooden Fence, Per Linear Foot, Forty Cents (\$0 40/100).

No bid will be allowed to be withdrawn, for any reason whatever, after it has been received and deposited with the President. The President expressly reserves the right to reject all bids if he shall deem it for the public interest so to do. No bid will be accepted from, nor contract awarded to, any person who is in arrears to The City of New York upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

30 No bid or proposal will be received, considered and deposited unless, as a condition precedent to the reception or consideration of any proposal it be accompanied by either a certified check upon one of the State or National Banks of The City of New York, drawn and made payable to the order of the Comptroller of The City of New York, or money to the amount of *five per centum* (5%) of the amount of the security or surety bond required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the proposal, but must be either inclosed in a separate envelope addressed to the Borough President, or submitted personally upon the presentation of the bid or proposal and handed to the officer or clerk of the Department who has charge of the proposal box, and who will give a proper voucher for the deposit, and no bid can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All such deposits, except that made by the bidder to whom the con-

40

EXHIBIT C-173 (continued) :

tract shall be awarded, will be returned to the person or persons making the same within three (3) days after the decision as to who shall receive the contract. If the bidder to whom the contract shall have been awarded shall refuse or neglect to execute the same within five days after due notice that the contract has been awarded to him, and that the adequacy and sufficiency of the surety offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York as liquidated damages for such neglect or refusal; but if he shall execute the contract and furnish the said security within the time aforesaid, the amount of the deposit shall be returned to him.

Each and every person bidding must sign here.

NOTE.—Each and every person bidding and named above must sign here. In the case of a firm, give the name of each and every partner in full.

John C. Schrade [L. S.]

In case a bid shall be submitted by or in behalf of a corporation, it must be signed in the full legal name of such corporation by some authorized officer or agent thereof, who shall subscribe his name and office. If practicable, the seal of the corporation must be affixed.

..... [L. S.]

..... [L. S.]

The following affidavit must be similarly signed and sworn to:

..... [L. S.]

THE CITY AND STATE OF NEW YORK,
COUNTY OF KINGS, ss.

The above-named bidder(s), being severally duly sworn, say, each for himself, that the several matters stated in the above bid are in all respects true.

Signature(s) of Bidder(s)

John C. Schrade

Subscribed and sworn to before me, this 16th day of Aug. 1916.

.....
.....
.....

CHARLES J. MUISTERER,
Commissioner of Deeds.

EXHIBIT C-174:

EXHIBIT C-174.

(Bid of Ward & Tully or estimate for the construction of
a sewer and appurtenances in: Collins Avenue from Mt. Olivet
Avenue to Adriatic Street; Adriatic Street from Collins Avenue
to Fresh Pond Road; Fresh Pond Road from Mt. Olivet Avenue
10 to Woodbine Street, Second Ward of the Borough of Queens.)

No. 6

THE CITY OF NEW YORK

Office of the

PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

20 Sealed Bids or Proposals for the herein named work will
be received at the office of the President of the Borough
of Queens, Borough Hall, Fifth Street and Jackson Avenue, Long
Island City, Borough of Queens, in The City of New York, until
11 o'clock A. M.

ON AUG. 16, 1916.

30 The time allowed for the completion of the work and the
full performance of the contract is 250 CONSECUTIVE WORK-
ING DAYS.

The liquidated damages for each day in excess of the al-
lowed time, as stipulated in the contract, is *ten dollars per day*.

The amount of SECURITY or surety bond required will
be (\$56,000.00).

40 NOTE.—All bids must be submitted upon the proper blank
form of bid and in the sealed envelope prepared and furnished by
the Borough President, and must be made out as required. Any
bid which fails to name a price, both *in writing* and *in figures*
per unit of measurement for each and every item of the proposed
work where quantities are given, or is incomplete, conditional,
obscure, or irregular, may be held to be informal and may be
rejected, and in case of any discrepancy between the price writ-
ten in the bid and that given in figures, the price in writing will
be considered as the bid. The writing must be in ink.

EXHIBIT C-174 (*continued*):

BID OR ESTIMATE

For the construction of a sewer and appurtenances in:
COLLINS AVENUE from Mt. Olivet Avenue to Adriatic Street;
ADRIATIC STREET from Collins Avenue to Fresh Pond Road;
FRESH POND ROAD from Mt. Olivet Avenue to Woodbine
Street, Second Ward of the Borough of Queens.

10 Made by the corporation of Ward & Tully Inc.
Address: 38th St. & 10th Ave., Brooklyn, N. Y.

NAME AND ADDRESS OF EACH AND EVERY MEMBER
OF THE FIRM OR PRINCIPAL OFFICERS OF
THE CORPORATION.

Name: Frederick Ward, President & Treasurer,
Address: 51 Clark St., Brooklyn, N. Y.

20 Name: Thos. Tully, Vice-President,
Address: 201 Beverley Road, Brooklyn, N. Y.

Name: A. G. Ward, Secretary,
Address: 51 Clark St., Brooklyn.

NOTE.—The *bidder's name and residence or address* must be inserted herebelow, and in case of a firm, *the name and address of each and every member of the firm must be inserted.*

30 In case a bid shall be submitted by or in behalf of any corporation, the complete legal name and address of such *corporation* must be written herebelow, together with the name, address and title of the principal officers of the corporation.

40 The party named above (of lawful age), as *Bidder*, declares: *That* the only person or persons interested in this bid or proposal as principal or principals is or are named above, and that no other person than herein above named has any interest in this bid or in the contract proposed to be taken; *that* this bid is made without any connection with any other person or persons making a bid for the same work or purpose; *that* the bid is in all respects fair and without collusion or fraud, and *that* no member of the Board of Aldermen, no head of a department, no chief of a bureau, deputy thereof, or clerk therein, nor any officer or employee of The City of New York, is, shall be or become, directly or indirectly, interested as contracting party, partner, stockholder, surety or otherwise in the performance of the contract, or in the supplies, work or business to which it relates, or in any

EXHIBIT C-174 (continued):

10 portion of the profits thereof, *that* he has examined the form of contract and specifications approved by the Corporation Counsel, and any plans therein referred to, and that he has visited the site of the proposed work and has made himself familiar with all the existing conditions; and he proposes and agrees, if this bid be accepted, that he will contract, in the form so approved, to provide, furnish and deliver all necessary work, labor, services, materials or supplies, machinery, tools, plant, and appliances, and to perform and complete all the work mentioned in said approved form of contract and specifications, and in strict accordance with the terms and conditions thereof, and that he will accept in full payment therefor the following named sums or prices:

20 The Engineer's estimate of the quantities as advertised and the nature and extent of the work and materials or supplies required, though stated with as much accuracy as is practicable in advance, are *approximate* only and are given to form a basis of comparison for testing bids and are not guaranteed to be accurate and are not considered as a binding feature of the contract. *Before bidding, Contractors must satisfy by personal examination of the Plans, Specifications, Contract, and location of the proposed work, and by such other means as they may prefer, as to the accuracy of the foregoing statement, and they must determine for themselves, and allow for all difficulties which may be encountered in the prosecution of the work.*

- 30 1: 901 Linear Feet 7'6" Reinforced concrete sewer, Per Linear Foot, Thirty five dollars and fifty cents (\$35.50).
- 2: 2,055 Linear Feet 7'0" Reinforced concrete sewer, Per Linear Foot, Thirty four Dollars (\$34.00).
- 3: 62 Linear Feet 5'0" Reinforced concrete sewer, Per Linear Foot, Twenty-four Dollars (\$24.00).
- 4: 303 Linear Feet 3'9" Plain concrete sewer, Per Lin. Foot, Seventeen Dollars (\$17.00).
- 5: 354 Linear Feet 3'6" Plain concrete sewer, Per Lin. Foot, Thirteen Dollars (\$13.00).
- 40 6: 488 Linear Feet 3'0" Plain concrete sewer, Per Lin. Foot, Ten Dollars (\$10.00).
- 7: 516 Linear Feet 2'6" Plain concrete sewer, Per Lin. Foot, Eight dollars and eighty five cents (\$8.85).
- 8: 265 Linear Feet 24-inch Vitrified pipe sewer, Per Linear Foot, Six Dollars (\$6.00).

EXHIBIT C-174 (continued) :

| | | | |
|----|-----|-------|--|
| | 9: | 375 | Linear Feet 22-inch Vitrified pipe sewer, Per Linear Foot, Six dollars and twenty five cents (\$6.25). |
| | 10: | 265 | Linear Feet 20-inch Vitrified pipe sewer, Per Linear Foot, Five Dollars (\$5.00). |
| | 11: | 9 | Linear Feet 18-inch Vitrified pipe sewer, Per Linear Foot, Four dollars and fifty cents (\$4.50). |
| 10 | 12: | 3 | Linear Feet 15-inch Vitrified pipe sewer, Per Linear Foot, Four Dollars (\$4.00). |
| | 13: | 222 | Linear Feet 12-inch Vitrified pipe sewer, Per Linear Foot, Three Dollars (\$3.00). |
| | 14: | 85 | Six-inch spurs, 24" long, on concrete sewer, Each, Eighty cents (\$0.80). |
| | 15: | 18 | Six-inch spurs on 24-inch Vitrified pipe sewer, Each, Four dollars and fifty cents (\$4.50). |
| | 16: | 33 | Six-inch spurs on 22-inch Vitrified pipe sewer, Each, Four Dollars (\$4.00). |
| 20 | 17: | 18 | Six-inch spurs on 20-inch Vitrified pipe sewer, Each, Three Dollars (\$3.00). |
| | 18: | 18 | Six-inch spurs on 12-inch Vitrified pipe sewer, Each, One Dollar (\$1.00). |
| | 19: | 1,257 | Feet of Risers for house connections, including Y's, Per Foot, One dollar and forty cents (\$1.40). |
| | 20: | 39 | Manholes, Complete, Each, One hundred and fifty five Dollars (\$155.00). |
| | 21: | 47 | Basin manholes, (New type), Complete, Each, One hundred seventy five Dollars (\$175.00). |
| 30 | 22: | 68 | Inlets, (New type), Complete, Each, Forty-five Dollars (\$45.00). |
| | 23: | 1,665 | Linear Feet 12-inch Vitrified pipe for basin connections, Per Linear Foot, Two Dollars (\$2.00). |
| | 24: | 1,100 | Linear Feet 10-inch Vitrified pipe for basin connections, Per Linear Foot, One Dollar (\$1.00). |
| | 25: | 1,540 | Linear Feet 6" Vitrified pipe for house connections, Per Linear Foot, One dollar and fifty cents (\$1.50). |
| | 26: | 1 | Chamber at Collins Ave. and Adriatic Street, Complete, Twelve hundred Dollars (\$1200.00). |
| 40 | 27: | 1 | Chamber at Fresh Pond Road and Adriatic Street, Complete, Eight hundred Dollars (\$800.00). |
| | 28: | 1 | Chamber at Fresh Pond Road and Winifred Street, Complete, Seven hundred Dollars (\$700.00). |
| | 29: | 1 | Chamber at Fresh Pond Road and Metropolitan Avenue, Complete, Seven hundred Dollars (\$700.00). |
| | 30: | 1 | Chamber at Fresh Pond Road and Ralph St., Complete, Four hundred and sixty five Dollars (\$465.00). |

EXHIBIT C-174 (continued):

- 31: 1 Drop Chamber at Fresh Pont Road, near Adriatic Street, Complete, Three hundred Dollars (\$300.00).
- 32: 5,000 Feet B. M. Timber for bracing and sheet piling, Per 1,000 Feet, Twenty five Dollars (\$25.00).
- 33: 5,000 Feet B. M. Timber for foundation, furnished and laid, per 1,000 Feet, Forty Dollars (\$40.00).
- 10 34: 500 Pounds Structural Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Six cents (\$0.06).
- 35: 500 Pounds Reinforcing Steel, exclusive of steel shown on plan, furnished and placed, Per Pound, Five cents (\$0.05).
- 36: 40 Cubic Yards Class "A" Concrete, exclusive of concrete shown on plan, in place, Per Cubic Yard, Eight dollars and fifty cents (\$8.50).
- 37: 7,900 Cubic Yards Displaced Material for sewer embankment, in place, Per Cubic Yard, Fifteen Cents (\$0.15).
- 20 38: 2,350 Linear Feet of Wooden Fence, Per Linear Foot. Twenty five cents (\$0.25).

No bid will be allowed to be withdrawn, for any reason whatever, after it has been received and deposited with the President. The President expressly reserves the right to reject all bids if he shall deem it for the public interest so to do. No bid will be accepted from, nor contract awarded to, any person who is in arrears to The City of New York upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

30

No bid or proposal will be received, considered and deposited unless, as a condition precedent to the reception or consideration of any proposal it be accompanied by either a certified check upon one of the State or National Banks of The City of New York, drawn and made payable to the order of the Comptroller of The City of New York, or money to the amount of *five per centum* (5%) of the amount of the security or surety bond required for the faithful performance of the contract. Such check or money must not be inclosed in the sealed envelope containing the proposal, but must be either inclosed in a separate envelope addressed to the Borough President, or submitted personally upon the presentation of the bid or proposal and handed to the officer or clerk of the Department who has charge of the proposal box, and who will give a proper voucher for the deposit, and no bid can be deposited in said box until such check or money has been examined by said officer or clerk and found to be correct. All

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EXHIBIT C-174 (continued) :

10 such deposits, except that made by the bidder to whom the contract shall be awarded, will be returned to the person or persons making the same within three (3) days after the decision as to who shall receive the contract. If the bidder to whom the contract shall have been awarded shall refuse or neglect to execute the same within five days after due notice that the contract has been awarded to him, and that the adequacy and sufficiency of the surety offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York as liquidated damages for such neglect or refusal; but if he shall execute the contract and furnish the said security within the time aforesaid, the amount of the deposit shall be returned to him.

Each and every person bidding must sign here.

20 NOTE.—*Each and every person bidding and named above must sign here.* In the case of a firm, give the name of each and every partner in full.

Ward & Tully Inc. [L. S.]

30 In case a bid shall be submitted by or in behalf of a corporation, it must be signed in the full legal name of such corporation by some authorized officer or agent thereof, who shall subscribe his name and office. If practicable, the seal of the corporation must be affixed.

Frederick Ward [L. S.]

President-Treasurer [L. S.]

The following affidavit must be similarly signed and sworn to:

..... [L. S.]

THE CITY AND STATE OF NEW YORK,
COUNTY OF KINGS, ss.

40 The above-named bidder(s), being severally duly sworn, say, each for himself, that the several matters stated in the above bid are in all respects true.

Signature(s) of Bidder(s)

Subscribed and sworn to before me, this 16th day of Aug. 1916.

Frederick Ward
.....

P. HADDOCK,
Notary Public, Kings County.

EXHIBIT C-21:

EXHIBIT C-21.

(Rejection of Bids for Collins Ave. Letter dated Nov. 29, 1916.)

THE CITY OF NEW YORK

10

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly,
President.

Joseph Flanagan
Borough Secretary.

20 Hugh Hall,
Secretary to President.

Long Island City, November 29, 1916.

30814

Hon. William A. Prendergast, Comptroller,
Department of Finance, City of New York,
Municipal Building, Borough of Manhattan.

Sir:—

30 Pursuant to the authority vested in me by law, I beg to
inform you that I have this day rejected all bids opened in this
Office on August 16, 1916, in connection with contemplated con-
tract;—

“For the construction of a sewer and appur-
tenances in COLLINS AVENUE from Mt. Olivet Ave.,
to Adriatic Street, in ADRIATIC STREET from Collins
Ave. to Fresh Pond Road, and in FRESH POND ROAD
from Mt. Olivet Ave. to Woodbine St., 2nd Ward, Borough
of Queens.”

40

Yours very truly,

PJH

MAURICE E. CONNOLLY,
President of the Borough of Queens.

EXHIBIT C-22:

EXHIBIT C-22.

(*City Record, December 18th, 1916.*)

Monday, December 18, 1916 THE CITY RECORD 8881

10

BOROUGH OF QUEENS.

Proposals.

SEALED BIDS OR ESTIMATE WILL BE received by the President of the Borough of Queens at 4th Floor, Queens Subway Building, Hunterspoint and Van Alst aves., L. I. City, until 11 a. m., on

20

Friday, December 29, 1916.

No. 1. For the construction of a sewer and appurtenances in Collins Ave., from Mt. Olivet Ave. to Adriatic St.; Adriatic St., from Collins Ave. to Fresh Pond Rd.; Fresh Pond Rd., from Mt. Olivet Ave. to Woodbine St., Second Ward, Borough of Queens.

The Engineer's estimate of the quantities is as follows:

30

901 linear feet 7' 6" reinforced concrete sewer.

2,055 linear feet 7' 0" reinforced concrete sewer.

62 linear feet 5' 0" reinforced concrete sewer.

303 linear feet 3' 9" plain concrete sewer.

354 linear feet 3' 6" plain concrete sewer.

488 linear feet 3' 0" plain concrete sewer.

516 linear feet 2' 6" plain concrete sewer.

265 linear feet 24-inch vitrified pipe sewer.

375 linear feet 22-inch vitrified pipe sewer.

265 linear feet 20-inch vitrified pipe sewer.

9 linear feet 18-inch vitrified pipe sewer.

3 linear feet 15-inch vitrified pipe sewer.

40

222 linear feet 12-inch vitrified pipe sewer.

85 six-inch spurs, 24 inches long, on concrete sewer.

18 six-inch spurs on 24-inch vitrified pipe sewer.

33 six-inch spurs on 22-inch vitrified pipe sewer.

18 six-inch spurs on 20-inch vitrified pipe sewer.

18 six-inch spurs on 12-inch vitrified pipe sewer.

1,257 feet risers for house connections including Y's.

39 manholes, complete.

EXHIBIT C-22 (continued):

- 47 basin manholes (new type), complete.
- 68 inlets (new type), complete.
- 1,665 linear feet 12-inch vitrified pipe for basin connections.
- 1,100 linear feet 10-inch vitrified pipe for basin connections.
- 10 1,540 linear feet 6-inch vitrified pipe for house connections.
 - 1 chamber at Collins ave. and Adriatic st.
 - 1 chamber at Fresh Pond rd. and Adriatic st.
 - 1 chamber at Fresh Pond rd. and Winifred st.
 - 1 chamber at Fresh Pond rd. and Metropolitan ave.
 - 1 chamber at Fresh Pond rd. and Ralph st.
 - 1 drop chamber at Fresh Pond rd. near Adriatic st.
- 5,000 feet board measure timber for bracing and sheet piling.
- 20 5,000 feet board measure timber for foundation,
 - 500 pounds structural steel, exclusive of steel shown on plan.
 - 500 pounds reinforcing steel, exclusive of steel shown on plan.
 - 40 cubic yards Class "A" concrete, exclusive of concrete shown on plan.
- 7,900 cubic yards displaced material for sewer embankment.
- 2,350 linear feet of wooden fence.
- 30 The time allowed for completing the above work will be two hundred and fifty (250) consecutive working days.

The amount of security required will be Fifty-six Thousand (\$56,000) Dollars.

EXHIBIT C-11 (continued):

| Commission Excess Ac. | Current % | Year of Award | Current Price | Quantity (Cwt) | Price Paid (Cwt) | Total Paid (Pounds) | Face Price (Market) | Total Face Value | Excess Paid (Pounds) | Contractor | |
|-----------------------|-----------|---------------|---------------|----------------|------------------|---------------------|---------------------|------------------|----------------------|---------------------|-----------------|
| C 107 | 6497 | 1923 | 3096611 | 30 | 3100 | 1020000 | 1018000 | 1020000 | 2000 | America Corp. | |
| C 111 | 79000 | 1925 | 16123100 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | 1926 | 11000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | 1927 | 10000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 90 | 9000 | 3000000 | 3000000 | 0 | | | |
| C 116 | 77000 | 1925 | 7000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | 1926 | 6377600 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | 1927 | 3998000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 90 | 9000 | 3000000 | 3000000 | 0 | | | |
| C 117 | 82311 | 1926 | 3998000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | 1927 | 3998000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| C 119 | 64716 | 1926 | 3397500 | 30 | 3000 | 1000000 | 1000000 | 0 | D.U.T. INS. | | |
| C 120 | 76222 | 1927 | 11000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| C 121 | 74718 | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | Hammer Contract Co. | |
| C 122 | 79939 | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| C 123 | 80303 | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| C 124 | 84711 | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | Oxford Eng. Co. |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| | | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | EVERETT Contract Co. | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| | | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 |  |  |  | Perrin & Perryman |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| | | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |
| | | 1927 | 3000000 | 30 | 3000 | 1000000 | 1000000 | 0 | | | |
| | | Total | | 60 | 6000 | 2000000 | 2000000 | 0 | | | |

EXHIBIT C-11 (continued):

| Commission Report No. | Contract No. | Year of Award | Contract Price | Quantity (Feet) | Size (Circuit) | Price Paid (Per Foot) | Total Paid (Per Foot) | Total Paid (Per Foot) | Total Paid (Per Foot) | Notes |
|-----------------------|--------------|---------------|----------------|-----------------|----------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|
| C-204 | 70074 | 1924 | 2000000 | 360 | 32 | 400 | 400 | 400 | 400 | American Power |
| | | | | 180 | 32 | 1800 | 1800 | 1800 | 1800 | |
| | | | | 180 | 32 | 1800 | 1800 | 1800 | 1800 | |
| | | | | 5700 | 40 | 2100 | 2100 | 2100 | 2100 | |
| | | | | 5700 | 40 | 2100 | 2100 | 2100 | 2100 | |
| | | | | 5700 | 40 | 2100 | 2100 | 2100 | 2100 | |
| C-205 | 70187 | 1925 | 7000000 | 2000 | 90 | 3000 | 3000 | 3000 | 3000 | American Power |
| | | | | 4500 | 90 | 3000 | 3000 | 3000 | 3000 | |
| C-206 | 70445 | 1925 | 7000000 | 4500 | 60 | 4000 | 4000 | 4000 | 4000 | American Power |
| | | | | 4500 | 60 | 4000 | 4000 | 4000 | 4000 | |
| C-207 | 71303 | 1926 | 5770000 | 200 | 30 | 700 | 700 | 700 | 700 | American Power |
| | | | | 620 | 30 | 1800 | 1800 | 1800 | 1800 | |
| | | | | 620 | 30 | 1800 | 1800 | 1800 | 1800 | |
| | | | | 200 | 60 | 1000 | 1000 | 1000 | 1000 | |
| | | | | 1200 | 70 | 2000 | 2000 | 2000 | 2000 | |
| | | | | 1200 | 70 | 2000 | 2000 | 2000 | 2000 | |
| C-208 | 72747 | 1927 | 3200000 | 70 | 30 | 3000 | 3000 | 3000 | 3000 | American Power |
| | | | | 2900 | 70 | 2000 | 2000 | 2000 | 2000 | |
| | | | | 1800 | 70 | 2000 | 2000 | 2000 | 2000 | |
| | | | | 1000 | 70 | 2000 | 2000 | 2000 | 2000 | |
| C-209 | 70617 | 1927 | 3070000 | 4000 | 30 | 1000 | 1000 | 1000 | American Power | |
| | | | | 1000 | 30 | 1000 | 1000 | 1000 | | 1000 |
| C-210 | 70611 | 1927 | 3000000 | 1000 | 20 | 1000 | 1000 | 1000 | American Power | |
| | | | | 1000 | 20 | 1000 | 1000 | 1000 | | 1000 |
| | | | | 1000 | 20 | 1000 | 1000 | 1000 | | 1000 |

(Continued on Page 1772)

EXHIBIT C-11 (continued):

| Company | Number of Successes | REDEMPTION | | Total No. Shares | Total Face Amount | Total No. Shares | Total Face Amount |
|----------------------|---------------------|------------|------------------|------------------|-------------------|------------------|-------------------|
| | | Years | Number of Shares |  |  |  |  | Number of Shares | Face Amount |
| Amick Corp | 3 | 1935/6 | 1 | 3737725 | 6132500 | 1823900 | 4296600 |
| Dart, Inc | 4 | 1941/6 | 1 | 10429000 | 4972300 | 1772400 | 3002500 |
| Hammex Corp, A | 1 | 1935 | 1 | 6232000 | 1289000 | 679900 | 649000 |
| Quatro Etn. Co | 1 | 1935 | 1 | 2263500 | 1170000 | 237800 | 732,400 |
| Everett Corp, Co | 1 | 1926 | 1 | 3773700 | 1900000 | 300500 | 1090400 |
| Archer, Preston | 1 | 1927 | 1 | 297700 | 90000 | 274600 | 25000 |
| Neebe Co | 2 | 1925 | 3 | 1062000 | 203600 | 797600 | 176000 |
| Mission & Decker | 4 | 1921/2 | 2 | 4277000 | 362000 | 100000 | 110000 |
| " | 12 | 1921/7 | 3 | 3721000 | 376000 | 376000 | 376000 |
| H.S. Tucker Corp, Co | 2 | 1921/6 | 3 | 1007000 | 2472000 | 1000000 | 1000000 |
| Asheville Park | 2 | 1921/2 | 4 | 2000000 | 900000 | 1100000 | 1100000 |
| Kennedy, Smith, Inc | 7 | 1921/7 | 5 | 1000000 | 1000000 | 1000000 | 1000000 |
| | 21 | | | 42820000 | 10000000 | 10000000 | 10000000 |

NOTE:
Has the money been (Quoted for purposes of Successes only in Exhibit) been used to discharge the entire liability?
Please fill in the column marked "Successes".

EXHIBIT C-24:

EXHIBIT C-24.

(*City Record, March 24, 1917.*)

Saturday, March 24, 1917.

THE CITY RECORD

2087

BOROUGH OF QUEENS.

10

Proposals.

SEALED BIDS OR ESTIMATE WILL BE received by the President of the Borough of Queens at 4th Floor, Queens Subway Building, Hunterspoint and Van Alst aves., L. I. City, until 11 a. m., on

Wednesday, April 4, 1917.

20 No. 2. For the construction of a sewer and appurtenances in Collins Ave., from Mt. Olivet Ave. to Adriatic St.; Adriatic St., from Collins Ave. to Fresh Pond Rd.; Fresh Pond Rd., from Mt. Olivet Ave. to Woodbine St., Second Ward, Borough of Queens.

The Engineer's estimate of the quantities is as follows:

Type "A" or Sewer Department Standard.

- 901 linear feet 7' 6" reinforced concrete sewer.
2,055 linear feet 7' 0" reinforced concrete sewer.
62 linear feet 5' 0" reinforced concrete sewer.
303 linear feet 3' 9" plain concrete sewer.
30 354 linear feet 3' 6" plain concrete sewer.
488 linear feet 3' 0" plain concrete sewer.
516 linear feet 2' 6" plain concrete sewer.
265 linear feet 24-inch vitrified pipe sewer.
375 linear feet 22-inch vitrified pipe sewer.
265 linear feet 20-inch vitrified pipe sewer.
9 linear feet 18-inch vitrified pipe sewer.
3 linear feet 15-inch vitrified pipe sewer.
222 linear feet 12 inch vitrified pipe sewer.
85 six-inch spurs, 24 inches long, on concrete sewer.
40 18 six-inch spurs on 24-inch vitrified pipe sewer.
33 six-inch spurs on 22-inch vitrified pipe sewer.
18 six-inch spurs on 20-inch vitrified pipe sewer.
18 six-inch spurs on 12-inch vitrified pipe sewer.
1,257 feet risers for house connections including Y's.
39 manholes, complete.
47 basin manholes (New Type), complete.
68 inlets (New Type), complete.

EXHIBIT C-24 (*continued*):

- 1,665 linear feet 12-inch vitrified pipe for basin connections.
- 1,100 linear feet 10-inch vitrified pipe for basin connections.
- 1,540 linear feet 6-inch vitrified pipe for house connections.
- 10 1 chamber at Collins ave. and Adriatic st.
- 1 chamber at Fresh Pond rd. and Adriatic st.
- 1 chamber at Fresh Pond rd. and Winifred st.
- 1 chamber at Fresh Pond rd. and Metropolitan ave.
- 1 chamber at Fresh Pond rd. and Ralph st.
- 1 drop chamber at Fresh Pond rd. near Adriatic st.
- 5,000 feet B. M. timber for bracing and sheet piling.
- 5,000 feet B. M. timber for foundation.
- 500 pounds structural steel, exclusive of steel shown on plan.
- 20 500 pounds reinforcing steel, exclusive of steel shown on plan.
- 40 cubic yards Class "A" concrete, exclusive of concrete shown on plan.
- 7,900 cubic yards displaced material for sewer embankment.
- 2,350 linear feet of wooden fence.
- Type "B"*
- 30 901 linear feet 7' 6" reinforced concrete pipe sewer (Pre-cast Type B).
- 2,055 linear feet 7' 0" reinforced concrete pipe sewer (Pre-cast Type B).
- 62 linear feet 5' 0" reinforced concrete pipe sewer (Pre-cast Type B).
- 303 linear feet 3' 9" reinforced concrete pipe sewer (Pre-cast Type B).
- 354 linear feet 3' 6" reinforced concrete pipe sewer (Pre-cast Type B).
- 488 linear feet 3' 0" reinforced concrete pipe sewer (Pre-cast Type B).
- 40 516 linear feet 2' 6" reinforced concrete pipe sewer (Pre-cast Type B).
- 265 linear feet 24" reinforced concrete pipe sewer (Pre-cast Type B).
- 375 linear feet 22" vitrified pipe sewer.
- 265 linear feet 20" vitrified pipe sewer.
- 9 linear feet 18" vitrified pipe sewer.
- 3 linear feet 15" vitrified pipe sewer.

EXHIBIT C-24 (*continued*):

- 222 linear feet 12" vitrified pipe sewer.
- 103 six-inch spurs, 24-inches long, on reinforced concrete pipe sewer.
- 33 six-inch spurs on 22" vitrified pipe sewer.
- 18 six-inch spurs on 20" vitrified pipe sewer.
- 18 six-inch spurs on 12" vitrified pipe sewer.
- 1,257 feet risers for house connections, including Y's.
- 10 39 manholes, complete.
- 47 basin manholes (New Type), complete.
- 68 inlets (New Type), complete.
- 1,665 linear feet 12" vitrified pipe for basin connections.
- 1,100 linear feet 10" vitrified pipe for basin connections.
- 1,540 linear feet 6" vitrified pipe for house connections.
- 1 chamber at Collins ave. and Adriatic st.
- 1 chamber at Fresh Pond rd. and Adriatic st.
- 1 chamber at Fresh Pond rd. and Winifred st.
- 1 chamber at Fresh Pond rd. and Metropolitan ave.
- 20 1 chamber at Fresh Pond rd. and Ralph st.
- 1 drop chamber at Fresh Pond rd. near Adriatic st.
- 5,000 feet B. M. timber for bracing and sheet piling.
- 5,000 feet B. M. timber for foundation.
- 500 pounds structural steel, exclusive of steel shown on plan.
- 500 pounds reinforcing steel, exclusive of steel shown on plan.
- 40 cubic yards Class "A" concrete, exclusive of concrete shown on plan.
- 30 7,900 cubic yards displaced material for sewer embankment,
- 2,350 linear feet of wooden fence.

Notice to Bidders.

Note—Bidders are invited to tender bids on monolithic plain and reinforced concrete sewers from 30 inches upward, these sewers being the standards of the Sewer Department, and hereafter designated as Type A, or on reinforced concrete pipe sewers from 24 inches upward (precast), which will be designated as Type B, or on both types if they so desire; but it is to be distinctly understood that no bids will be accepted on combinations of Types A and B. All bidders may secure specifications for reinforced concrete pipe sewers, Type B, on request.

The time allowed for completing the above work will be two hundred and fifty (250) working days.

The amount of security required will be Fifty-six Thousand (\$56,000) Dollars.

EXHIBIT C-8:

EXHIBIT C-8.

10 *(Contract between Joseph L. Sigretto and The City of New York for construction of sewers and appurtenances in Hull Avenue from Maurice Avenue to Willow Avenue, Willow Avenue from Jay Avenue to Grand Street, Hull Avenue from Willow Avenue to Hamilton Place, Hamilton Place from Hull Avenue to Grand Street, Grand Street from Hamilton Place to Monteverde Avenue, Second Ward of the Borough of Queens.)*

THE CITY OF NEW YORK—DEPARTMENT OF FINANCE

Office of the Comptroller

CONTRACT SUMMARY

20 Contractor JOSEPH L. SIGRETTO & CO. No. 47339

Names of Sureties: National Surety Co.
London & Lancashire Ind. Co.

Amount of Bond \$31000.00

Date of award: Apr. 10, 1917 Department: President, Borough of Queens; Date of contract: Apr. 23, 1917; Borough: Queens; Date of expiration: 250 days; Date of filing: Apr. 13, 1917; Damages: \$10.00 per day; Date paid in full 2/20/19.

30 DESCRIPTION OF WORK

For the construction of a sewer and appurtenances in Hull Ave., from Maurice Ave. to Willow Avenue, Willow Ave. from Jay Ave. to Grand St., etc.

Original Estimate, \$76,746.50

A.E 3,851.02

80,597.52

40 ACCOUNTS TO BE CHARGED

CFM 25

EXHIBIT C-8 (continued) :

PAYMENTS, AMOUNTS RETAINED AND EARNED

| | Date | 85% Payments | Amount paid to date | Amount retained to date | Amount earned to date |
|----|----------|--------------|---------------------|-------------------------|-----------------------|
| | | 2,997.44 | 2,997.44 | 528.96 | 3,526.40 |
| 10 | 8/ 9/17 | 10,561.35 | 13,558.79 | 2,392.73 | 15,951.52 |
| | 9/12/17 | 11,522.77 | 25,081.56 | 4,426.16 | 29,507.72 |
| | | 8,821.81 | 33,903.37 | 5,982.95 | 39,886.32 |
| | 11/14/17 | 14,147.32 | 48,050.69 | 8,479.53 | 56,530.22 |
| | 12/14/17 | 10,666.05 | 58,716.74 | 10,361.78 | 69,078.52 |
| | 1/17/18 | 4,811.94 | 63,528.68 | 11,210.94 | 74,739.62 |
| | | | | 220.00 | B.R.R.T. |
| | 4/30/18 | 15,495.60 | 79,024.28 | 1,353.24 | 80,597.52 |
| | 1/ 2/19 | 1,353.24 | 80,377.52 | 220.00 | 80,597.52 |
| | 2/ 5/19 | 220.00 | 80,597.52 | | 80,597.52 |
| 20 | 3/18/19 | 3,171.00 | 83,768.52 | | 83,768.52 |
| | | <hr/> | | | |
| | | 83,768.52 | | | |

IN FULL

THE CITY OF NEW YORK

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

30

Maurice E. Connolly
President

Mason O. Smedley
Borough Secretary

Hugh Hall
Secretary to President

Long Island City, May 14, 1917.

40 Hon. William A. Prendergast, Comptroller,
Department of Finance, City of New York,
Municipal Building, Borough of Manhattan.

Sir:—

Referring to contract No. 47339;—

“For the construction of a sewer and appurtenances
in HULL AVENUE from Maurice Avenue to Willow Ave-

EXHIBIT C-8 (continued) :

nue; WILLOW AVENUE from Jay Avenue to Grand Street; HULL AVENUE from Willow Avenue to Hamilton Place; HAMILTON PLACE from Hull Avenue to Grand Street; GRAND STREET, from Hamilton Place to Monteverde Avenue, Second Ward, Borough of Queens, Type "B" construction."

10 I beg to inform you that the contractor, Joseph L. Sigretto & Co., 1455 Woodhaven Avenue, Woodhaven, N. Y., has been ordered to commence the work embraced in said contract on May 21, 1917, or before five days from the receipt of his notice.

Yours very truly,

WPB-PJH

.....
Acting President of the Borough of Queens.

20

City of New York

DEPARTMENT OF FINANCE

William A. Prendergast, Comptroller

Edmund D. Fisher
Deputy Comptroller

Sheppard A. Morgan
Deputy Comptroller

Albert E. Hadlock
Deputy Comptroller

Hubert L. Smith
Assistant Deputy Comptroller

30

In replying refer to

1919.

Mr. John J. Kelly,
Auditor of Disbursements.

Sir:

Please set up in the contract ledgers a contract liability against the contract herein below named, as follows:

40

| Contract No. | Code | Amount |
|--------------|-----------|----------|
| 47339 | C.F.M. 25 | \$3171.— |

Yours very truly,

P. L. KENNEY,
Chief Clerk in Charge,
Division of Auditors & Examiners.

EXHIBIT C-8 (continued):

THE CITY OF NEW YORK
Departmentt of Finance—Bureau of Audit
ADVICE OF VOUCHER ADJUSTMENT

New York, 3/22/19.

10 To the Department of
President of Borough of Queens.

NOTICE FOR BOOKKEEPER

The following voucher transmitted by you to this bureau for payment, has been adjusted in the manner described below.

Corresponding entry must be made in the books of your department.

| 20 | Depart- | Finance | Class | Amount | Amount | Adjustment | | Code |
|-----|---------|---------|----------|----------|----------|------------|-------|------|
| | Voucher | | | | | Tickler | Added |  | Deducted |
| No. | No. | | Claimed | Audited | | | | |
| 75 | 47079 | M | 3,171.00 | 3,171.00 | 3,171.00 | | C. | |
| | | | | | | 3,171.00 | M. | |

Name of Claimant: Joseph L. Sigretto & Co. C.F.M. 25

Item Adjusted, with Reason for Adjustment: Wrong Voucher.

Respectfully,

30

J. J. FLANIGAN,
Auditor of Accounts.

Warrant No. 49287.

Fund Ledger: F 8 H.K.

Adj. Register, ON.

Adj. Summary.

40 Claimants Ledger.

EXHIBIT C-8 (*continued*):

THE CITY OF NEW YORK

Department of Finance

Bureau of Audit—Division of Disbursements

Municipal Building Room 631

10 \$220.—

New York, Feb. 20, 1919.

Received from WILLIAM A. PRENDERGAST, Comptroller, Warrant No. 37981 for the sum of TWO HUNDRED, TWENTY Dollars, on account of the within Contract numbered 47339 for and in full of repairing security, Joseph L. Sigretto & Co., Contractor.

Mailed Fed. 20, 1919.

WM. F. HEFFERNAN,
Disbursing Clerk.

20

CORPORATION

General Release.

To all to whom these Presents shall come or may concern,
Greeting:

30

KNOW DE, That JOS. L. SIGRETTO & CO., for and in consideration of the sum of FIFTEEN THOUSAND, FOUR HUNDRED, NINETY FIVE 60/100 Dollars, lawful money of the United States of America, to it paid by The City of New York, the receipt of which is hereby acknowledged, have remised, released and forever discharged, and by these presents does for itself, its successors and assigns, remise, release and forever discharge the said The City of New York, their successors and assigns, of and from all and all manner of action and actions, cause and causes of action, suits, debts, dues, sums of money, accounts, reckonings, bonds, bills, specialties, covenants, contracts, controversies, agreements, promises, variances, trespasses, damages, judgments, extents, executions, claims and demands whatsoever in law or in equity, which against them it ever had, now has or which it or its successors or assigns hereafter can, shall or may have, for, upon or by reason of a certain contract or agreement made the 23rd day of April, A. D. 1917, by and between

40

EXHIBIT C-8 (*continued*):

10 JOS. L. SIGRETTO & CO., and the said The City of New York, for Contract No. 47339, Sewer, Hull Ave. &c., or by reason of any matter, cause or thing whatsoever resulting or arising therefrom from the beginning of the world to the day of the date of these presents, excepting the sum of \$1353.24 retained as repairing security and further excepting any claim it may have to a sum not exceeding \$15,000.00 for work done outside the contract by reason of change of line of work, which claims are not hereby released by it nor conceded by the City of New York.

IN WITNESS WHEREOF, JOS. L. SIGRETTO & CO., has caused its corporate seal to be affixed hereto and its corporate name to be signed to these presents by its President this 12th day of June, in the year one thousand, nine hundred and eighteen.

Sealed and delivered in the presence of

20 (Signed) R. O'CONNOR.

JOSEPH L. SIGRETTO & CO.,

(Signed) Joseph L. Sigretto.

(Seal)

Original delivered to Chief Auditor.

W. J. G.

30 Date: 6/20/18.

State of New York,
County of New York, ss.:
City of New York,

40 On this 12th day of June 1918, before me personally came JOSEPH L. SIGRETTO, to me known, who being by me duly sworn, did depose and say that he resided in Boro. of Queens that he is the President of the Joseph L. Sigretto & Co., the Corporation described in and which executed the above instrument, that he knew the seal of said Corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

(Signed) WM. F. HEFFERNAN.

EXHIBIT C-8 (continued) :

Contract No. 47339

(To be filled in by the Dept. of Finance)

The City of New York

ADVICE OF AWARD OF CONTRACT

(This copy to be retained by Bookkeeping Division,
Department of Finance)

10 Dep't of President, Borough of Queens

*Date April 10, 1917.

Comptroller of The City of New York :

Please take notice that the following described contract has this day * been awarded to Contractor Joseph L. Sigretto & Company, Address 1455 Woodhaven Avenue, Woodhaven, L. I.

SURETIES

AMT. OF BONDS

\$15,500

\$31000.00

National Surety Company, 115 Broadway

\$15,500

20

London & Lancashire Ind. Co.
15853

DETAILS OF PURPOSE OF CONTRACT

For the construction of a sewer and appurtenances in Hull Avenue from Maurice Avenue to Willow Avenue; Willow Avenue from Jay Avenue to Grand Street; Hull Avenue from Willow Avenue to Hamilton Place; Hamilton Place from Hull Avenue to Grand Street; Grand Street from Hamilton Place to Monteverde Avenue, Second Ward, Type "B" construction.

30

| Contract Chargeable to Code No. | Estimated Amount | Contracts Previously Awarded (Including Adjustments) | Open Market Orders Issued To Date (Including Adjustments) | Misc. Vouchers, Payrolls, and Other Charges |
|---------------------------------|------------------|--|---|---|
| CFM 25 | 76,746.50 | 1,545,789.87 | 28,091.52 | 89,685.23 |

Enter full titles of accounts below and refer to code numbers by means of line numbers in margins.

Street Improvement Fund.

40

The within expense is properly payable from the fund or funds shown hereon.

JAS. P. McINERNEY,

4/12/17

Auditor of Accounts.

Yours respectfully,

MAURICE E. CONNOLLY,

President, Borough of Queens.

Head of Dept.

EXHIBIT C-8 (*continued*):

* This will be the date of the entry by which the fund is charged with the estimated amount of the contract both in the department making the award and by the Department of Finance. There must therefore be no delay in forwarding this advice.

Amended Feb. 14th, 1917.

10

NOTICE.—Bidders are particularly requested to carefully examine the Proposal for Bids, Form of Agreement, Specifications, Plan and the location of the work and the surroundings thereof before bidding.

No. 15853 C

THE CITY OF NEW YORK

Office of

20

THE PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

1916

ASSESSMENT WORK

30

Proposal for Bids, Bid, Bond, Agreement and Specifications for Constructing Sewers and Appurtenances in

HULL AVENUE from Maurice Avenue to Willow Avenue;
WILLOW AVENUE from Jay Avenue to Grand Street;
HULL AVENUE from Willow Avenue to Hamilton Place;
HAMILTON PLACE from Hull Avenue to Grand Street;
GRAND STREET from Hamilton Place to Monteverde Avenue,

40 Second Ward of the Borough of Queens,
together with all the work incidental thereto.

APPROVED
Feb. 15, 1917

JAMES RICE,
Engineer in Charge.

ENGINEERING CONSTRUCTION

EXHIBIT C-8 (continued) :

Time for presenting bids.

1. *Sealed bids* for the above-entitled work will be received at the office of the President of the Borough of Queens, Borough Hall, Jackson avenue and Fifth street, Long Island City, in The City of New York, until 11 o'clock A. M., on Wednesday April 4th, 1917.

10 **Time allowed for completion.**

2. The time allowed for the full completion of the work herein described will be two hundred and fifty (250) **CONSECUTIVE WORKING DAYS.**

Security required.

3. The amount of security required will be Thirty-one thousand Dollars (\$31,000.00).

20 **Bidders referred to form of agreement, etc.**

4. Bidders are referred to the form of agreement, to the specifications and to the plan and drawings of Standard Details on file at the office of the President, and to the following Engineer's estimate of the quantity and kind of work required, the items whereof in all cases include all materials and labor necessary to fully complete said work. Prices for each item shall be named, upon the sum total of which the comparison and tests of bids will be made.

30 **Engineer's estimate.**

NOTICE TO BIDDERS

40 Bidders are invited to tender bids on monolithic plain and reinforced concrete sewers from 30 inches upward, these sewers being the standards of the Sewer Department, and hereafter designated as type A, or on reinforced concrete pipe sewers from 24 inches upward (precast) which will be designated as type B, or on both types if they so desire; but it is to be distinctly understood that no bids will be accepted on combinations of types A and B. All bidders may secure specifications for reinforced concrete pipe sewers, type B, on request.

EXHIBIT C-8 (continued) :

TYPE A or SEWER DEPT. STANDARD

| | | | |
|----|-------|--|--|
| | 974 | Linear Feet 6'-0" | Reinforced Concrete Sewer |
| | 525 | Linear Feet 5'-6" | Reinforced Concrete Sewer |
| | 686 | Linear Feet 5'-0" | Reinforced Concrete Sewer |
| | 245 | Linear Feet 3'-9" | Plain Concrete Sewer |
| | 265 | Linear Feet 3'-6" | Plain Concrete Sewer |
| 10 | 380 | Linear Feet 3'-3" | Plain Concrete Sewer |
| | 1,250 | Linear Feet 3'-0" | Plain Concrete Sewer |
| | 1,050 | Linear Feet 2'-6" | Plain Concrete Sewer |
| | 49 | Linear Feet 24" | Vitrified Pipe Sewer |
| | 296 | Linear Feet 22" | Vitrified Pipe Sewer |
| | 380 | Linear Feet 18" | Vitrified Pipe Sewer |
| | 57 | Linear Feet 12" | Vitrified Pipe Sewer |
| | 39 | Manholes, Complete | |
| | 1 | Cleaning Shaft, Complete | |
| | 23 | Basin Manholes, (New type), Complete | |
| 20 | 35 | Inlets, (New type), Complete | |
| | 575 | Linear Feet 12" | Vitrified Pipe for Basin Connections |
| | 510 | Linear Feet 10" | Vitrified Pipe for Basin Connections |
| | 272 | Six-inch Spurs, 24" long, on Concrete Sewers | |
| | 13 | Six-inch Spurs on 22" Vitrified Pipe Sewers | |
| | 24 | Six-inch Spurs on 18" Vitrified Pipe Sewers | |
| | 36 | Linear Feet Risers | |
| | 2,674 | Linear Feet 6" | Vitrified Pipe for House Connection Drains |
| | 1,000 | Linear Feet Piles | |
| | 3,000 | Feet B. M. Foundation Timber | |
| 30 | 2,000 | Pounds Structural Steel, including bolts, nuts and washers | |
| | 2,000 | Feet B. M. Timber for Sheeting and Bracing | |
| | 25 | Cubic Yards Class "A" Concrete, not shown on plan | |
| | 1,000 | Pounds Reinforcing Steel, not shown on plan | |
| | 6,000 | Cubic Yards Fill for Sewer Embankment | |
| | 1,500 | Linear Feet Wooden Fence | |
| | 1 | Junction Chamber at Willow Ave. and Hull Ave. (South) | |
| | 1 | Junction Chamber at Willow Ave. and Hull Ave. (North) | |
| | 1 | Junction Chamber at Willow Ave. and Jay Ave. | |
| | 1 | Junction Chamber at Willow Ave. and Maspeth Ave. | |
| 40 | 1 | Drop Chamber at Hull Ave. and Remsen Place | |
| | 1 | Junction Chamber at Hull Ave. and Hamilton Place | |
| | 1 | Junction Chamber at Hamilton Pl. and Grand St. | |
| | 1 | Junction Chamber at Grand St. near Willow Ave. | |
| | 60 | Linear Feet 24" | Corrugated Culvert Pipe |

EXHIBIT C-8 (continued) :

TYPE "B"

| | | |
|----|-------|---|
| | 974 | Linear Feet 6'-0" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 525 | Linear Feet 5'-6" Reinforced Concrete Pipe Sewer (Precast Type B) |
| 10 | 686 | Linear Feet 5'-0" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 245 | Linear Feet 3'-9" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 265 | Linear Feet 3'-6" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 380 | Linear Feet 3'-3" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 1,250 | Linear Feet 3'-0" Reinforced Concrete Pipe Sewer (Precast Type B) |
| 20 | 1,050 | Linear Feet 2'-6" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 49 | Linear Feet 24" Reinforced Concrete Pipe Sewer (Precast Type B) |
| | 296 | Linear Feet 22" Vitrified Pipe Sewer |
| | 380 | Linear Feet 18" Vitrified Pipe Sewer |
| | 57 | Linear Feet 12" Vitrified Pipe Sewer |
| | 39 | Manholes, Complete |
| | 1 | Cleaning Shaft, Complete |
| | 23 | Basin Manholes, (New type), Complete |
| | 35 | Inlets, (New type), Complete |
| 30 | 575 | Linear Feet 12" Vitrified Pipe for Basin Connections |
| | 510 | Linear Feet 10" Vitrified Pipe for Basin Connections |
| | 272 | Six-inch Spurs, 24-inches long, on Reinforced Concrete Pipe Sewer |
| | 13 | Six-inch Spurs on 22" Vitrified Pipe Sewers |
| | 24 | Six-inch Spurs on 18" Vitrified Pipe Sewers |
| | 36 | Linear Feet Risers |
| | 2,674 | Linear Feet 6" Vitrified Pipe for House Connection Drains |
| | 1,000 | Linear Feet Piles |
| | 3,000 | Feet B. M. Foundation Timber |
| 40 | 2,000 | Pounds Structural Steel, including bolts, nuts and washers |
| | 2,000 | Feet B. M. Timber for Sheeting and Bracing |
| | 25 | Cubic Yards Class "A" Concrete, not shown on plan |
| | 1,000 | Pounds Reinforcing Steel, not shown on plan |
| | 6,000 | Cubic Yards Fill for Sewer Embankment |
| | 1,500 | Linear Feet Wooden Fence |
| | 1 | Junction Chamber at Willow Ave. and Hull Ave. (South) |

EXHIBIT C-8 (continued) :

- 1 Junction Chamber at Willow Ave. and Hull Ave. (North)
- 1 Junction Chamber at Willow Ave. and Jay Ave.
- 1 Junction Chamber at Willow Ave. and Maspeth Ave.
- 1 Drop Chamber at Hull Ave. and Remsen Place
- 1 Junction Chamber at Hull Ave. and Hamilton Place
- 1 Junction Chamber at Hamilton Pl. and Grand St.
- 1 Junction Chamber at Grand St. near Willow Ave.
- 10 60 Linear Feet 24" Corrugated Culvert Pipe

Personal examination of work.

5. The foregoing Engineer's Estimate is *approximate only* and is not to be considered as a binding feature of the contract. Bidders are required to submit their bids upon the following express conditions which apply to and become a part of every bid received. Bidders must satisfy themselves by personal examination of the location of the proposed work and surroundings thereof, and by such other means as they may prefer as to the accuracy of the foregoing estimate, and shall not at any time after submission of their bids, dispute or complain of such estimate of the engineer, nor assert that there was any misunderstanding in regard to the quantity or kind of materials to be furnished or work to be done.
- 20

Prices to be stated in writing and in figures.

6. Any bid which fails to name a price, written both in words and in figures, per unit of measurement for each of the items for which quantities are given, will be held to be informal and will be rejected. In case of any discrepancy between the price in words and that in figures, the price in words will be considered as the bid.
- 30

Prices bid to cover.

7. The prices bid must cover the cost of furnishing *all necessary materials and labor for and the complete performance of all the work* set forth in this proposal, described in the form of agreement and specification annexed hereto, and indicated by the plan of the work on file in the office of the President, to all of which information the bidders are referred.
- 40

Rock excavation.

8. The attention of the bidders is particularly directed to the specifications relating to rock excavation.

EXHIBIT C-8 (*continued*):

Bids may be rejected.

9. Permission will not be given for the withdrawal of any bid and the right is expressly reserved by the President to reject all bids if he shall deem it to the public interest so to do. No bid will be accepted from, or contract awarded to, any person who is in arrears to The City of New York upon debt or contract or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

Times and places for commencing and prosecuting work to be determined by the President.

10. Bidders are especially notified that the President reserves the right to determine the times and places for commencing and prosecuting the work, and that postponement or delay on the whole, or any part thereof, occasioned by the precedence of other contracts, which may be either let or executed before the opening of the bids for this work, can constitute no claim for damages nor for a reduction of the damages fixed for delay in completing the work beyond the time allowed.

No extra compensation.

11. The Contractor will be required to complete the entire work to the satisfaction of the President and in accordance with the agreement, the specifications and the plan of the work. No extra compensation beyond the amount payable for the several classes of work hereinbefore enumerated, which shall be actually furnished and performed at the prices bid therefor by the bidder to whom the contract is awarded, shall be due or payable for the entire materials and work.

Deposit to accompany bid.

12. No bid will be received or considered unless accompanied by either a certified check upon one of the National or State Banks of The City of New York, drawn to the order of the Comptroller, or money or corporate stock or certificate of indebtedness of any nature issued by The City of New York, which the Comptroller shall approve as of equal value with the security required, to an amount of five per centum of the amount of the bond required for the faithful performance of the contract (as provided by section 420 of The Greater New York Charter, as amended). Such check or money or other form of security must not be inclosed in the sealed envelope containing the bid, but

EXHIBIT C-8 (*continued*) :

10 must be handed to the officer or clerk who has charge of the bidding, and no bid can be deposited in the box provided for that purpose until such check or money or other form of security has been examined by said officer or clerk and found to be correct. All such deposits, except those of the lowest three bidders, will be returned to the persons making the same within ten days after the opening of the bids; within three days after the awarding of the contract, the remaining deposits, except that made by the bidder whose bid has been accepted, will be returned to the persons making the same. If the successful bidder shall refuse or neglect to execute the contract within five days after notice that it has been awarded to him, and that the adequacy and sufficiency of the security offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York, but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

20

Names of persons interested.

13. Bidders are required to state in their bids, under oath, their names and places of residence or business, the names of all persons interested with them therein, and if no other person be so interested, they shall distinctly state that fact; also, that it is made without any connection with any other person making any bid for the same purpose, and that it is in all respects fair and without collusion or fraud; and that no member of the Board of Aldermen, head of a department, chief of a bureau, deputy thereof or clerk therein or officer or employee of The City of New York, is, shall be or become interested, directly or indirectly, as contracting party, partner, stockholder, surety or otherwise, in or in the performance of the contract or in the material, work or business to which it relates, or in any portion of the profits thereof. Bidders must verify by oath, in writing, the several matters stated in their bids.

30

Sealed bids to be submitted.

40

14. Each bid must be delivered in a sealed envelope, endorsed with the *title* given above of the work for which the bid is made, with the name of the bidder, and the date of presentation to the President at his office, on or before the date and hour hereinbefore named, at which time and place the bids received will be publicly opened by the President and read and the award of the contract made according to law as soon thereafter as prac-

EXHIBIT C-8 (*continued*):

10 ticable. The person or persons to whom the contract may be awarded will be required to attend at said office with the sureties offered by him or them and execute the contract within five days from the date of the service of a notice to the effect that the contract has been so awarded and the surety accepted; and in case of failure or neglect so to do he or they will be considered as having abandoned the contract and as being in default to the City.

Bidders shall use blank forms to be furnished by the President.

20 15. Bidders shall make their bids upon the forms prepared by the President, a copy of which with the proper envelope in which to enclose the same can be obtained upon application therefor at the office of the President, Borough Hall, Jackson avenue and Fifth street, Long Island City, where the plan can be seen, as also the form of contract, including the specifications in the form approved by the Corporation Counsel.

MAURICE E. CONNOLLY,
President of the Borough of Queens.

The City of New York,....., 191

City of New York

Office of

30 PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

Joseph Flanagan
Borough Secretary

Hugh Hall
Secretary to President

40 Long Island City, May 2, 1917.

Hon. William A. Prendergast, Comptroller,
Department of Finance, City of New York,
Municipal Building, Borough of Manhattan.

Sir:—

I beg to transmit herewith for registration, the following named contracts;—

EXHIBIT C-8 (continued) :

“For completing an abandoned contract executed by William J. Horie, May 23rd, for regulating and grading, etc., in FORTIETH STREET, 2nd Ward, Borough of Queens.”

10 “For constructing sewers and appurtenances in HULL AVENUE from Maurice Ave. to Willow Ave., WILLOW AVENUE from Jay Avenue to Grand Street, HULL AVENUE from Willow Ave. to Hamilton Place, HAMILTON PLACE from Hull Ave. to Grand St., GRAND STREET from Hamilton Place to Monteverde Ave., Second Ward, Borough of Queens.”

Yours very truly,

MAURICE E. CONNOLLY,
President of the Borough of Queens.
WPB-PJH

20

NATIONAL SURETY COMPANY
Capital and Surplus over \$6,000,000.00

LWF-mr

115 Broadway

Address reply to

30 CONTRACT DEPARTMENT

Howard Abrahams, vice president
Joseph R. Wells, vice president
Robert C. Carson, assistant secretary
Frank T. Gilson, supt. of western division

New York, April 13th, 1917.

Hon. William A. Prendergast,
Comptroller.

40 SIR :

Joseph L. Sigretto, has been awarded a contract by the Department of The President of the Borough of Queens, for the construction of a sewer and appurtenances in Hull Ave., from Maurice Ave. to Willow Ave., et al, Borough of Queens, and he has requested this company to prepare the surety bond in the sum of \$15,500.00.

EXHIBIT C-8 (continued) :

Department of Queens.

The adequacy and sufficiency of the above bond is herein approved and the London & Lancashire Indemnity Co., of America may now be notified to execute the surety bond and attach it to the contract.

10 This letter of approval should be affixed to and made a part of the original contract to be hereafter filed in the Department of Finance.

ETC-JM Apr. 16 1917.

.....
Deputy and Acting Comptroller.

20 THE CITY OF NEW YORK
OFFICE OF THE PRESIDENT OF THE BOROUGH
OF QUEENS
BUREAU OF SEWERS
CONTRACT FOR

the construction of a sewer and appurtenances in:
HULL AVENUE from Maurice Avenue to Willow Avenue;
WILLOW AVENUE from Jay Avenue to Grand Street;
30 HULL AVENUE from Willow Avenue to Hamilton Place;
HAMILTON PLACE from Hull Avenue to Grand Street;
GRAND STREET from Hamilton Place to Monteverde Avenue;
Second Ward of the Borough of Queens,
together with all the work incidental thereto.

Parties.

40 THIS AGREEMENT, made and entered into this 23rd day of April, in the year one thousand nine hundred and seventeen by and between The City of New York, party of the first part, by the President of the Borough of Queens, and Joseph L. Sigretto & Co., 1455 Woodhaven Avenue, Woodhaven, L. I., Contractor, party of the second part, pursuant to the provisions of The Greater New York Charter, and the resolution of The Board of Estimate and Apportionment adopted on the 27th day of March 1916, of which resolution the following is a copy:

EXHIBIT C-8 (*continued*):

BOARD OF ESTIMATE and APPORTIONMENT
CITY OF NEW YORK
(Cal. No. 118)

10 A copy of a resolution of the Local Board of the Newtown District, duly adopted by said Board on the 13th day of January, 1916, and approved by the President of the Borough of Queens on the 19th day of January, 1916, having been transmitted to the Board of Estimate and Apportionment, initiating proceedings for the following local improvement:

20 For the construction of a sewer and appurtenances in Hull Avenue, from Maurice Avenue to Willow Avenue, Willow Avenue, from Jay Ave. to Grand Street, Hull Avenue, from Willow Avenue to Hamilton Place, Hamilton Place, from Hull Avenue to Grand Street, Grand Street, from Hamilton Place to Monteverde Avenue, Second Ward of the Borough of Queens,

30 and thereupon on the 27th day of July, 1916, resolutions having been adopted by the Board of Estimate and Apportionment authorizing the President of the Borough of Queens to prepare the necessary plans, specifications and an estimate of the cost of the proposed improvement based on actual survey and further resolving that the Board of Estimate and Apportionment will consider the authorization of the construction of the proposed improvement after the President of the Borough of Queens has submitted certain statements as provided in the said resolution, and the said resolution having been duly complied with by the President of the Borough of Queens, as appears by papers and documents on the files of the Board of Estimate and Apportionment, and there having been presented to the Board of Estimate and Apportionment an estimate in writing in such details as the Board has directed, that the cost of the proposed work or improvement, together with the preliminary expenses will be the sum of \$68,600; and a statement of the assessed value according to the last preceding tax roll of the real estate included within the probable area of assessment, to wit, the sum of \$836,670, having also been presented, it is

40 **RESOLVED**, That the said resolution of the Local Board be and the same is hereby approved and the construction of the local improvement therein provided for is hereby authorized. This Board does hereby determine that no portion of the cost

EXHIBIT C-8 (*continued*) :

and expense thereof shall be borne and paid by The City of New York, but that the whole of such cost and expense, including the aforesaid preliminary expenses, shall be assessed upon the property deemed to be benefited by the said local improvement.

I hereby certify that the foregoing is a true copy of a resolution adopted by the Board of Estimate and Apportionment at a meeting of said Board held on October 15, 1916.

Dated, New York, October 16, 1916.

(Signed) JOSEPH HAAG,
Assistant Secretary,
Board of Estimate and Apportionment.

JCD.

RESOLUTION

BOARD OF ESTIMATE AND APPORTIONMENT

City of New York

(Cal. No. 237)

WHEREAS, The President of the Borough of Queens has transmitted to the Board of Estimate and Apportionment a copy of a resolution of the Local Board of the Newton District, duly adopted by said Board on the 13th day of January, 1916, and approved by the President of the Borough of Queens on the 19th day of January, 1916, initiating proceedings for the following local improvement :

For the construction of a sewer and appurtenances in Hull Avenue, from Maurice Avenue to Willow Avenue, Willow Avenue, from Jay Ave. to Grand Street, Hull Avenue, from Willow Avenue to Hamilton Place, Hamilton Place, from Hull Avenue to Grand Street, Grand Street, from Hamilton Place to Monteverde Avenue, Second Ward of the Borough of Queens,

and which resolution is accompanied with an approximate estimate of the cost of work and the assessed value of the property benefited.

RESOLVED, That the Board of Estimate and Apportionment hereby authorizes the President of the Borough of Queens to prepare plans, specifications and an estimate of cost based on

EXHIBIT C-8 (*continued*):

part and parcel thereof: the Proposal for Bids, the Bid, the Bond, this Agreement and the Specifications hereto annexed; also the Plan of the Work dated Oct. 6, 1916, filed in the office of the President of the Borough, entitled: Plan, Profile and Details for the construction of a sewer and appurtenances in:

- 10 HULL AVENUE from Maurice Avenue to Willow Avenue;
WILLOW AVENUE from Jay Avenue to Grand Street;
HULL AVENUE from Willow Avenue to Hamilton Place;
HAMILTON PLACE from Hull Avenue to Grand Street, and in
GRAND STREET from Hamilton Place to Monteverde Avenue,
Second Ward, Borough of Queens,

and also the Drawings of Standard Details pertinent thereto on file in the office of the Engineer.

Party of the first part.

- 20 II. Whenever the term "The City" or a word "President," or a pronoun in place of either, is used, it refers to and means The City of New York, the party of the first part hereto, or the President of the Borough of Queens, or his authorized representative.

Party of the second part.

- 30 Whenever the word "Contractor," or a pronoun in place thereof, is used, it refers to and means the party of the second part hereto.
Engineer described.

- III. Whenever the word "Engineer," or a pronoun in place thereof, is used, it refers to and means the Engineer in Charge of Sewers, Borough of Queens, acting either directly or through assistants designated by him to act in the premises, limited to the particular duties entrusted to them. In case said Engineer may not be able to act, then such Engineer as may be designated by the President shall act in his place.

- 40 Terms defined.

IV. Whenever the word "plan" is used it refers to and means the plan of this work and the standard drawings pertinent thereto. Whenever it is provided that anything is "to be" or "to be done," "if" or "as," or "when" or "where approved," "required," "directed," "permitted," "ordered," "designated" or "deemed

EXHIBIT C-8 (*continued*):

necessary" it shall be taken to mean approved, required, permitted, ordered, designated or deemed necessary as the case may be by the Engineer. Whenever the words "desirable," "suitable," "sufficient," "satisfactory" or others of a similar purport are used it is hereby agreed that the desirability, suitability, sufficiency, satisfactoriness or other denominated condition shall be as determined by the Engineer.

10

Contractor to furnish tools, proper appliances, etc.

V. The Contractor hereby agrees to furnish and provide all materials, labor, and appliances necessary and proper for the purpose, to excavate for, build, complete and connect in a good substantial manner, to the satisfaction of the President, and in conformity with the contract, the hereinbefore entitled work and all the work incidental thereto, and the Contractor hereby agrees to receive and accept as and for his full compensation the following prices, which are the amounts or rates at which this contract was awarded to the Contractor at the public letting thereof: Prices.

20

TYPE "A" or SEWER DEPT. STANDARD.

| | | | | |
|----|-------|-------------------|--|--------------------------|
| | 974 | Linear Feet 6'-0" | Reinforced Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| | 525 | Linear Feet 5'-6" | Reinforced Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| 30 | 686 | Linear Feet 5'-0" | Reinforced Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| | 245 | Linear Feet 3'-9" | Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 265 | Linear Feet 3'-6" | Plain Concrete Sewer, Per Linear Foot | Dollars (\$.....). |
| | 380 | Linear Feet 3'-3" | Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |
| | 1,250 | Linear Feet 3'-0" | Plain Concrete Sewer, Per Linear Foot, | Dollars (\$.....). |
| 40 | 1,050 | Linear Feet 2'-6" | Plain Concrete Sewer, Per Linear Foot, | Dollars (.....). |
| | 49 | Linear Feet 24" | Vitrified Pipe Sewer, Per Linear Foot | Dollars (.....). |
| | 296 | Linear Feet 22" | Vitrified Pipe Sewer, Per Linear Foot | Dollars (.....). |
| | 380 | Linear Feet 18" | Vitrified Pipe Sewer, Per Linear Foot, | Dollars (.....). |

EXHIBIT C-8 (continued) :

| | | | |
|----|-------|--|--------------------|
| | 57 | Linear Feet 12" Vitrified Pipe Sewer, Per Linear Foot, | Dollars (.....). |
| | 39 | Manholes, Complete, Each, | Dollars (\$.....). |
| | 1 | Cleaning Shaft, Complete, | Dollars (\$.....). |
| 10 | 23 | Basin Manholes, (New type), Complete, Each, | Dollars (\$.....). |
| | 35 | Inlets, (New type), Complete, Each, | Dollars (\$.....). |
| | 575 | Linear Feet 12" Vitrified Pipe for Basin Connections, Per Linear Foot, | Dollars (.....). |
| | 510 | Linear Feet 10" Vitrified Pipe for Basin Connections, Per Linear Foot, | Dollars (.....). |
| | 272 | Six-inch Spurs (24" long) on Concrete Sewers, Each, | Dollars (\$.....). |
| 20 | 13 | Six-inch Spurs on 22" Vitrified Pipe Sewers, Each, | Dollars (\$.....). |
| | 24 | Six-inch Spurs on 18" Vitrified Pipe Sewers, Each, | Dollars (\$.....). |
| | 36 | Linear Feet Risers, including Y's, Per Linear Foot, | Dollars (\$.....). |
| | 2,674 | Linear Feet 6" Vitrified Pipe for House Connection Drains, Per Linear Foot, | Dollars (\$.....). |
| | 1,000 | Linear Feet Piles, furnished, driven and cut-off, Per Linear Foot, | Dollars (\$.....). |
| 30 | 3,000 | Feet B. M. Foundation Timber, furnished, placed and secured, Per 1,000 Feet B. M., | Dollars (\$.....). |
| | 2,000 | Pounds Structural Steel, including bolts, nuts, washers, Per Pounds | Dollars (\$.....). |
| | 2,000 | Feet B. M. Timber for Sheet and Bracing, Per 1,000 Feet, B. M., | Dollars (\$.....). |
| | 25 | Cubic Yards Class "A" Concrete, not shown on plan, Per Cubic Yard, | Dollars (\$.....). |
| 40 | 1,000 | Pounds Reinforcing Steel, not shown on plan, Per Pound, | Dollars (\$.....). |
| | 6,000 | Cubic Yards Fill for Sewer Embankment, Per Cubic Yard, | Dollars (\$.....). |
| | 1,500 | Linear Feet Wooden Fence, Per Linear Foot, | Dollars (\$.....). |
| | 1 | Junction Chamber at Willow Ave. and Hull Ave. (South), Complete | Dollars (.....). |

EXHIBIT C-8 (continued):

- 1 Junction Chamber at Willow Ave. and Hull Ave. (North), Complete Dollars (\$.....).
- 1 Junction Chamber at Willow Ave. and Jay Ave., Complete Dollars (\$.....).
- 1 Junction Chamber at Willow Ave. and Maspeth Ave., Complete Dollars (\$.....).
- 10 1 Drop Chamber at Hull Ave. and Remsen Pl., Complete, Dollars (\$.....).
- 1 Junction Chamber at Hull Ave. and Hamilton Pl., Complete Dollars (\$.....).
- 1 Junction Chamber at Hamilton Pl. and Grand St., Complete Dollars (.....).
- 1 Junction Chamber at Grand St. near Willow Ave., Complete Dollars (.....).
- 60 Linear Feet (24" Corrugated Culvert Pipe, Per Linear Foot Dollars (\$.....).

20 The quantities for bracing and sheeting called for are for the purpose of securing a price in the event of bracing and sheet piling being ordered left in, and for securing a price for reinforcing steel, structural steel and Class "A" concrete, not shown on plan, in the event that these materials shall be required.

TYPE "B"

- 974 Linear Feet 6'-0" Reinforced Concrete Pipe Sewer, precast Type B), Per Linear Foot, Thirteen and 90/100 Dollars (\$13.90).
- 30 525 Linear Feet 5'-6" Reinforced Concrete Pipe Sewer, (precast Type B), Per Linear Foot, Thirteen and 80/100 Dollars (\$13.80).
- 686 Linear Feet 5'-0" Reinforced Concrete Pipe Sewer, (precast Type B), Per Linear Foot, Thirteen and 00/100 Dollars (\$13.00).
- 245 Linear Feet 3'-9" Reinforced Concrete Pipe Sewer, (precast Type B), Per Linear Foot, Nine and 80/100 Dollars (\$9.80).
- 265 Linear Feet 3'-6" Reinforced Concrete Pipe Sewer, (precast Type B), Per Linear Foot, Ten and 80/100 Dollars (\$10.80).
- 40 380 Linear Feet 3'-3" Reinforced Concrete Pipe Sewer, (precast Type B), Per Linear Foot, Eleven and 10/100 Dollars (\$11.10).
- 1,250 Linear Feet 3'-0" Reinforced Concrete Pipe Sewer, (precast Type B), Per Linear Foot Eight and 60/100 Dollars (\$8.60).

EXHIBIT C-8 (continued):

- 1,050 Linear Feet 2'-6" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Eight and 00/100 Dollars (\$8.00).
- 49 Linear Feet 24" Reinforced Concrete Pipe Sewer, (Precast Type B), Per Linear Foot, Six and 00/100 Dollars (\$6.00).
- 296 Linear Feet 22" Vitrified Pipe Sewer, Per Linear Foot, Five and 75/100 Dollars (\$5.75).
- 10 380 Linear Feet 18" Vitrified Pipe Sewer, Per Linear Foot, Four and 65/100 Dollars (\$4.65).
- 57 Linear Feet 12" Vitrified Pipe Sewer, Per Linear Foot, Three and 00/100 Dollars (\$3.00).
- 39 Manholes, Complete, Each, Sixty five and 00/100 Dollars (\$65.00).
- 1 Cleaning Shaft, Complete, One hundred and eighty five 00/100 Dollars (\$185.00).
- 23 Basin Manholes, (New Type), Complete, Each, Eighty and 00/100 Dollars (\$80.00).
- 20 35 Inlets, (New Type), Complete, Each, Thirty-eight and 00/100 Dollars (\$38.00).
- 575 Linear Feet 12" Vitrified Pipe for Basin Connections, Per Linear Foot, One and 60/100 Dollars (\$1.60).
- 510 Linear Feet 10" Vitrified Pipe for Basin Connections, Per Linear Foot, One and 25/100 Dollars (\$1.25).
- 272 Six-inch Spurs (24 inches long), on Reinforced Concrete Pipe Sewers, Each, Fifty cents (\$0.50).
- 13 Six-inch Spurs on 22" Vitrified Pipe Sewers, Each, Four and 00/100 Dollars (\$4.00).
- 30 24 Six-inch Spurs on 18" Vitrified Pipe Sewers, Each, Three and 00/100 Dollars (\$3.00).
- 36 Linear Feet Risers, including Y's, Per Linear Foot, One and 50/100 Dollars (\$1.50).
- 2,674 Linear Feet 6" Vitrified Pipe for House Connection Drains, Per Linear Foot, One and 10/100 Dollars (\$1.10).
- 1,000 Linear Feet Piles, furnished, driven and cut off, Per Linear Foot, One cent (\$0.01).
- 3,000 Feet B. M. Foundation Timber, furnished, placed and secured, Per 1,000 Feet, B. M., Fifty and 00/100 Dollars (\$50.00).
- 40 2,000 Pounds Structural Steel, including bolts, nuts, washers, Per Pound, Seven cents (\$0.07).
- 2,000 Feet B. M. Timber for Sheeting and Bracing, Per 1,000 Feet B. M., Fifty and 00/100 Dollars (\$50.00).
- 25 Cubic Yards, Class "A", Concrete, not shown on plan, Per Cubic Yd., Eight and 00/100 Dollars (\$8.00).

EXHIBIT C-8 (*continued*):

- 1,000 Pounds Reinforcing Steel, not shown on plan, Per Pound, Eight cents (\$0.08).
6,000 Cubic Yards Fill for Sewer Embankment, Per Cubic Yard, One cent (\$0.01).
1,500 Linear Feet Wooden Fence, Per Linear Foot, Fifty cents (\$0.50).
10 1 Junction Chamber at Willow Ave. & Hull Ave. (South), Complete, Four hundred and fifty and 00/100 Dollars (\$450.00).
1 Junction Chamber at Willow Ave. & Hull Ave. (North), Complete, Three hundred and 00/100 Dollars (\$300.00).
1 Junction Chamber at Willow Ave. & Jay Ave., Complete, Two hundred and 00/100 Dollars (\$200.00).
1 Junction Chamber at Willow Ave. & Maspeth Ave., Complete, Two hundred and 00/100 Dollars (\$200.00).
1 Drop Chamber at Hull Ave. & Remsen Place, Complete, One hundred and seventy five and 00/100 Dollars (\$175.00).
20 1 Junction Chamber at Hull Ave. & Hamilton Place, Complete, Two hundred and 00/100 Dollars (\$200.00).
1 Junction Chamber at Hamilton Place & Grand St., Complete Two hundred and 00/100 Dollars (\$200.00).
1 Junction Chamber at Grand St. near Willow Ave., Complete, Two hundred and fifty and 00/100 Dollars (\$250.00).
60 Linear Feet 24" Corrugated Culvert Pipe, Per Linear Foot, Five and 00/100 Dollars (\$5.00).

30 The quantities for bracing and sheeting called for are for the purpose of securing a price in the event of bracing and sheet piling being ordered left in, and for securing a price for reinforcing steel, structural steel and Class "A" concrete, not shown on plan, in the event that these materials shall be required.

Quantities are approximate only.

No extra compensation.

40 VI. The Contractor admits that the quantities of materials to be furnished and the amount of work to be done, as stated in the proposal for bids for the work, are approximate only. The Contractor agrees that The City is not to be held responsible that any of said quantities and amounts shall obtain in the construction of the work, as he has judged for himself as to such quantities and amounts and each of them, and as to the other circumstances affecting the cost of the performance of this contract; and that he will not at any time dispute or complain

EXHIBIT C-8 (*continued*) :

of such statement nor assert that there was any misunderstanding in regard to the character, size or depth of the excavations to be made or the kind or amount of the materials to be furnished or work to be done. The Contractor hereby agrees that he will not ask, demand, sue for, nor seek to recover for the entire work any extra compensation beyond the amount payable for the several classes of work and kinds of materials in this contract
10 enumerated, which shall be actually performed and furnished, at the prices therefor herein agreed upon and fixed.

Sewers, etc., to be built as shown on the plan.

VII. The sewer and appurtenances will be built on the lines, at the depths and at the grades and in the manner shown on the plan of the work as the same will be designated on the ground by the Engineer.

20 Line may be changed.

The President may change the line of the sewer or the location of the receiving basins, or other sewer appurtenances provided such changes do not materially affect either the character or the amount of the work to be done, or the conditions under which it is to be performed, and the Contractor hereby agrees to make no claim for damages or extra compensation on account thereof.

30 Preservation of points, stakes, etc.

The Contractor will safeguard all points, stakes, grade marks, monuments and bench marks made or established on or near the line of work, and he agrees to accept responsibility for and to remedy at his cost any mistakes that may be caused by the unauthorized disturbance or removal of such points, stakes, grade marks, monuments and bench marks.

Written order for extra work.

40 VIII. No claim for additional work or materials shall be made by or allowed to the Contractor, unless before the performance of such additional work the President shall have first authorized the same, in writing, and the same shall have been done or furnished under a written order from the President, given before the performance of such additional work or the furnishing of such additional materials. The aggregate price to be paid for additional work or materials so authorized or ordered shall not

EXHIBIT C-8 (*continued*):

exceed five per cent. (5%) of the contract price or the total cost of the work and materials.

Contract may be modified.

10 This contract may be modified and changed from time to time as may previously be agreed to, in writing, between the parties hereto, in a manner not materially affecting the substance thereof or increasing the contract price thereunder, in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed.

limit to extras.

20 All claims for additional work or materials in any month shall be made to the Engineer, in writing, before the 15th day of the following month, and failing to make such claim within the time required, the rights of the Contractor to additional pay for such additional work or materials shall be deemed to have been waived and forfeited.

Inspection.

Work or materials may be condemned at any time.

30 IX. The Engineer shall inspect the materials furnished and the work done and see that the same correspond with the specifications. The Engineer is hereby authorized and empowered to reject and refuse all labor and material or method of application, or any part thereof, offered under or in fulfillment of this contract, that do not comply in kind, quality or quantity with the terms thereof. Any material delivered or offered to be delivered under this contract, which shall be rejected by the Engineer as not conforming to the terms thereof, will be forthwith removed by the Contractor, and material which does so conform will be forthwith furnished and delivered by him in place thereof. The Contractor hereby agrees not to use any material which has not been inspected and accepted, nor to perform any work except under inspection, to which end he further agrees to notify the
40 Engineer when lines, grades or inspection are required so that the Engineer may have time to provide for the same. No inspection, approval or acceptance of any part of the work herein contracted for or of the materials used therein, or any payment on account thereof, shall prevent the President from refusing to accept the work or materials at any time thereafter.

EXHIBIT C-8 (*continued*):

Engineer to be final arbiter.

10 X. To prevent all disputes and litigation, it is hereby agreed that the Chief Engineer in Charge of Sewers shall, in all cases determine the amount and the quality of the several kinds of work and materials which are to be paid for under this contract, and he shall determine all questions in relation to the work and materials and the construction thereof, and he shall in all cases decide every question which may arise relative to the execution of this contract on the part of the Contractor, and his decision will be final and conclusive; and such decision, in case any question shall arise, shall be a condition precedent to the right of the Contractor to receive any money under this contract.

20 Any doubt as to the meaning of this contract and the specifications thereof, or any obscurity as to the wording of them, or any discrepancy between them and the plan will be explained by the Engineer, and his explanation will be accepted by the Contractor, who hereby agrees to execute the work in accordance with such explanation, and to make no charge or claim for any extra work or damage on account thereof.

Work and materials must agree with specifications.

30 XI. The work will be performed in the best manner, and all materials of which the work is composed will be of the best kind, and a sufficient number of persons will be at all times employed to execute the work with due dispatch, the whole to be done to the satisfaction of the Engineer, and any materials furnished or work done not satisfactory to the Engineer will be immediately removed and satisfactorily replaced by the Contractor at his own expense; or if he shall neglect or refuse to remove and replace the same when notified so to do by a written notice to be served upon him, then the President may remove, or cause the same to be removed and satisfactorily replaced, by contract or otherwise, as he may deem expedient, and charge the expense thereof to the Contractor; and the expense so charged shall be deducted and paid by The City out of such moneys as are or may become due under this contract.

40

Examinations.

During the progress or after the completion of the work, should the Engineer require it, for the purpose of examining the same, the Contractor will make such openings, and to such extent through such part or parts of the work as the Engineer may

EXHIBIT C-8 (*continued*):

direct, and the Contractor will satisfactorily restore the work so disturbed. Should the openings disclose defects in the work such defects shall be remedied in accordance with the provisions of the first paragraph of this section.

Use of patented articles.

10 XII. Wherever an article or any kind of material is specified by a trade name or by the name of a patentee, manufacturer or dealer, or by reference to the catalogue of a manufacturer or dealer, it shall be taken as intending to mean and specify the article or kind of material designated, or any other equal thereto in quality, finish and durability, and equally serviceable for the purposes for which it is or they are intended. Nothing on the plan or in the specifications shall be interpreted or taken to violate the provisions of section 1554 of the Greater New York Charter, which provides that "except for repairs, no patented
20 pavement shall be laid and no patented article shall be advertised for, contracted for or purchased, except under such circumstances that there can be a fair and reasonable opportunity for competition, the conditions to secure which shall be prescribed by the Board of Estimate and Apportionment."

Claims for infringement.

The Contractor will be responsible for any claims made against The City for any infringement of patents, by the use of patented articles or processes in the construction and completion
30 of the work, and he will have harmless and indemnify The City against all costs, expenses and damages caused by reason of any infringement of patents used in the construction and completion of the work.

Commencement and completion.

XIII. The Contractor will begin the work herein agreed to be performed on such date as the President shall notify him to begin on and from which date the time hereinafter fixed for the completion of the work shall begin to run. The place where
40 the work is to be begun will be either stated in said notice or designated on the ground by the Engineer. The commencement of work by the Contractor shall be deemed and taken to be a waiver on his part of notice to begin work, in which case the time for the completion of the work will begin to run on and from the date the work was commenced.

EXHIBIT C-8 (*continued*):

Time of performance.

XIV. The Contractor will carry on the work with such force and in such manner and order and at such places, times and seasons, including freezing weather, as may be directed by the Engineer, and will execute all the work in every respect in a thorough and workmanlike manner; and he will fully and entirely
10 perform this contract on his part before the expiration of TWO HUNDRED FIFTY (250) CONSECUTIVE WORKING DAYS.

Time important.

It is hereby agreed that the time designated for the performance of all the work under this Contract is of the essence of this agreement, in view whereof it is hereby further agreed that a rate of progress will be maintained so that the work performed up to any time will be at least the same percentage of the total work to be performed under this contract as the net elapsed time
20 at such time is of the total time allowed for the performance of all the work under this contract.

In the computation of the number of consecutive working days, the time during which the completion of the work has been delayed in consequence of the condition of the weather, or tides, or by any act or omission of the party of the first part or during such period as the work has been suspended by written order of the President, or delays for which the Contractor is not responsible (all of which will be terminated by the President, who shall
30 certify to the same in writing, and whose determination and certificate thereof shall be binding and conclusive upon the Contractor), will be allowed to the Contractor and will be deducted in computation. Sundays and also holidays on which no work is done, will also be excluded from said computation. In case a larger amount of rock excavation than is set forth in the Engineer's Estimate shall be necessary, an allowance of one day will be made for each cubic yards of such excess of rock excavated and removed in accordance with the measurement of rock allowed
40 by the specifications. If the completion of the work to be done under this contract shall require work or materials or both in greater amounts than those set forth in the Engineer's Estimate of quantities, or if unforeseen obstacles are encountered in the prosecution of said work, then the time which the Contractor is delayed on account thereof will be determined and allowed by the President at the completion of the work, upon the receipt by him of a written application from the Contractor for such deter-

EXHIBIT C-8 (*continued*):

mination and allowance. No demand by the Contractor that the President determine and certify the matters aforesaid shall be of any effect whatsoever unless the same be made in writing and duly served upon the President prior to the filing in the office of the Comptroller of The City of the final certificate of the completion and acceptance of the work.

10 End of time period.

The time shall run against this contract until all work called for in this contract is completed to the satisfaction of the Engineer.

Liquidated damages.

20 XV. In case the Contractor shall fail to complete the work hereunder in accordance with the contract within the time aforesaid, he agrees to pay to The City the sum of Ten Dollars (\$10.00) for each and every day the time consumed in said performance and completion exceeds the time hereinbefore allowed for that purpose; which said sum, in view of the difficulty of ascertaining the loss which The City will suffer by reason of delay in the performance of the work hereunder, is hereby agreed upon, fixed and determined by the parties hereto as the liquidated damages that The City will suffer by reason of said delay and default, and not as a penalty; and The City shall and may deduct and retain the amount of such liquidated damages out of the moneys which may be due or become due to the Contractor under this
30 contract.

Work no provided for in contract.

40 XVI. If, before the completion of the work contemplated herein, it shall become necessary to do any other or further work on or near the line thereof than is provided for in this contract, the Contractor will not in any way interfere with or molest such person or persons as the President may employ to do such work, and will carry on the work under this contract in such manner as may be ordered so as to afford all reasonable facilities for doing such other or further work; and no damage or claim by the Contractor shall be allowed therefor, except such allowance of time for delay as the President may deem reasonable.

President's right to suspend work.

XVII. The President is hereby authorized to suspend the whole or any part of the work herein contracted to be done, if he

EXHIBIT C-8 (*continued*):

shall deem it for the interest of The City so to do. During such suspension the trenches shall be backfilled, if required, and the roadways and pavements over the same satisfactorily restored, and all materials upon the work shall be neatly piled so as not to obstruct public travel, or shall be removed from the line of the work, if directed.

- 10 No damages to be claimed for delay due to other contracts.

20 XVIII. Should postponement or delay be occasioned by the precedence of paving or other contracts, which may have been either let or executed before the opening of the bids for this contract, the Contractor will make no claim for damages therefor nor for any damages in consequence of the street or the adjoining sewers not being in the condition contemplated by the parties at the time of making the contract; if, however, the Contractor shall be delayed in performance of his work by reason of the street or the adjoining sewers not being in such condition, or by reason of the work or any work or any part thereof being suspended as herein before provided, such allowance of time on account thereof as the President shall deem reasonable will be made.

30 If the work be suspended or delayed by any act or omission of The City, or for the reason that The City does not own or has not obtained possession of, or the right to enter upon the land upon which the work is to be performed, or because of any act or omission of any employee or agent of The City or any other Contractor performing work for The City, the President, or whoever is directed by this contract, to make the certificate in reference to time, shall make such allowance of time for the completion of the work as the Engineer shall certify that the work has been delayed. No allowance whatever as damages will be made to the Contractor because of any such suspension or delays, and no claim shall be made by the Contractor on account thereof.

Allowance of time for delays.

- 40 XIX. No allowances of time for delays under the provisions of this contract nor the delivery and acceptance of any articles or materials called for by this contract, shall be deemed to be a waiver by the President of the right to abrogate this contract for abandonment or delay in the manner hereinafter provided.

EXHIBIT C-8 (*continued*):

Right to construct sewers, etc.

Permits for connections.

10 XX. Prior to the commencement of and during the progress of the work under this contract the President shall have the right to undertake, and to grant permits for, any construction, reconstruction, and repairing of any pipes, sewers, basins,
20 subway ducts and railway tracks, and any appurtenances thereof located on and adjoining the line of the work, and for any connections with and additions to such pipes, etc., and for such purposes the President is hereby authorized to suspend work on any part of this contract, in accordance with Section XVII., and the Contractor will not interfere with nor place any obstructions in the way of any person or persons who may be engaged upon such work. The President is hereby authorized to connect, by contract
30 or otherwise, any sewers and drains with the work built under this contract and to grant permits to any person or persons to make connections therewith at any time before it is completed; and the Contractor will not interfere with nor place obstructions in the way of such persons as may be employed in building such sewers and drains, or in making such connections, and the flow from such sewers, drains and connections will be permitted by the Contractor to discharge into the work built under this contract and the Contractor agrees to make no claim for compensation, damages or delay on account thereof. The issuance of such permits shall not be considered as an acceptance by The City
40 of that part of the sewer into which such connections empty or flow, nor shall the Contractor on account thereof be relieved from the cleaning of the sewer prior to the final examination of the work. No new connections or drains will be allowed to be made or joined to the work built under this contract unless a permit therefor has been duly issued by the President, which permit shall be shown in all cases to the Inspector of the work.

Flow of sewer and drains, etc.

40 Drains, etc., interrupted.

Sewers, etc., to be kept clean.

 XXI. The Contractor will provide at his own cost for the flow of the sewers, drains and water courses interrupted during the progress of the work, and will immediately cart away and remove all offensive matter. The flow throughout the entire length of such sewers and appurtenances as are to be replaced

EXHIBIT C-8 (*continued*) :

10 by the work to be done under this contract will be maintained by the Contractor. The Contractor will remove at his own cost and expense all such bulkheads, as may be directed, from the sewers with which the work under this contract will be connected. When the permanent removal of any existing pipe sewers and appurtenances and pipe drains is necessitated by the work to be done under this contract, such of the materials of such structures as may be directed shall be carefully taken up, piled and left at the disposal of The City, and shall not be used in the work, and the remainder shall be removed from the work and disposed of by the Contractor. Wherever the work to be built under this contract, or the trenches in which it is to be constructed, follow the line, and occupy the place of or intercept the Fire Alarm Telegraph System of The City, or any existing sewers, drains, culverts, basin connections or house connections for which permits may have been granted prior to the opening of the bids for this contract, 20 the Contractor will make the same good, and will rebuild the Fire Alarm Telegraph System of The City and also said sewers, drains, culverts and connections, or connect the same with the sewer built under this contract, whichever he may be directed to do, at his own cost and expense. All sewers, drains, culverts, basins and basin connections rendered unnecessary by the construction of the work herein contemplated, shall be thoroughly broken up, except as otherwise hereinbefore provided, and satisfactorily filled in by the Contractor at his own cost and expense, as shall also all portions of water courses in, through or across 30 any street that may be rendered unnecessary by the construction of this work. During the progress of the work, and until the completion and acceptance thereof, the sewers, drains, basins, culverts and connections built under this contract shall be kept thoroughly cleaned throughout, and shall be left clean.

Sale of sand or earth.

40 XXII. The Contractor will not sell, nor permit to be removed from the line of the work, before the trench shall have been backfilled, any building sand or earth thrown up, except upon written permission, and then only so much as shall remain after reserving a sufficient quantity to backfill the trench and complete the paving; and the Contractor will, in all cases, backfill the trench with the same material thrown out, provided it be suitable, then the same shall be removed from the line of work, and suitable material procured and used for backfilling the trench, and when required sand of proper quality and depth shall be spread on the surface to receive the pavement.

EXHIBIT C-8 (*continued*):

The Contractor hereby agrees that all excavated material and materials of construction placed by him or for him upon private property, unless by written permission of the owners or lessees thereof, will be removed by him and all damage to said property remedied by him at his own cost and expense. Unless such materials are removed and such damage remedied by the Contractor within 48 hours after the receipt by him of a written notice so to do, he agrees that the President shall be and is hereby authorized to dispose of such materials, and to remedy such damage and to deduct the expense thereof from the moneys due or to become due under this contract.

Contractor to give personal attention to work.

Not to assign or sublet.

XXIII. The Contractor will give his personal attention constantly to the faithful prosecution of the work; he will not assign, transfer, convey, sublet or otherwise dispose of this contract, or his right, title or interest in or to the same, or any part thereof, without the previous consent, in writing, of the President, indorsed hereon or hereto attached; and he will not assign, by power of attorney or otherwise, any of the moneys to become due and payable under this contract, unless by and with the like consent, signified in like manner. If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys due or to become due under this contract, to any other person, company or other corporation, this contract may, at the option of the President, be revoked and annulled, and The City shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the Contractor, and to his assignee or transferee; provided that nothing herein contained shall be construed to hinder, prevent or affect an assignment by the Contractor for the benefit of his creditors, made pursuant to the statutes of the State of New York; and no right under this contract, or to any money to become due hereunder, shall be asserted against The City, in law or in equity, by reason of any so-called assignment of this contract, or any part thereof, or of any moneys due or to become due hereunder, unless authorized as aforesaid by the written consent of the President.

EXHIBIT C-8 (continued) :

When Contractor is absent.

Disorderly workmen.

Contractor to provide assistance.

10 XXIV. Whenever the Contractor is not present on any part of the work where it may be necessary to give directions, orders will be given by the Engineer to and shall be received and obeyed by the superintendents and foremen who may have immediate charge of the men employed on the particular work in relation to which the order may be given; and at any time, if a foreman or workman employed by the Contractor shall be declared by the Engineer to be disobedient, incompetent or disrespectful, the Contractor, on receiving written notice to that effect, will forthwith dismiss such person, and will not again employ him on any part of the work. The Contractor will provide all
20 necessary assistance for the Engineer when required, without charge or expense to The City or Engineer.

Contractor to plank and bridge for traffic.

 XXV. The Contractor will observe the law and all ordinances of The City in relation to obstructing the streets, keeping open passageways and protecting the same where they are exposed and would be dangerous to the public travel, and such passageways shall, as may be required, be planked or bridged by the Contractor, at his own expense.

30 Guards and lights.

Indemnification of City.

 XXVI. During the performance of the work herein set forth the Contractor will place proper guards upon and around the same for the prevention of accidents, and at night will put up and keep suitable and sufficient lights, and he will indemnify and save harmless The City against and from all claims, suits and actions, of every name and description, brought against it,
40 and all costs and damages to which it may be put on account or by reason of any injury or alleged injury to the person or property of another, resulting from the prosecution of the work or from negligence or carelessness in the performance of the work, or in guarding the same, or from any improper materials used in its prosecution, or by or on account of any act or omission of the Contractor or his agents; and the Contractor agrees that the whole or so much of the moneys due to the Contractor under and

EXHIBIT C-8 (*continued*):

by virtue of this contract, as shall or may be considered necessary by the Comptroller of The City, may, as its option, be retained by The City until all such suits and claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the Comptroller.

Contractor to make repairs.

10 XXVII. In case any injury is done to property along the line of the work, or to any sidewalk, in consequence of any act or omission on the part of the Contractor or his employees or agents in carrying out any of the provisions or requirements of this contract, the Contractor will make such repairs as are necessary in consequence thereof, at his own expense and to the satisfaction of the President, and in case of failure on the part of the Contractor to promptly make such repairs, they may be made by
20 the President, and the expense thereof will be deducted out of the moneys due or to become due to the Contractor under this contract.

Loss or damage to be assumed by Contractor.

 XXVIII. The Contractor agrees to assume, and to make no claim on account of, any and all loss or damages arising out of the nature of the work to be done under this contract, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the action of the elements, or from incumbrances on or near the line of the
30 work, or from the breaking of water mains, sewer and gas mains on or near the line of the work.

Claims for labor, etc.

 XXIX. The Contractor will pay promptly, and in cash, for all labor employed upon and all materials furnished and used in the work, and if at any time before or within thirty days after the whole work herein agreed to be performed has been completed and accepted by The City, any person or persons claiming to have
40 performed any labor or furnished any materials toward the performance and completion of the contract, shall file with the President and with the Comptroller of The City any such notice as is described in the Lien Law or any act of the Legislature of the State of New York, then, and in every such case, The City shall retain—anything herein contained to the contrary thereto notwithstanding—from the moneys under its control, and due or to become due under this contract, so much of the moneys as shall

EXHIBIT C-8 (*continued*):

10 be sufficient to pay off, satisfy and discharge the amount in such notice alleged or claimed to be due to the person or persons filing such notice, together with the reasonable cost of any action or actions brought to enforce such claim or the lien created by the filing of such notice. The money so retained shall be retained by The City until the lien thereon created by the said act and the filing of the said notice shall be discharged, pursuant to the provisions of the said act.

Contractor will prevent filing of liens, etc.

20 XXX. The Contractor will not, at any time, suffer or permit any lien, attachment, or other incumbrances, under the law of this State or otherwise, by any person or persons whomsoever, to remain on file in the Finance Department or at the office of the City Department having supervision of the work against any money due or to become due for any work done or materials furnished under this contract, or by reason of any other claim or demand against the Contractor; and that any such lien, attachment, or other incumbrance, until it is removed, shall preclude any and all claim or demand for any payment whatsoever under or by virtue of this contract.

Evidence of satisfaction of liens, etc.

30 The Contractor further agrees that he will present to the party of the first part satisfactory evidence that all just liens, claims and demands of his employees, or of parties from whom materials used in the construction of the work may have been purchased or procured are fully satisfied and that the materials furnished and work done under this contract are fully released from all such liens, claims and demands before said party of the second part will demand or shall receive the sums due one final payment under this contract.

Notice to gas companies, etc.

Not to hinder other companies.

40 XXXI. The Contractor will give notice in writing to all gas, railroad and other companies owning or controlling any pipe, tracks or other structures which during the progress of the work may be affected by the prosecution of the same so that said companies may protect or remove their structures, and he will not cause any hindrance to, or interference with, any such gas company or other company or companies in protecting their said

EXHIBIT C-8 (*continued*):

10 pipes, tracks or other structures, nor in removing or otherwise protecting and replacing the main and service pipe, lampposts, lamps, tracks or other structures where necessary, but the Contractor will suffer the said company or companies to take all such measures as are requisite for the purpose aforesaid. But if said gas, railroad, or other companies, within five days after receipt of such notice, fail to support, remove or otherwise protect their structures (except such railroad tracks or other railroad structures upon or within a right of way owned by a railroad company (see Section XXXIV), the Contractor will upon the approval of the President protect or remove the same, it being expressly understood that the cost thereof shall not be a charge against The City, but shall be a matter for adjustment between the Contractor and the company or companies concerned.

Pipes, conduits, etc., of private companies.

20 XXXII. It is hereby agreed that The City is not responsible or liable for the support, protection or reconstruction of such gas pipes, conduits, water pipes, tracks or structures owned by private companies enjoying special franchises or occupying any portion of the street or way on or below the surface in its streets or ways, as the Contractor admits that he has carefully examined the location of work, has made special inquiry at the offices of the companies owning, controlling or operating said pipes, conduits, tracks and structures, and he has determined to his satisfaction the character, size, location and length of such
30 pipes, conduits, tracks and structures; that he has inspected the public records of the various City Departments having cognizance and control of pipes, conduits, and other subsurface structures. and of The City's water pipes, conduits and sewers, and he has made such further personal inspection and investigation as he deemed proper to determine the correctness of the information so obtained; and he clearly understands that The City does not insure the accuracy of such reports or information, and agrees that he will not make any claim against The City for damages or extra work caused or occasioned by his relying upon such
40 records, reports or information furnished by any City Department or any companies, either as a whole or in part.

Protection and restoration of pipes, etc., of private companies.

XXXIII. The Contractor agrees to confer with and to make to or entertain an offer from such private companies as

EXHIBIT C-8 (*continued*):

own the said pipes, conduits, tracks or structures, except such railroad companies whose tracks or other railroad structures are upon or within a right of way owned by said companies (see Section XXXIV); and the Contractor further agrees to enter into an agreement with said companies by what terms and at what prices the support, protection, removal and reconstruction of the pipes, conduits, tracks and structures will be undertaken and accomplished, and in the event of the failure to make such an agreement with said companies, he will not complain nor make any demand on The City for additional compensation or pay for supporting, protecting, removing or restoring the said pipes, conduits, tracks or other structures.

Agreement between City and railroad company, etc.

XXXIV. If for the purpose of performing the work required by this contract The City has entered into an agreement with any railroad company owning a right of way, or with the owners of any property through or across which the work, or any part thereof, is to be constructed, the Contractor agrees to carry on such work or such part thereof as directed in accordance with the terms of such agreement, a copy whereof is hereto annexed and is hereby agreed upon as forming part of this contract.

Contractor to notify Department Water Supply, Gas and Electricity.

XXXV. At least twenty-four hours before breaking ground, for the purpose of constructing the work of this contract, the Contractor agrees to give notice thereof in writing to the Department of Water Supply, Gas and Electricity.

City's water pipes, etc.

XXXVI. If upon excavating it shall be found that any existing water pipes or appurtenances owned or controlled or operated by The City follow the lines, or occupy the place, of the sewer or sewers and appurtenances to be laid or built as shown on the plan, such existing water pipes and appurtenances will be removed and relaid, or rebuilt, by and at the cost of the Department of Water Supply, Gas and Electricity of The City of New York; if, however, in order to facilitate the work to be done under this contract, it be found desirable to temporarily remove any water pipes or appurtenances owned or controlled or operated by The City, the removal and replacing in their original positions of such water pipes and appurtenances will be done by the Depart-

EXHIBIT C-8 (*continued*):

ment of Water Supply, Gas and Electricity for the Contractor at his cost and expense.

Protection of City's water pipes, etc.

10 XXXVII. The Contractor agrees to protect all water mains and service water pipes owned, controlled or operated by The City which may be affected in any manner by the work done under this contract, except as hereinbefore provided, and to protect all such water and service pipes from freezing, and if he fails to do so, the Commissioner of Water Supply, Gas and Electricity is hereby authorized to protect such main and service pipes, or in the event of their having suffered injury to replace such pipes, and recalk and repair the same immediately, as the work progresses, and the cost thereof shall be charged to the Contractor; the cost so charged shall be deducted from any sum or sums due or to become due to the Contractor under this contract, and in 20 case such sum or sums shall be insufficient to cover such cost, the Contractor will be liable for the balance.

Protection of gas and water mains and pipes, etc.

30 XXXVIII. The Contractor agrees to sustain in their places and protect from injury all water or gas mains, conduits, subways or service pipes, steam pipes and pneumatic pipes, and all sidewalks, curbs, stoops, areas, and all other property in the vicinity of his work, from direct or indirect injury by caving or otherwise, and he hereby assumes all expenses for direct or indirect damage which may be occasioned by injury to any of them, and he agrees to have at all times a sufficient quantity of timber and other necessary materials and appliances on the ground, and will use the same, as required, for bracing and sheeting the sides and ends of excavations, and for sustaining and supporting any and all pipes, conduits, subways, lamp-posts and lamps or other structures that are undermined, weakened, endangered or threatened; and in case any damage or injury shall or may result to said pipes, conduits, subways, lamp-posts and lamps and other 40 works or structures or any gas, electric, railroad or other company whatsoever, or to any private property, through or by reason of any negligence, wilfulness, carelessness or want of skill on the part of the Contractor, his agents or servants, the Contractor hereby agrees to pay such amount as may be sufficient to cover the expense and damages occasioned by such negligence, wilfulness, carelessness or unskillfulness, and that such amount shall be charged against him; and the President is hereby authorized

EXHIBIT C-8 (*continued*):

to deduct and retain from any moneys which may be due, or which shall become due, under this Contract, a sum sufficient, in his judgment, to cover the cost of making good any such damages, expense or loss, and to apply said sum so deducted and retained to the requisite repairs or renewals, or to reimburse the parties damaged or injured.

10 Old water and gas pipes.

XXXIX. All iron, water and gas pipes which it becomes necessary to remove shall be considered the property of The City and will be piled by the Contractor in such part or parts of the streets as may be directed, unless notice to the contrary is given him in writing, in which case he will remove the same at his own expense.

Change of grade.

20 XL. In case the grade of the street shall be changed during the progress of the work, the Contractor will conform to the altered grade at the contract prices, as far as they are applicable; and for any work for which there is no contract price, the provisions in relation to work not provided for in this contract shall apply.

Measurement of work and material.

30 XLI. All quantities of work and materials to be paid for will be measured and determined, according to the plan and the working lines that may be given, and the specifications, when the work conforms thereto. No allowance will be made on any part of the work for any excess above the quantities required by such plan, lines and specifications. Should the dimensions of any part of the work, or of the materials, be less than those required by the plan, the actual quantities only will be allowed in measurement.

Payment on acceptance of work.

40 XLII. The Contractor will not be entitled to demand or receive payment for any portion of the work or materials unless the same has been fully completed in the manner set forth in this contract, and such completion duly certified by the Engineer in Charge of Sewers, and until each and every one of the stipulations hereinbefore mentioned is complied with, and the work completed to the satisfaction of the President and accepted by him, and the

EXHIBIT C-8 (*continued*):

10 final certificate of completion and acceptance thereof, signed by the President and said Engineer, filed with the Comptroller. The City will pay to the Contractor on or before the expiration of thirty days from the filing of said final certificate of completion and acceptance in the office of the Comptroller, the whole of the moneys accruing to the Contractor, under this contract, except such sum or sums of money as shall be retained under any of the provisions herein contained for that purpose, or in any law of the State, or under any ordinance of The City passed prior to the date of this contract and now in force.

Moneys to be retained for repairs to unpaved streets.

20 It is hereby further agreed that The City shall be and is hereby authorized to retain out of the moneys payable to the Contractor, during a period of six months from the date of the final completion and the acceptance by the President of the work done under this contract, the sum of \$0 09/100 for each linear foot of sewer, basin connection, and house connection constructed under this contract within unpaved streets, and the sum of \$0 25/100 for each linear foot constructed within streets repaired by the Contractor. And should the Contractor fail to make such repairs to the street surface as may become necessary by reason of the work done under this contract within two days of the date of service of notice upon him so to do, then the President may expend such sum or any part thereof in making such repairs.

30 Payment of retained moneys to be made after six months.

It is hereby further agreed that The City, upon the expiration of the said period of six months, will pay to the said party of the second part the whole or such part of the moneys retained as may remain after the expenses of making said repairs, in the manner aforesaid, shall have been paid therefrom.

Termination of six months' period.

40 It is hereby further agreed that if the termination of the said period of six months after the completion and acceptance of the work done under this contract shall fall within the months of December, January, February or March, then and in that case the said months of December, January, February and March, or such part thereof as the President may determine, will not be included in the computation of said period of six months.

EXHIBIT C-8 (*continued*):

Final certificate to control.

XLIII. The action of the Engineer in Charge of Sewers, by which the Contractor is to be bound and concluded according to the terms of this Contract shall be that evidenced by said Engineer's final certificate, all prior certificates upon which eighty-five per centum (85%) payments may have been made being
10 merely estimates, and subject to the corrections of such final certificate, which may be made without notice to the Contractor thereof, or of the measurements upon which the same is based.

85% payments.

XLIV. In case the amount of this contract, based on the Engineer's estimate and the contract prices, shall be five thousand dollars (\$5,000.00) or over, payment will be made to the Contractor by monthly installments of eighty-five Per Cent. (85%)
20 of the estimated value of the work performed, provided the work is being prosecuted in conformity with the provisions of the contract, and in a manner satisfactory to the Engineer, in which case, however, the quantity returned shall be such that the amount paid will be fairly due and in accordance with the provisions and stipulations of this contract; provided, the amount of work done on each installment shall not be less than fifteen hundred dollars (\$1,500.00); and provided that The City may at all times reserve and retain out of said installments, or any of them, all such sum or sums as by the terms hereof or any act of the Legislature of the
30 State of New York, or of any ordinance of The City of New York, now in force, it is or may be authorized to reserve or retain; and provided that where the Contractor, although the lowest bidder in the gross calculation, is to receive unusual or extraordinary prices for any of the different items of the work when considered separately, nothing herein contained shall be construed to affect the right of the President to determine the amount that may be due from time to time, not necessarily by the prices agreed upon in this contract, but by causing an estimate to be made of the value of the work done, taking as a basis of the calculations the
40 whole amount of money that will have become due, according to the terms of this contract, when the whole work shall be completed.

EXHIBIT C-8 (*continued*):

If abandoned, etc.

Contract may be declared abandoned.

Completion of work to be undertaken by President.

10 XLV. The Contractor hereby agrees that if the work to be done under this contract shall be abandoned by him, or if this contract shall be assigned or the work sublet by him otherwise than as provided by the terms hereof, or if at any time the Engineer shall be of the opinion, and shall so certify, in writing, to the President that the performance of the contract is unnecessarily or unreasonably delayed, as evidenced by its actual rate of progress compared with the required progress (See Section XIV); or that the Contractor is wilfully violating any of the conditions or covenants of this contract or the specifications thereof, or is executing the same in bad faith, or not in accordance with the terms thereof, or that the work is not fully completed
20 within the time designated in this contract for its completion, the President may declare this contract or any part thereof abandoned and notify the Contractor to discontinue all work or any part thereof under this contract, by a written notice to be served upon the Contractor either personally, or by leaving said notice at his residence, or with his agent in charge of the work, or in the manner provided in Section XLVI., or with any employee found on the work, and the Contractor agrees to thereupon discontinue said work or such part thereof, and he further
30 agrees that the President shall thereupon have the power to contract for the completion of the contract in the manner prescribed by law, or to place such and so many persons as he may deem advisable, by contract or otherwise, to work at and complete the work declared abandoned, and to use such materials as he may find upon the line of the work, and to procure other materials for the completion of the same, and to charge the expense of said labor and materials to the Contractor; and it is further agreed that the expense so charged shall be deducted and paid by The City out of such moneys as may be due or may at any time thereafter become due to the Contractor under and by virtue of this
40 contract, or any part thereof. And in case such expense shall exceed the amount which would have been payable under the contract if the same had been completed by the Contractor, he shall and will pay the amount of such excess to The City. Should the Contractor fail to complete the work as stipulated herein, or should the contract be declared abandoned, he agrees to forfeit all money earned, but unpaid whether certified or not at the time

EXHIBIT C-8 (*continued*):

of the abandonment of the contract. In case such expense shall be less than the sum which would have been payable under the Contract if the same had been completed by the Contractor, he agrees to forfeit all claim to the remainder; and when any particular part of the work is being carried on by the President, by contract or otherwise, under the provisions of this clause of the contract, the Contractor agrees to continue the remainder of the work in conformity with the terms of this contract and in such manner as in nowise to hinder or interfere with the persons or workman employed, as above provided, by the President, by contract or otherwise, to do any part of the work, or to complete the same under the provisions of this section of the contract.

Notice to Contractor.

XLVI. It is agreed that the residence or place of business, given in the bid upon which this contract is founded, is hereby designated as the place where all notices, letters and other communications shall be served, mailed or delivered. It is further agreed that any notice, letter or other communication addressed to the Contractor and delivered at the above-named place, or deposited in a post-paid wrapper in any post-office box regularly maintained by the post-office, shall be deemed sufficient service thereof upon the Contractor. It is also further agreed that the place named may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the President. It is also further agreed that nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

Labor law.

XLVII. The Contractor agrees that he will comply with the provisions of "The Labor Law." He further agrees that no laborer, workman or mechanic in the employ of the Contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be permitted or required to work more than eight hours in any one calendar day, except in cases of extraordinary emergency, caused by fire, flood or danger to life or property; that the wages to be paid for a legal day's work to all classes of such laborers, workmen or mechanics upon public work or upon any material to be used thereupon shall not be less than the prevailing rate for a day's work in the same trade or occupation in the locality where

EXHIBIT C-8 (*continued*):

such public work is being constructed. Each such laborer, workmen or mechanic shall receive the prevailing rate of wages. This contract shall be void and of no effect, unless the person or corporation, making or performing the same shall comply with the provisions of section 14 of the Labor Law.

No estoppel.

- 10 XLVIII. The City shall not, nor shall any Department or officer thereof be precluded or estopped by any return or certificate made or given by the President, any Engineer or other officer, agent or appointee of The City under any provision of this contract from at any time (either before or after the final completion and acceptance of the work and payment therefor pursuant to any such return or certificate) showing the true and correct amount, quality and character of the work done and materials furnished by the Contractor, or any other person under this contract, or from showing at any time that any such return or certificate is untrue and incorrect or improperly made in any particular, or that the work and materials, or any part thereof do not in fact conform to the contract; and The City shall not be precluded or estopped, notwithstanding any such return or certificate or payment in accordance therewith, from demanding and recovering from the Contractor such damages as it may sustain by reason of his failure to comply with the contract.
- 20

Understanding of plans and specifications.

- 30 XLIX. The Contractor hereby distinctly and expressly declares and acknowledges that, before the signing of this contract, he has carefully read the same, and the whole thereof, together with and in connection with the plan and specifications, and that he has made such examination of this contract and of said plan and specifications, and the location where said work is to be done, and such investigation of the work required to be done, and in regard to the material required to be furnished, as to enable him to thoroughly understand the intention of the same, and the requirements, covenants, agreements, stipulations and restrictions contained in this contract and in said plan and specifications; and distinctly agrees that he will not hereafter make any claim or demand upon The City, based upon or arising out of any alleged misunderstanding or misconception on his part of the said requirements, covenants, stipulations and restrictions: and that any information given to the Contractor by the Engineer or others as to the quantities in the work, prior to, or
- 40

EXHIBIT C-8 (*continued*):

during the progress of the work, shall have no bearing or effect whatsoever, upon the total amount of work to be paid for, in the final settlement.

Chap. 478, Laws 1916.

10 This contract shall be void and of no effect unless the person or corporation making or performing the same shall secure compensation for the benefit of, and keep insured during the life of this contract, the employees engaged thereon, in compliance with the provisions of Chapter 41 of the laws of 1914, known as the Workmen's Compensation Law, and acts amendatory thereof.

20 Should the Comptroller at any time deem the sureties under the contract to be unsatisfactory he shall notify the Contractor to that effect and the Contractor shall when so notified forthwith submit in substitution new sureties acceptable to the Comptroller. No further payment shall be deemed due or shall be made until the new sureties shall qualify and be accepted by the Comptroller.

30 IN WITNESS WHEREOF, The President of the Borough of Queens has hereunto set his hand for and on behalf of The City of New York, and the Contractor has also hereunto set his or its hand the day and year herein first above written; and the President and Contractor have executed this agreement in triplicate; one part of which is to remain with the President, one other to be filed with the Comptroller of The City of New York, and the third to be delivered to the Contractor.

.....
Acting President of the Borough of Queens.

JOSEPH L. SIGRETTO & CO.,

By Joseph L. Sigretto,
President.

(Contractor (s)).

EXHIBIT C-8 (*continued*):

The City and State of New York, ss:
County of Queens

10 On this 2nd day of May 1917, before me personally came Richard S. Newcombe to me known and known to me to be the Acting President of the Borough of Queens, of The City of New York, the person described as such in and who as such executed the foregoing instrument, and he acknowledged to me that he executed the same as said Acting President for the purposes therein mentioned.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

The City and State of New York, ss:
County of Queens

20 On this 23rd day of April, 1917, before me personally came Joseph L. Sigretto to me known and known to me to be the President of Joseph L. Sigretto and Co. who being by me duly sworn, did depose and say for himself that he resides in Orange, N. J.; that he is the President of Joseph L. Sigretto and Co., the corporation described in and which executed the above instrument; that he knew the corporate seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said Joseph L. Sigretto and Co., and that, by like order, he thereunto
30 signed his name and official designation.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

40 KNOW ALL MEN BY THESE PRESENTS, That we Joseph L. Sigretto and Co., as principal, and National Surety Company and London and Lancashire Indemnity Company of America as surety are held and firmly bound unto The City of New York, in the sum of THIRTY ONE THOUSAND DOLLARS, lawful money of the United States of America, to be paid unto THE CITY OF NEW YORK, or to its certain attorneys, successors or assigns; for which payment, well and truly to be made, we and each of us do bind ourselves, and our several and respective heirs, executors, administrators and assigns, jointly and severally, firmly by these presents.

Signed and dated this 23rd day of April, 1917.

EXHIBIT C-8 (*continued*):

WHEREAS, The above bounden Joseph L. Sigretto and Co., by an instrument in writing, under their hands, and bearing even date with these presents, one part whereof is hereto annexed, have contracted with The City of New York, by the President of the Borough of Queens, to furnish all the labor and materials, and to excavate for, build, construct and in all respects complete Sewer and appurtenances in Hull Avenue from Maurice
10 Avenue to Willow Avenue; Willow Avenue from Jay Avenue to Grand Street; Hull Avenue from Willow Avenue to Hamilton Place; Hamilton Place, from Hull Avenue to Grand Street; Grand Street from Hamilton Place to Monteverde Avenue, Second Ward, together with all the work incidental thereto, as is fully and at large set forth and described in the contract aforesaid.

NOW, THEREFORE, The condition of the above obligation is such that if the said above bounden Joseph L. Sigretto and Co and its, his or their heirs, executors, administrators and assigns, or any or either of them, shall well and truly, and in a
20 good, sufficient and workmanlike manner, perform or cause to be performed the said contract, and each and every of the covenants, promises, agreements and provisions therein contained on their part to be performed, and complete the same within the period therein stipulated, and in each and every respect comply with the conditions therein contained, then this obligation to be void; otherwise, to remain in full force and virtue.

30 Joseph L. Sigretto & Co. [L. S.]
By JOSEPH L. SIGRETTO [L.S.]
President.

National Surety Company [L. S.]
By FRANK T. GILSON [L. S.]
Resident Vice-President.

Attest L. W. FITZGERALD
Res. Ast. Secretary.

40 London & Lancashire Indemnity Company
of America
By J. E. SWEENEY,
Attorney-in-fact.

EXHIBIT C-8 (*continued*):

The City and State of New York, ss.
County of Queens

On this 23rd day of April, 1917, before me personally came Joseph L. Sigretto to me known and known to me to be the President of Joseph L. Sigretto and Co. who, being by me duly sworn, did depose and say for himself that he resides in Orange, N. J.;
10 That he is the President of the Joseph L. Sigretto and Co., the corporation described in, and which executed the above instrument, that he knew the corporate seal of said corporation; that the seal affixed to the said instrument is such corporate seal: that it was so affixed by order of the Board of Directors of said Joseph L. Sigretto and Co., and that by like order he thereto signed his name and official designation.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

20

STATE OF NEW YORK, ss.
COUNTY OF NEW YORK,

On the 30th day of April, in the year 1917, before me personally came J. E. Sweeney, to me known, who, being by me duly sworn, did depose and say that he resides in City of New York, Kings County, New York; that he is the Attorney-in-fact of the LONDON & LANCASHIRE INDEMNITY COMPANY OF
30 AMERICA, the corporation described in and which executed the within instrument; that he knows the seal of said corporation; that the seal affixed to said instrument was such corporate seal that it was so affixed in pursuance to the By-Laws of said corporation, and that he signed his name thereto by like order; and that the liabilities of said company do not exceed its assets, as ascertained in the manner provided in Chapter 33 of the Consolidated Laws of the State of New York for the year 1909.

JOSEPH PEREZ PETINTO,
40 Notary Public, Kings County No. 6,
Cert. filed N. Y. County Clerk No. 48
My commission expires March 30, 1918.

Section 7 of the By Laws of the London & Lancashire Indemnity Company of America:

“The President and/or Vice President shall have power and Authority to appoint Assistant Secretaries, Resident Vice

EXHIBIT C-8 (*continued*):

Presidents, Resident Secretaries, Resident Assistant Secretaries and Attorneys-in-fact, and to give such appointees full power and authority to sign and to seal with the Company's seal where required all policies, bonds, recognizances, stipulations and all underwriting undertakings and may at any time in their judgment remove any such appointees and revoke the authority given to them."

10

At a Special Meeting of the Board of Directors of the London & Lancashire Indemnity Company of America, held at its office in the City of New York, N. Y., on the ninth day of July, 1915, the following resolution was unanimously adopted, to wit:

"WHEREAS, It frequently becomes necessary for a representative of the Company to execute a bond on behalf of the Company, which, for lack of time or some other cause, it is impossible to have executed by the regularly elected officers of the Company."

20

"THEREFORE, BE IT RESOLVED, That the President and/or one of the Vice-Presidents is hereby authorized to empower any representative of the Company to execute on behalf of the Company, any bond which the Company might execute through its duly elected officers."

In accordance therewith, the following Power of Attorney has been issued, to wit:—

"KNOW ALL MEN BY THESE PRESENTS;

30

That the LONDON & LANCASHIRE INDEMNITY COMPANY OF AMERICA, by E. E. Pearce, its Vice President in pursuance to Section 7 of the By-Laws of said Company, a copy of which is hereunto attached, does hereby nominate, constitute and appoint J. E. Sweeney its true and lawful Attorney-in-fact, to sign and to seal with the Company's seal where required all policies, bonds, recognizances, stipulations and all underwriting undertakings, for and on its behalf as surety, and as its act and deed.

40

And the execution of such instruments in pursuance of these presents shall be as binding on said Company, as fully and amply, to all intents and purposes as if they have been duly executed and acknowledged by the regularly elected officers of the Company in their own proper persons.

IN WITNESS THEREOF, the said E. E. Pearce, Vice President, has hereunto subscribed his name and affixed the cor-

EXHIBIT C-8 (continued) :

porate seal of the said LONDON & LANCASHIRE INDEMNITY COMPANY OF AMERICA, this 20th day of September, 1916.

E. E. PEARCE,
Vice President.

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

10 I, E. GISSING, Assistant Sec'y of the LONDON & LANCASHIRE INDEMNITY COMPANY OF AMERICA, have compared the foregoing by-law and resolution with the original thereto as recorded in the Minute Book of the said Company and have compared the foregoing Power of Attorney with the original thereof, and do hereby declare the same are true and correct transcripts therefrom and of the whole of said originals.

20 IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the said company in the City of New York, this 30th day of April 1917.

E. GISSING.

LONDON & LANCASHIRE INDEMNITY COMPANY
of America

STATEMENT OF JANUARY 1st 1917

ASSETS

| | | |
|----|--|-----------------------|
| 30 | Bonds and Stocks (Market Values) | \$1,845,640.00 |
| | Interest due and accrued | 12,412.51 |
| | Premiums in course of collection | 322,461.19 |
| | Cash on Hand and in Banks | 660,448.65 |
| | Other Assets | 3,082.86 |
| | Total Assets | \$2,844,045.21 |

LIABILITIES

| | | |
|----|-------------------------------------|-----------------------|
| 40 | Reserve for Unearned Premiums | \$ 788,041.50 |
| | Reserve for Unpaid Losses | 885,688.17 |
| | All other Liabilities | 154,075.43 |
| | Capital | 750,000.00 |
| | Net Surplus | 266,240.11 |
| | | \$2,844,045.21 |
| | Surplus to Policyholders | \$1,016,240.11 |

EXHIBIT C-8 (continued) :

COUNTY OF NEW YORK
STATE OF NEW YORK ss. :

E. GISSING, being duly sworn, says that he is the Assistant Secretary of the London & Lancashire Indemnity Company of America, that the foregoing is a true and correct Statement of the financial condition of said company as of January 1st, 1917, to the best of his knowledge and belief and that the financial condition of said company is as favorable now as it was when such statement was made.

E. GISSING.

Subscribed and sworn before me
this 30th day of April 1917.

JOSEPH PEREZ PETINTO,
Notary Public, Kings County No. 6,
Cert. filed N. Y. County Clerk No. 48,
My commission expires March 30, 1918.

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

On April 25, 1917, before me personally appeared FRANK T. GILSON, Resident Vice-President of the NATIONAL SURETY COMPANY, with whom I am personally acquainted, who, being by me duly sworn, said that he is the Resident Vice-President of the NATIONAL SURETY COMPANY, the corporation described in and which executed the within instrument; that he knows the corporate seal of said Company; that the seal affixed to the within instrument is such corporate seal; that it was affixed by order of the Board of Directors of said Company, and that he signed said instrument as Resident Vice-President of said Company by like authority; and that the liabilities of said Company, do not exceed its assets as determined by an audit of the Company's annual statement filed with the Superintendent of Insurance of the State of New York and certified to by said Superintendent, pursuant to Section 2 of Chapter 182 of the Laws of the State of New York for the year 1913, amending section 182 of chapter 33 of the Laws of the State of New York for the year 1909 constituting chapter 28 of the Consolidated Laws of the State of New York. And said FRANK T. GILSON further said that he is acquainted with L. W. FITZGERALD and knows him to be the Resident Assistant Secretary of said Company; that

EXHIBIT C-8 (*continued*):

the signature of the said L. W. FITZGERALD subscribed to the said instrument is in the genuine handwriting of the said L. W. FITZGERALD and was thereto subscribed by the like order of the said Board of Directors and in the presence of him, the said Resident Vice-President.

10 CHARLES J. KOCH,
Notary Public, For Kings County, No. 33; Certificate
filed in New York Co. No. 156; Bronx No. 10, Queens
No. 76, Richmond & Westchester Counties; Kings
County Register's Office No. 8025; New York County
Register's Office No. 8139; Bronx County Register's
Office No. 823; My Commission expires March 30,
1918.

COPY OF BY-LAW

20 BE IT REMEMBERED: That at a regular meeting of the
Board of Directors of the NATIONAL SURETY COMPANY,
duly called and held on the sixth day of February, 1912, a quorum
being present, the following By-Law was adopted:

ARTICLE XIII.

30 Section I. *Signatures required.*—All bonds, recogniz-
ances, or contracts of indemnity, policies of insurance, and all
other writings obligatory in the nature thereof, shall be signed
by the President, a Vice-President, a Resident Vice-President,
or Attorney-in-Fact, and shall have the seal of the Company af-
fixed thereto, duly attested by the Secretary, an Assistant Secret-
ary, or Resident Assistant Secretary. All Vice-Presidents and
Resident Vice-Presidents shall each have authority to sign such
instruments, whether the President be absent or incapacitated, or
not, and the Assistant Secretaries and Resident Assistant Secret-
aries shall each have authority to seal and attest such instru-
ments, whether the Secretary be absent or incapacitated, or not;
40 and the Attorneys-in-Fact shall each have authority, in the dis-
cretion of such Attorneys-in-Fact, to affix to such instruments
an impression of the Company's seal, whether the Secretary be
absent or incapacitated, or not, or to attach the individual seal
of the Attorney-in-Fact thereto, or to use the scroll of the Attor-
ney-in-Fact, or a water, wax, or other similar adhesive substance
affixed thereto, or a seal of paper or other similar substance
affixed thereto by mucilage, or other adhesive substance, or use
the word "seal" or the letters "L. S." opposite the signature of
such Attorneys-in-Fact, as the case may be.

EXHIBIT C-8 (continued) :

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

I, L. W. FITZGERALD, Resident Assistant Secretary of
the NATIONAL SURETY COMPANY, have compared the fore-
going By-Law with the original thereof, as recorded in the Minute
Book of said Company, and do certify that the same is a correct
and true transcript therefrom, and of the whole of Article XIII.
10 Section I of said original By-Law.

Given under my hand and the seal of the Company,
in the County of New York, April 25, 1917.

L. W. FITZGERALD,
Resident Assistant Secretary.

For use in New York and other states which do not require
published figures to conform to statement furnished the depart-
ment of such state after audit by them.

20 NATIONAL SURETY COMPANY OF NEW YORK

Financial Statement, December 30th, 1916.

WM. B. JOYCE, President. HUBERT J. HEWITT, Secretary.

ASSETS

| | |
|--|------------------------|
| Cash in Banks and Offices | \$2,475,272.31 |
| Government, Municipal and Other Bonds, and Stocks | 8,734,216.18 |
| Real Estate, Mortgages and Collateral Loans | 264,157.99 |
| 30 Unpaid Premiums (excluding Premiums 90 days overdue) | 962,208.57 |
| Accrued Interest and Accounts Receivable | 505,057.52 |
| Total. | <u>\$12,940,912.57</u> |

LIABILITIES.

| | |
|--|------------------------|
| Unearned Premium Reserve | \$2,780,723.87 |
| Contingent Claim and Expense Reserve (Less Re- insurance) | 1,079,726.62 |
| 40 Reserve for taxes and Unpaid Commissions (not due) | 287,026.46 |
| Accounts Payable and Expenses Incurred (not due) | 157,339.87 |
| Dividend Declared (Payable Jan. 2nd, 1917) | 90,000.00 |
| Capital Stock | 4,000,000.00 |
| Surplus | 4,546,095.75 |
| Total, | <u>\$12,940,912.57</u> |

EXHIBIT C-8 (continued):

STATE OF NEW YORK,
COUNTY OF NEW YORK, ss:

10 L. W. FITZGERALD being duly sworn, says: That he is Resident Assistant Secretary of the NATIONAL SURETY COMPANY, that said Company is a Corporation duly organized, existing, and engaged in business as a Surety by virtue of the Laws of the State of New York, and has duly complied with all the requirements of the Laws of said State and of the Laws of the State of New York applicable to said Company, and is duly qualified to act as Surety under such Laws; that said Company has also complied with and is duly qualified to act as Surety under the Act of August 13, 1894, entitled, "An Act Relative to Recognizances, Stipulations, Bonds and Undertakings, and To Allow Certain Corporations To be Accepted As Surety Thereon," as amended by the Act of Congress of March 23, 1910. That the
20 foregoing is a full, true and correct statement of the financial condition of said Company on the 30th day of December, 1916.

L. W. FITZGERALD,
Resident Assistant Secretary.

Sworn to before me this April 25, 1917,

30 CHARLES J. KOCH,
Notary Public For Kings County, No. 33; Certificate filed in New York Co. No. 156; Bronx No. 10, Queens No. 76, Richmond & Westchester Counties; Kings County Register's Office No. 8025; New York County Register's Office No. 8139; Bronx County Register's Office No. 823; My Commission expires March 30, 1918.

FUNDS

PRESIDENT'S CERTIFICATE

40 It is hereby certified that the estimated cost of the work and materials required by the within contract is SEVENTY SIX THOUSAND SEVEN HUNDRED AND FORTY SIX and 50/100 DOLLARS, (\$76,746 50/100), and is chargeable to the Street Improvement Fund of the City of New York.

.....
Acting President of the Borough of Queens.

The City of New York, May 2nd, 1917.

EXHIBIT C-8 (*continued*):

SPECIFICATIONS

TRENCHES

Length of trench.

1. Unless otherwise directed or permitted not more than 200 feet of any trench in advance of the end of the built sewer shall be open at any time, and unless written permission to the contrary is given, the trench shall be excavated to its full depth for a distance of at least 20 feet more than the minimum length of sewer permitted to be laid in it. (See paragraphs 159 and 182.) Trenches for house connection drains shall not be open on both sides of the street at the same time, unless permission has previously been given to close the street. Unless otherwise directed each trench for basin connections and house connection drains shall be fully excavated for its entire length before any pipes are laid therein.

Sheeting and bracing.

2. Where necessary the sides of the trenches and excavations shall be supported by adequate sheeting and bracing. Steel sheeting may be used only where shown on the plan or directed. Sheeting and bracing will be paid for only when left in place by written order, in which event the amount left in place will be paid for at the contract price for such material. Unless specially permitted sheeting against which concrete is placed shall not be removed and will not be paid for. The Contractor will be held accountable and responsible for the sufficiency of all sheeting and bracing used, and for all damage to persons or property resulting from the improper quality, strength, placing, maintaining or removing of the same.

Sheeting in soft material.

3. Where the material to be excavated is of such a character as to render it necessary, the sheeting shall be closely driven and to such depth below the bottom of the sewer as may be directed.

Tunneling.

4. All work shall be done in open trenches or excavations; no tunneling shall be done except with the consent of the Engineer.

EXHIBIT C-8 (*continued*):

Trees and stumps.

5. The Contractor shall grub and clear the surface over the trenches and excavations of all trees and stumps and remove the same from the work.

Material to be disinfected.

10 6. If required, any or all of the excavated material shall be satisfactorily disinfected or deodorized or immediately removed from the work.

Roadway, sidewalks, etc., to be kept clear.

20 7. The excavated material and materials of construction shall be so deposited, and the work shall be so conducted as to leave open and free for traffic all crosswalks, a space on each sidewalk not less than one-third the width of such sidewalk and unless permission is given to the contrary a roadway not less than 8 feet wide for the free passage of vehicles. Street hydrants, water gates, fire alarm boxes and letter boxes shall be kept accessible for use. Not more than feet of sidewalk shall be used at any time for storage of materials of construction or material excavated from any one trench. During the progress of the work the Contractor shall maintain such crosswalks, sidewalks and roadways in satisfactory condition, and the work shall at all times be so conducted as to cause a minimum inconvenience to public travel, and permit of safe and convenient access to private and public property along the line of the work.

30 Surplus material.

8. If all of the excavated material cannot be stored on the street in such a manner as to maintain the traffic conditions hereinbefore specified, the surplus shall be removed from the work and stored. After the construction of the sewer, so much of this material as is of satisfactory quality and necessary for the purpose shall be brought back and used for backfilling the trench.

40 Material from first feet to be carted away.

9. Where directed, in built-up districts and in streets where traffic conditions render it necessary, the material excavated from the first feet of trench shall be carted away by the Contractor as soon as excavated, and the material subsequently excavated, if suitable for the purpose, shall be used

EXHIBIT C-8 (*continued*):

to backfill the trench in which the sewer has been built, and neither the excavated material nor materials of construction shall be stored on the roadway or sidewalks.

Fence.

- 10 10. Where necessary a suitable fence shall be placed along the sides of the trench to keep the street safe for traffic.

Temporary bridges.

11. Where any crosswalk is intersected by the trench, it shall be temporarily replaced by a substantial timber bridge not less than 3 feet wide, with side railings. Where required, suitable temporary bridges for vehicles shall be provided and maintained across the trench.

Disposal of water from trenches.

- 20 12. The Contractor shall at all times during the progress of the work keep the trenches and excavations free from water. The water from the trenches and excavations shall be disposed of in such a manner as will not cause injury to the public health, not to public or private property, not to the work completed or in progress, not to the surface of the streets, nor cause any interference with the use of the same by the public.

Cost to be covered.

- 30 13. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 1 to 12 inclusive, except as otherwise provided, shall be covered by all the contract prices for all the items for which there are contract prices.

EARTH EXCAVATION.

14. Earth excavation shall include the removal of all material other than rock as hereinafter defined.

- 40 Width of trench for sewers, etc.

15. The minimum widths of trenches in earth, for pipe sewers, basin connections, house connection and other drains not over 18 inches in diameter, shall be such as to give a clearance inside the sheeting of 8 inches on each side of the pipe, and for those of larger diameters 10 inches on each

EXHIBIT C-8 (*continued*) :

side of the pipe, exclusive of spurs and hubs. The minimum widths of trenches in earth, inside the sheeting, for other sewers shall be the greatest external width of the structures, including the necessary forms, to be built therein.

- 10 16. Where a riser, manhole or other appurtenance or the foundation therefor extends beyond the exterior lines of the sewer or its foundation, the minimum excavation in earth, required for the same shall be that contained in a prism with vertical sides and a horizontal section equal to the smallest rectangle which will enclose such appurtenance and its foundation.

Excavation for receiving basins, etc.

- 20 17. The minimum dimensions of the excavation in earth, for brick receiving basins, inlet basins, shall be such as to give a clearance inside the sheeting of 1 foot on all sides, above the foundation, but in all such cases the excavation shall be large enough to include the foundations for such structures shown on the plan. The excavation for concrete receiving basins, catch basins shall be of such dimensions as to permit the proper placing and removal of the necessary forms.

Depth of trenches.

- 30 18. The trenches shall be excavated to the depths required for the foundations of the sewers and appurtenances shown on the plan, and where the conditions are such as to make it necessary, to such additional depths as may be directed. Where pipe is laid without a cradle the bottom of the trenches shall be excavated to fit the lower third of the pipe, and excavations shall be made to receive the hubs. All irregularities in the bottoms of the trenches shall be filled up to the required grade with suitable material.

Cost to be covered.

- 40 19. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 15 to 18 inclusive, except as otherwise provided, shall be covered by all the contract prices for all the items for which there are contract prices.

ROCK EXCAVATION.

20. Rock excavation shall include the excavation and removal of the following materials :

EXHIBIT C-8 (*continued*):

(a) Rock which shall be determined to be of such a character as to warrant its removal by blasting, in order to insure the prompt and proper prosecution of the work.

(b) Boulders and pieces of rock, masonry in mortar and concrete, each of which contains 1 cubic yard or more, except the masonry and concrete of old sewers and their appurtenances.

- 10 21. Pieces of rock, masonry, concrete or boulders, which fall or slide into the trench from beyond the lines thereof, as herein defined, will not be measured, and the cost of the removal of the same shall be covered by all the contract prices for all the items for which there are contract prices.

BACKFILLING.

Backfilling around sewers, etc.

- 20 30. Unless otherwise specified or directed, all trenches and excavations shall be backfilled immediately after the structures are built therein. For a depth of at least 2 feet over the top of the sewer, basin connection, house connection or other drain, the material for backfilling trenches as excavated, shall be clean earth, sand or rock dust. It shall be carefully deposited in uniform layers not exceeding 6 inches in depth, and unless otherwise permitted, each layer shall be carefully and solidly tamped with appropriate tools in such a manner as to avoid injuring or disturbing the completed work.

30 Backfilling for remainder of trench.

31. Backfilling for the remainder of the trenches as excavated, shall be proved material free from organic matter and containing no stone over 10 inches in their largest dimensions. Any stones shall be so distributed through the mass that all interstices are filled with the fine material. This backfilling shall be deposited as directed, and unless otherwise permitted, shall be spread in layers and solidly tamped.

40 Backfilling around manholes, receiving basins, etc.

32. Backfilling within 2 feet of manholes, house connection drains, receiving basins, inlet basins, and other structures shall be of the same quality as that specified in paragraph 30. 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 thereon.

EXHIBIT C-8 (*continued*):

puddling.

33. Backfilling shall, if required, be flooded or puddled with water as the work progresses, instead of being tamped.

10 34. When sheeting is drawn, 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 as directed.

Deficiency of filling.

35. Unless otherwise shown on the plan, the trenches shall be backfilled to the height of the surface of the ground as it existed at the commencement of the work. Should there be a deficiency of proper material for the purpose, the Contractor shall furnish and place such additional material as may be required.

20 Temporary bulkheads.

36. For retaining the backfilling only temporary bulkheads will be allowed over sewers, basin connections and drains. Such bulkheads shall not be of stone, and they shall be removed as the trenches are backfilled.

Curves, branches, etc., not to be covered.

30 37. Drains, basin connections, house and sewer connections and intersections, ends of sewers and branches shall not be covered until the Engineer shall have inspected, measured and located the same, and given permission to backfill the trenches over them.

Removal of surplus material.

40 38. As the trenches are backfilled, the Contractor shall remove all surplus material and regrade and leave free, clear and in good order all roadways and sidewalks to within feet of the end of the completed work. During the progress of and until the final acceptance of the work, he shall maintain in good and safe condition the surface of the street over all the trenches, and promptly fill all depressions over and adjoining the trenches caused by settlement of the backfilling. In case of failure or neglect on the part of the Contractor to comply with the requirements of this paragraph within 24 hours after the service upon him of a written notice so to do, the President may

EXHIBIT C-8 (*continued*) :

furnish all materials and do all work required, and the cost thereof will be charged to the Contractor and deducted from any moneys due or to become due him under this contract. All surplus material or any part thereof shall, if required, be deposited as directed on the streets and avenues within the limits of this contract where the same are below grade, and in such a manner as to leave the surfaces of the filled material even.

10

Cost covered.

39. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 30 to 38 inclusive, shall be covered by all the contract prices for all the items for which there are contract prices.

CEMENT.

20

40. All cement used in the work shall be a high grade Portland cement of a well-established and approved brand. It shall be the product obtained by finely pulverizing clinker produced by calcining to incipient fusion, an intimate mixture of properly proportioned argillaceous and calcareous substances, with only such additions subsequent to calcining as may be necessary to control certain properties. Such additions shall not exceed 3 per cent. by weight, of the calcined product.

30

Specific gravity; weight.

41. The cement shall have a specific gravity of not less than 3.10 after being thoroughly dried at 212° F. It shall weigh not less than 380 pounds net, to the barrel, 4 bags of 95 pounds each being considered equivalent to a barrel.

Fineness.

40

42. The cement shall be dry, finely ground, of uniform color and free for lumps. It shall leave a residue of not more than 8 per cent. by weight, when passed through a No. 100 sieve, and not more than 25 per cent. when passed through a No. 200 sieve.

Tensile strength.

43. Standard briquettes shall develop within the periods specified, tensile strength not less than that shown in the following table.

EXHIBIT C-8 (*continued*):

Neat Cement:

| | |
|--|------------------------|
| 24 hours | 175 pounds per-sq. in. |
| 7 days (1 day in moist air, 6 days in water) | 500 pounds per sq. in. |
| 28 days (1 day in moist air, 27 days in water) | 600 pounds per sq. in. |

10 Mortar consisting of 1 part cement and 3 parts of Standard Ottawa Sand, by weight:

| | |
|--|------------------------|
| 7 days (1 day in moist air, 6 days in water) | 180 pounds per sq. in. |
| 28 days (1 day in moist air, 27 days in water) | 225 pounds per sq. in. |

20 The average of the tensile strengths developed at each age by the briquettes in any set made from one sample will be considered the strength of the sample at that age, excluding any results that are manifestly faulty. The average strength of briquettes at 28 days shall be greater than the average strength at 7 days, and if tests are made after 28 days the strength shall be not less than that at 28 days.

Soundness.

30 44. Pats of neat cement when tested for constancy of volume or soundness shall remain firm and hard and show no sign of checking, cracking, distortion or desintegration.

Setting.

45. Unless otherwise required, the cement shall not develop initial set in less than 30 minutes, and shall develop final set in not less than 1 hour nor more than 10 hours. Quick-setting cement of an approved brand shall, if required, be kept on the work in sufficient quantity to provide for any contingency requiring the use of the same.

40 Testing.

46. The cement will be subjected to such tests as the Engineer may deem necessary, and such tests will be made in accordance with the methods recommended by the Committee on Uniform Tests of Cement of the American Society of Civil Engineers, except that the time of setting will usually be determined by means of the Gilmore needles. In case of dispute as to the

EXHIBIT C-8 (*continued*):

time of setting, this test will be made by means of the Vicat needle.

Retesting.

47. Any cement which shall have been kept in storage after testing for a sufficient time to warrant it, shall be retested. Any prior acceptance shall be considered void and the acceptance or rejection of the cement shall depend upon the results of the latest tests.

Approval of brand may be rescinded.

48. The Engineer may at any time rescind the approval of any brand of cement that develops objectionable qualities.

Samples.

49. The Contractor shall notify the Engineer of the arrival of cement on the work, and furnish such facilities as may be required for obtaining samples for testing. Samples will be taken so as to fairly represent the material. The number of packages sampled and the quantity to be taken from each will depend upon the importance of the work and the number of tests to be made.

Delivery and storing.

50. Cement shall be delivered on the work in barrels or approved bags of uniform size, with the brand and the name of the manufacturer plainly marked thereon; it shall be immediately stored in a dry place and carefully protected from the weather. A sufficient stock of cement shall be kept on the work in advance of the necessity for its use to permit of the making of the required seven day tests. Except by written permission, no cement shall be used before it has been tested and accepted, and any concrete or masonry which may have been made under such permission with cement that is subsequently rejected, shall be removed and replaced by the Contractor, at his own expense, with concrete or masonry made of accepted cement.

Cost to be covered.

51. The cost of furnishing, storing and incorporating cement in the work, and the cost of samples required for testing, shall be covered by the contract prices for the structures or classes of work in connection with which the cement is used.

EXHIBIT C-8 (*continued*):

MORTAR.

52. All mortar used in the work, unless otherwise specified, shall be composed of 1 volume of cement, as in the original package, and $2\frac{1}{2}$ volumes of sand. Where required, mortar of cement and sand in other proportions or mortar of neat cement shall be used as directed.

10

Sand.

53. Sand shall be composed of grains of clean, sharp quartz, not softer than hard limestone. It shall be moderately coarse and preferably made up of grains of varying size not exceeding one-quarter ($\frac{1}{4}$) inch producing a mass with low percentage of voids. It shall not contain, in all, more than five (5) per cent, by volume of clay, loam, mica, scales, silt, or other objectionable inorganic matter, nor more than one (1) per cent. of organic matter.

20

Tests may also be made of the cement and sand used in the proportions of 1 part cement to 3 parts sand, and these tests must show at least 70 per cent. of the strength of the mortar made with the cement and standard sand, or the sand may be rejected.

Mixing.

54. Mortar shall be mixed in a suitable box or on a tight platform, and never upon the pavement or ground. The cement and sand shall be thoroughly mixed dry, until the mixture has a uniform color. Clean, fresh water shall then be added and the mass worked until a mortar, which is uniform and of the required consistency is produced. The mortar shall be mixed in no greater quantity than is required for the work in hand, and any that has set sufficiently to require retempering shall not be used.

30

Freezing weather.

55. The mixing and use of mortar in freezing weather shall be subject to the same requirements as hereinafter specified for mixing and placing concrete under similar conditions.

40

Cost covered.

56. The cost of all labor and materials required to furnish and place the mortar in the work, as specified, shall be

EXHIBIT C-8 (*continued*) :

covered by the contract price for the structure or class of work in connection with which the mortar is used.

CONCRETE.

Class A concrete.

10 57. Class A concrete shall be made of 1 part of cement, 2 parts of sand and 4 parts of broken stone or gravel.

58. Broken stone for Class A concrete shall be approved trap rock, dense fine-grained blue limestone or granite broken into roughly cubical or pyramidal fragments. Broken stone which contains dust, loam, clay, organic matter or other improper substances shall not be used. Broken stone for Class A concrete shall be the run of the crusher that will pass through a screen with circular openings $1\frac{1}{4}$ inches in diameter and shall be retained on a screen with openings $\frac{1}{8}$ -inch in diameter. Gravel shall be equal in quantity to North Shore Long Island gravel, shall be clean and sound, and shall be of the sizes herein specified for broken stone.

20

Measuring ingredients.

67. For the purpose of determining the proportions of the materials for concrete, each bag of cement will be considered as containing $\frac{9}{10}$ cubic foot, and the other ingredients shall be measured by an approved method.

30 Water.

68. Only clean fresh water shall be used for concrete.

Mixing.

69. Unless permitted to be mixed by hand, concrete shall be mixed in approved mechanical batch mixers, so constructed and operated that the ingredients of the concrete may be accurately measured and thoroughly mixed. Enough water shall be added during the mixing to bring the concrete to the required consistency, which generally shall be such that the concrete may be poured into place without causing the separation of the stones from the mortar. When concrete is mixed by hand the broken stone or gravel shall be spread on a tight platform in a bed about 6 inches deep and shall be thoroughly wetted. The cement and sand shall be mixed dry on a suitable platform, until the mixture has a uniform color. This mixture shall be spread evenly on the

40

EXHIBIT C-8 (*continued*):

bed of wet stone, water added, and the entire mass turned until each piece of stone is entirely coated with mortar and a concrete produced which is uniform and of the consistency herein specified for machine mixed concrete. When a comparatively dry concrete is required it shall be mixed to such consistency as may be directed.

10 Placing concrete.

70. Concrete shall be mixed only in such quantity as is required for the work in hand, and any that has set sufficiently to require retempering shall not be used. Any concrete in which the water has separated from the solid matter shall be satisfactorily remixed before being placed. The concrete shall be so deposited in the work as to prevent the separation of the stone from the mortar. It shall be deposited in as nearly a continuous operation as practicable and shall be tamped or spaded with suitable tools to expel air bubbles and produce a dense and compact mass. When the operation of placing concrete is interrupted the concrete in the work, shall, if required, be confined by suitable temporary forms or bulkheads. When concrete is to surround reinforcing metal, structural steel, or wire netting, it shall be so deposited as to work closely around such material. When a comparatively dry concrete is used it shall be deposited in horizontal layers not exceeding 6 inches in depth and solidly tamped.

30 Joining old and new concrete.

71. When fresh concrete is to be laid on or adjoining concrete already set, the surface of the latter shall be thoroughly cleaned, washed, and roughened, and coated with a grout of neat cement before the fresh concrete is deposited.

Forms and centres.

72. The Contractor shall provide all necessary forms and centres for shaping concrete wherever used. They shall be true to the required shapes and sizes, strong enough and so secured in place as to withstand all operations incidental to placing the concrete, and watertight, and the faces against which the concrete is to be placed shall be satisfactorily smooth and clean. Timber used in forms and centres for exposed faces of concrete shall be seasoned stock. Unless otherwise permitted, those surfaces of forms and centres which will be in contact with concrete shall be coated as directed with an approved lubricant; when no

EXHIBIT C-8 (*continued*):

lubricant is required such surfaces shall be thoroughly wetted just before the concrete is placed.

Removal of forms and centres.

10 73. The forms and centres shall be left in place until the concrete has set sufficiently to permit their removal without danger to the structure, and until so much of the backfilling or embankment as may be directed has been put in place. No forms or centres shall be struck or removed until permission to do so has been given.

Exposed surfaces.

20 74. Special care shall be used to secure a smooth and uniform finish to the surfaces of concrete which will be exposed in the completed structure. Immediately after the removal of the forms such surfaces, if uneven, shall be rubbed smooth to a uniform and satisfactory finish, all exposed edges of concrete shall be neatly rounded as directed, and if any voids, projections or other imperfections be found, such defects shall at once be corrected by tooling, cutting out and filling with mortar, or otherwise, as directed.

Expansion joints.

30 75. Expansion joints shall be provided in such manner and at such places as are shown on the plan or as may be directed. All unavoidable joints shall be made as shown on the plan or as directed.

Depositing concrete under water.

76. Whenever it becomes necessary to place concrete under water, it shall be deposited by means of approved method. Concrete so deposited shall be carefully spread without tamping.

Freezing weather.

40 77. In freezing weather, until the temperature falls to 24 degrees Fahrenheit the water used for concrete shall, if directed, be heated to an approved temperature, and if directed, one per cent. by weight of salt shall be added to the water for each degree Fahrenheit that the temperature of the air is below 32 degrees Fahrenheit. The other materials for the concrete shall be heated sufficiently to remove all frost and ice. No concrete shall be laid when the temperature of the air is below 24 degrees Fahrenheit.

EXHIBIT C-8 (*continued*):

Protection.

78. Concrete shall be allowed to set for such time as may be directed before being worked or walked upon, or before filling, backfilling or other material is placed upon or against it. It shall not be flooded with water until it has sufficiently set. Concrete shall be carefully protected from injury, from freezing and from the drying effects of the sun and wind by covering it with canvas, bagging, hay or other suitable and approved materials. Such protection shall be placed as soon as the concrete is in condition to receive it, and except in freezing weather, the covering as well as the concrete shall be kept wet for such time as may be directed.

Measurement.

79. The amount of concrete to be paid for as such will be all concrete put in place as shown on the plan or as directed, except such concrete shown on the plan as being part of structures for which there are contract prices and the cost of which is hereinafter specified to be covered by the contract prices for such structures. No deduction will be made on account of the space occupied by spurs for house connections, reinforcing metal, structural steel or waterproofing, but deduction will be made on account of space occupied by pile heads, timber, sewers, basin connections and drain pipes.

Prices to cover.

80. The contract prices for the various classes of concrete shall cover the cost of all labor and materials required to furnish, place and remove all necessary forms and centres, and to furnish, make, place, finish and protect the concrete as specified.

BRICK MASONRY.

Quality of bricks.

81. All bricks used in the work shall be sound and hard burned throughout, and of uniform size and quality. If required the bricks shall be culled immediately after they are brought on the work and all bricks which are warped, cracked or of improper quality shall be at once removed. The proportion of bats permitted will be determined according to the character and location of the work in which they are to be used. When bricks are used

EXHIBIT C-8 (*continued*):

as the lining for inverts of sewers they shall be specially selected, and no bats shall be used except for closers.

How laid.

10 83. Bricks shall be satisfactorily wet when being laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The joints shall be not wider than $\frac{3}{8}$ inch, except when the bricks are laid radially, in which case the narrowest part of the joint shall not exceed $\frac{1}{4}$ inch. The bricks shall be laid in a workmanlike manner, true to line, and wherever practicable the joint shall be carefully struck and pointed on the inside. Brickwork shall be laid with a satisfactory bond, and as it progresses shall be racked back in courses, unless otherwise permitted.

Protection.

20 84. All fresh brickwork shall be carefully protected from freezing and from the drying effects of the sun and wind, and if required, it shall be sprinkled with water at such intervals and for such a time as may be directed. Brickwork shall be protected from injuries of all sorts, and all portions which may become damaged or may be found defective shall be repaired, or if directed, be removed and rebuilt.

Freezing weather.

30 85. In freezing weather bricks shall be heated sufficiently to remove all ice and frost.

Price to cover.

86. The cost of all brick masonry shall be covered by the contract price for the structure in connection with which it is used.

STRUCTURAL STEEL.

Quality.

40 98. Structural steel shall be medium steel and rivet steel made by the open hearth process and shall conform to the latest revised Standard Specifications for Structural Steel for Buildings adopted by the American Society for Testing Materials, and such tests as may be required shall be made in accordance therewith and at the places hereinafter specified. The chemical and physical properties of the steel be as follows:

EXHIBIT C-8 (*continued*):

| Properties Considered | Medium Steel | Rivet Steel |
|--|---------------------------------|---------------------|
| Phosphorus (maximum) | 0.06 per cent. | 0.06 per cent. |
| Ultimate strength, lbs. per sq. in. | 55,000-65,000 | 48,000-58,000 |
| Yield point (minimum), lbs. per sq. in. | 1/2 ult. tens. str. | 1/2 ult. tens. str. |
| 10 Elongation, per cent. in 8 in. (minimum) | 1,400,000 | 1,400,000 |
| | ult. tens. str. | ult. tens. str. |
| Character of fracture | Silky | Silky |
| Cold bend without fracture . . . | 180° to diam. of 1 thickness | 180° flat |

Finish.

20 99. All finished material shall be free from injurious seams, flaws and cracks, and have a workmanlike finish.

Variation in weight.

30 100. When steel is inspected at the will or shop all pieces (except plates), which vary in weight more than 2 1/2 per cent. from that specified shall be rejected; when steel is not inspected until it is delivered on the work such variation in weight will be sufficient cause for rejection when, in the judgment of the Engineer, the safety of the work will be impaired thereby.

Workmanship.

101. All structural steel shall be in accordance with the plan and approved shop drawings. All details not shown on the plan, and all workmanship and finish shall be equal to the best current practice in similar work for buildings.

Anchor bolts.

40 102. Anchor bolts and expansion bolts shall be furnished where required and set in place as directed. When holes are drilled in masonry or concrete for such bolts, the holes shall be washed clean and the bolts shall be firmly embedded in a mortar composed of equal parts of cement and sand, unless other material is shown on the plan.

EXHIBIT C-8 (*continued*) :

Melt numbers.

103. Test specimens and every finished piece of steel shall be stamped with melt or blow number, except that small pieces may be shipped in bundles securely wired together, with the melt or blow number on a metal tag attached.

10 Tests and inspections.

104. The required tests and inspections of structural steel shall, if directed, be made at the mills and shops by the City's authorized inspector. The Contractor shall notify the City as to the mills and shops which are to supply the steel sufficiently in advance to enable the City to arrange for such tests and inspections and the mills and shops shall afford every facility for making the same.

Mill certificates.

20 105. If it is decided not to make the City's tests and inspections at the mills, then mill certificates showing the properties of each melt of which the steel is made will be accepted for consideration.

Shipping invoices.

106. The Contractor will be required to furnish complete copies of shipping invoices with each shipment of steel.

30 Certificates, etc., for information only.

107. Steel will not be accepted until the required inspector's reports or mill certificates are received. All tests, inspections, reports and certificates are for the information of the Engineer, and he shall not be precluded on account thereof from requiring or making any further tests which he may deem necessary.

Shop drawings.

40 108. The Contractor shall prepare complete and accurate shop drawings of all steel work, and no shop work shall be done until such drawings shall have been approved. The Contractor shall furnish the Engineer with 3 complete sets of prints of the approved shop drawings.

EXHIBIT C-8 (*continued*) :

Painting.

10 109. All steel shall be thoroughly cleaned of scale, rust, oil and dirt, and unless otherwise directed, those parts which are not to be bedded in concrete shall be painted with a priming coat of the best red lead and linseed oil or such other paint of equivalent value as may be directed. After erection the metal which will be exposed in the finished work shall be evenly painted with 2 coats of approved paint. No painting shall be done on wet surfaces.

Measurement.

20 110. The amount of structural steel paid for as such will be all structural steel placed in the work in accordance with the plan or directions, except any excess greater than 2½ per cent. above the weight required, and except such structural steel shown on the plan as being part of structures for which there are contract prices, and the cost of which is hereinafter specified to be covered by the contract prices for such structures.

Price to cover.

30 111. The contract price for structural steel shall cover the cost of all labor and materials required to furnish, fabricate, erect and paint the same, to furnish all test pieces, to prepare and furnish prints of shop drawings, and to drill holes for and set anchor and expansion bolts, where required, all as specified.

STEEL REINFORCEMENT BARS.

Shape.

112. Steel bars for reinforcing concrete shall be of such shape as to afford an approved mechanical bond with the concrete at frequent intervals and to insure intimate contact between the steel and concrete. Plain bars may be used only when shown on the plan.

40 Samples.

113. The Contractor shall indicate the type of bars proposed to be used, and if required shall furnish samples thereof, and he is cautioned not to place the order for the bars until the type has been approved.

EXHIBIT C-8 (continued) :

Size.

114. Each bar shall have a net cross sectional area equivalent to that designated on the plan or required, or it shall be the commercial size of the approved type of bar having a net cross sectional area next larger than that designated or required.

10 Variation in weight.

115. Reinforcement bars will be rejected if their actual weight varies more than 5 per cent. from their theoretical weight as shown by the manufacturer's tables. For weighing reinforcement bars the Contractor shall, whenever required, provide an accurate scale of an approved type, with a capacity of not less than 500 pounds.

Quality.

20 116. All steel for reinforcement bars shall be made by the open hearth process and shall conform to the latest revised Standard Specifications for Steel Reinforcement Bars adopted by the American Society for Testing Materials, and such tests as may be required, shall be made in accordance therewith, and at the places hereinafter specified. The chemical and physical properties of the steel shall be as follows:

| Properties Considered | Structural Steel Grade | | Hard Grade* | | Cold Twisted Bars |
|--|------------------------|----------------------|----------------------|----------------------|----------------------|
| | Plain Bars | Deformed Bars | Plain Bars | Deformed Bars | |
| Phosphorus, max. | | | | | |
| Bessemer | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Open Hearth | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Ultimate Tensile Strength, pounds per sq. in. | 55,000-70,000 | 55,000-70,000 | 80,000 min. | 80,000 min. | Recorded only |
| Yield Point, minimum pounds per sq. in. | 33,000 | 33,000 | 50,000 | 50,000 | 55,000 |
| Elongation, minimum per cent. in 8 inches | 1,400,000 | 1,250,000 | 1,200,000 | 1,000,000 | 5 per cent. |
| | tens. str. | tens. str. | tens. str. | tens. str. | |
| Cold bend without fracture: | | | | | |
| Bars under 3/4 in. in diam. or thickness | 180° to diam. of 1t. | 180° to diam. of 1t. | 180° to diam. of 3t. | 180° to diam. of 4t. | 180° to diam. of 2t. |
| Bars 3/4 in. in diam. or thickness and over ... | 180° to diam. of 1t. | 180° to diam. of 2t. | 90° to diam. of 3t. | 90° to diam. of 4t. | 180° to diam. of 3t. |

t: Nominal thickness or diameter of bar. * The hard grade will be used only when specified.

EXHIBIT C-8 (*continued*):

117. Reinforcement bars shall be rolled from billets of new steel; they shall be straight and free from seams, flaws, cracks and imperfections of all kinds.

Tests and inspections.

10 118. The provisions of paragraphs 104, 105 and 107 relating to tests and inspections of structural steel shall also apply to tests and inspections of steel reinforcement bars.

119. Test pieces 18 inches long may be cut from any of the bars delivered on the work, and the failure of any test piece to meet the specified requirements, or the failure of any bar when being bent will be sufficient cause for the rejection of all steel from the melt from which the test piece or bar was made.

Bending sheets.

20 120. Bending sheets for steel reinforcement shall be furnished if required, in which case the reinforcement bars shall not be bent until such bending sheets have been approved.

Delivery and protection.

30 121. Bars shall be delivered in bundles, to each of which shall be securely wired a metal tag with the number of the melt from which the bars were made stamped thereon. The bars shall be protected at all times from mechanical injury and from the weather and when placed in the work they shall be free from dirt, scale-rust, paint and oil. Bars which are not to be embodied in concrete within a short time after being placed in the work shall, if directed, be immediately coated with a thin grout of equal parts of cement and sand.

Cutting and bending.

40 122. The bars shall be bent to the shapes shown on the plan and in conformity with approved templets. When bars are cut and bent on the work, the Contractor shall employ competent men and shall provide the necessary appliances for the purpose.

Placing.

123. All bars shall be as long as can be conveniently used, accurately bent, placed, spaced and jointed as shown or directed, and they shall be securely held in their required positions by approved devices until the concrete has been placed around them.

EXHIBIT C-8 (*continued*):

Joints.

10 124. Where more than one bar is necessary to complete the required length the joints shall be made by means of approved clamps which will develop the full strength of the bars or by looping the ends of the bars around each other in such a manner as to produce and maintain tension on the joint during construction or by lapping the ends of the bars, as directed, and wiring them together in an approved manner, or by lapping the ends of the bars for a distance of 30 times their nominal diameters for deformed bars, and 40 times their nominal diameters for plain bars, and with a space not less than 2 inches between them. Laps of longitudinal bars below the standard sewer sections shall be 6 inches in length unless otherwise shown on the plan or directed. Joints in longitudinal bars shall be staggered as directed.

20 Measurement.

30 125. The amount of steel reinforcement bars paid for as such will be the weight computed from the lengths and theoretical net sections of the steel reinforcement bars placed in the work in accordance with the plan or directions, except such steel reinforcement bars shown on the plan, as being part of structures for which there are contract prices, and the cost of which is hereinafter specified to be covered by the contract prices for such structures. The amount paid for will not include any waste metal cut from bars nor the lengths of bars used for laps, nor wires, clamps and other devices used for spacing, joining and securing the bars in place, nor lugs, corrugations and irregularities which increase the weight of the bars above the weight of plain steel bars of the same net cross sectional areas, the cost of all of which shall be covered by the contract price for steel reinforcement bars. In computing the weight 1 cubic foot of steel will be considered as weighing 489.6 pounds.

Price to cover.

40 126. The contract price for steel reinforcement bars shall cover the cost of all labor and materials required to furnish, clean, cut, bend, place, join, secure and protect the same, to furnish all test pieces and samples, and to prepare and furnish prints of bending sheets, all as specified.

EXHIBIT C-8 (*continued*):

WROUGHT IRON.

Quality.

10 132. Wrought iron shall be double rolled, tough, fibrous and uniform in quality. It shall be thoroughly welded in rolling and be free from surface defects. It shall have an ultimate tensile strength of at least 48,000 pounds per square inch, an elongation of at least 20 per cent. in 8 inches, and a fracture wholly fibrous. Specimens shall bend cold, with the fiber, through 180 degrees around a diameter equal to the thickness of the piece tested. When nicked and bent the fracture shall be at least 90 per cent. fibrous.

Galvanizing painting.

20 133. When required by the plan exposed wrought iron shall be thoroughly and uniformly galvanized. When not required to be galvanized exposed wrought iron shall be painted as specified in paragraph 109.

Measurement.

134. The cost of all wrought iron shall be covered by the contract price for the structure in connection with which it is used.

IRON CASTINGS.

Quality.

30 136. Iron castings shall be of the best foundry pig iron, gray, tough and free from cold shuts, blow holes and other imperfections. The weight shall be conspicuously painted by the manufacturer with white oil paint on each casting. The castings shall be sound, clean and neatly finished. Where required, castings shall be thoroughly coated with coal tar pitch varnish.

Cost covered.

40 137. The cost of all labor and materials required to furnish coat and place the castings as specified, shall be covered by the contract price for the structure or class of work in connection with which they are used.

TIMBER.

Quality.

138. All timber shall be merchantable pine or spruce, unless otherwise specified, and shall be sound and free from shakes.

EXHIBIT C-8 (*continued*):

cracks, large or loose knots, and other defects impairing its strength or durability. It shall be squared to the required dimensions throughout its entire length.

Placing.

10 139. Timber shall be placed where shown on the plan or directed, and where necessary shall be firmly spiked or bolted with approved nails, spikes or bolts of such sizes and lengths, and at such places and in such numbers as shown on the plan or as directed.

Measurement.

20 140. The amount of timber to be paid for as such will be all timber placed in the work in accordance with the plan or directions, except piles and timber sheeting, and except such timber shown on the plan as being part of structures for which there are contract prices, and the cost of which is hereinafter specified to be covered by the contract prices for such structures. The amount paid for will not include timber used for forms, templets, centres, scaffolds, bridges (unless otherwise specified), fences, guard rails or other temporary structures, the cost of all of which shall be covered by all the contract prices for all the items for which there are contract prices. No deduction will be made in the measurement of timber flooring on account of the spaces occupied by the piles.

30 Price to cover.

141. The contract price for timber shall cover the cost of all labor and materials required to furnish, work, place and secure the same as specified.

TIMBER SHEETING.

Quality, placing, etc.

40 142. Timber sheeting and the rangers and braces for the same shall be of a satisfactory quality of timber and of sufficient size and strength to adequately support the sides of the trenches and excavations. Sheeting shall be driven in such a manner as to avoid cracking and splitting, and if required for the proper prosecution of the work, shall be tongued and grooved.

EXHIBIT C-8 (continued) :

When paid for.

143. Timber sheeting will be paid for as such only when left in place by written order. When sheeting is left in, so much of it below the surface of the ground as may be directed shall be cut off.

10 Measurement.

144. The amount of timber sheeting to be paid for as such will be all timber sheeting, rangers and braces left in place by written order, and will not include sheeting, dangers and braces left in place without such order, not sheeting left in place because concrete is placed against it, nor that part of the sheeting that extended above the ground after having been driven, the cost of all of which shall be covered by all the contract prices for all the items for which there are contract prices. Inclined piling or planking at the bottom of a trench, if used to prevent the caving in of the excavation and in such a position that it cannot be drawn, shall be paid for at the price bid for sheet piling.

Price to cover.

145. The contract price for timber sheeting shall cover the cost of all labor and materials required to furnish, place and cut off the sheeting, rangers and braces as specified, and shall also cover the cost of all excavation necessary to place the same.

PILES.

30 Quality.

146. Piles shall be of white oak, spruce or yellow pine, sound and free from splits, shakes and other imperfections impairing their strength or durability. They shall be straight, taper uniformly from butt to point and if required shall be barked. Unless otherwise shown on the plan, they shall conform to the following dimensions :

Dimensions.

| 40 | Length Below Cutoff | Minimum Diameter at Point | Minimum Diameter at Cutoff |
|----|--------------------------|---------------------------|----------------------------|
| | Less than 20 feet | 6 inches | 10 inches |
| | 20 feet to 25 feet | 6 inches | 11 inches |
| | 26 feet to 35 feet | 6 inches | 12 inches |
| | 36 feet to 45 feet | 6 inches | 13 inches |
| | 46 feet and over | 6 inches | 14 inches |

EXHIBIT C-8 (continued) :

147. To determine the necessary length of piles to be used in the work, the Contractor may be required to drive test piles.

148. Each pile less than 60 feet long shall be in one piece; piles longer than 60 feet may be spliced in an approved manner. The small ends of piles shall be pointed, and, if required, shall be shod with approved iron shoes. The butt ends of piles shall be cut off square and protected with approved iron bands while driving.

How driven.

149. Piles shall be driven without the use of a follower, unless specially permitted. Pile heads that become split or broomed shall be cut off and the driving continued. Any pile which splits, breaks or drives unsatisfactorily will not be paid for, and it shall be withdrawn or abandoned and another driven in place of it. After being driven piles shall be accurately cut off at the required elevation.

Bearing pile.

150. Bearing piles shall be driven vertically and shall be spaced as shown on the plan or as directed. They shall be driven to a satisfactory refusal by a hammer having a concave face and weighing not less than 2,000 pounds nor more than 2,500 pounds. Refusal in general will be indicated by a penetration not exceeding 1 inch per blow under the last 6 blows of the hammer falling 15 feet. If steam hammer pile drivers are used, the piles shall be driven so that their bearing power shall be not less than that of piles driven as herein specified. When it is shown on the plan or specified that piles are to be driven to a certain required depth, they shall be driven if necessary, by the use of a water jet or by any other approved method.

Brace piles.

151. Where shown on the plan, brace, batter or spur piles shall be driven at the inclination shown or directed, to a satisfactory refusal, and the tops shall be framed, bolted or strapped to adjoining piles or to each other as shown on the plan, or directed.

Measurement.

152. The amount of piles to be paid for will be the total length below cutoff of all piles remaining in the work in accor-

EXHIBIT O-8 (*continued*) :

dance with the plan or directions, and the total length of all piles used only as test piles. Piles driven for temporary use will not be paid for.

Price to cover.

- 10 153. The contract price for piles shall cover the cost of all labor and materials required to furnish, drive and cut off the same as specified, of fastening brace piles, and of furnishing and placing all shoes, bands, bars, straps, bolts and other fastenings required.

CONCRETE SEWERS.

Inverts.

Brick lining.

- 20 154. Inverts of concrete sewers shall be formed between transverse templets and shall be screeded. The templets shall be placed at such intervals as to divide the invert into sections of suitable size for convenient construction, and unless otherwise permitted, the concrete shall be deposited in alternate sections and allowed to set before the remaining sections are built. Unless otherwise shown on the plan, a layer of mortar not less than 1/2-inch thick shall be spread evenly and to a smoothly finished surface upon the concrete of the invert as soon as such concrete is in place. Where the radii of inverts are too short to permit
30 screeding between templets, the inverts shall be shaped by means of suitable forms, which shall be removed as soon as the concrete has a sufficient set, and if required, the surfaces of inverts shall be floated or troweled to a smooth finish. The concrete for inverts shall be deposited continuously for their entire cross sections and for such longitudinal distances as may be convenient. Where shown on the plan, inverts shall be lined with brick masonry, tile or other material, which shall be laid at such times and in such manner as may be directed. Inverts shall be carefully
40 protected from all injury during progress of the work.

EXHIBIT C-8 (continued) :

TYPE "B"

SPECIFICATION FOR CEMENT CONCRETE PIPE WITH REINFORCED CEMENT.

General dimensions of pipes and minimum test load per lin. ft. of pipe.

10 154a. Reinforced cement concrete pipe used shall be circular in section with or without flat base and shall conform in dimensions as shown in table.

| | Size | Minimum thickness | Minimum length in feet | Minimum joint length inches | Minimum test load per lin ft. of pipe |
|----|------|-------------------|------------------------|-----------------------------|---------------------------------------|
| | 24" | 3 " | 4' | 3 " | 3350 Lbs. |
| | 27" | 3 1/2" | 4' | 3 " | 3700 " |
| 20 | 30" | 3 1/2" | 4' | 3 " | 4400 " |
| | 33" | 4 " | 4' | 3 " | 4600 " |
| | 36" | 4 " | 4' | 4 " | 4800 " |
| | 39" | 4 " | 4' | 4 " | 5200 " |
| | 42" | 4 1/2" | 4' | 5 1/2" | 5600 " |
| | 45" | 4 1/2" | 4' | 5 1/2" | 6100 " |
| | 49" | 5 " | 4' | 5 1/2" | 6600 " |
| | 51" | 5 " | 4' | 5 1/2" | 7050 " |
| | 54" | 5 1/2" | 4' | 5 1/2" | 7500 " |
| | 57" | 5 1/2" | 4' | 5 1/2" | 7750 " |
| 30 | 60" | 6 " | 4' | 5 1/2" | 8000 " |
| | 63" | 6 " | 4' | 5 1/2" | 8400 " |
| | 66" | 6 1/2" | 4' | 5 1/2" | 8800 " |
| | 72" | 7 " | 4' | 5 1/2" | 9400 " |
| | 78" | 8 " | 4' | 5 1/2" | 10400 " |
| | 84" | 8 " | 4' | 5 1/2" | 11200 " |
| | 90" | 8 1/2" | 4' | 5 1/2" | 12000 " |
| | 96" | 8 1/2" | 4' | 5 1/2" | 12800 " |
| | 102" | 9 " | 4' | 5 1/2" | 13600 " |
| | 108" | 9 " | 4' | 5 1/2" | 14400 " |

40 Testing pipe.

Reinforced concrete pipe shall not have less thickness of concrete, less length of pipe or joint than specified above, and two (2) pipes, for each size of sewer (reinforced concrete) shall be selected at random for a load test. These pipes shall be tested at the age of twenty-one (21) days and the total load specified

EXHIBIT C-8 (*continued*) :

per lineal foot shall be applied on the upper half of the sewer. The lower half of the pipe shall be supported in a cradle covering an arc 180 degrees. The pipe shall sustain these loads per lineal foot without hair-cracks of any kind whatsoever. Failure to fulfill the above requirements in the manner set forth will be sufficient cause for the rejection of the pipe. Testing of pipe shall be done by the contractor at his own expense and under the supervision and to the satisfaction of the Engineer-in-Charge of Engineering-Construction.

Material of pipe, cement, sand, stone or gravel.

Reinforced concrete pipe shall be constructed at the site of the work, in a shed if the weather requires, and the pipe shall be made by a manufacturer of established reputation, who shall have had previous experience in the manufacture of reinforced concrete pipe. The cement, sand, stone or gravel shall conform to the specifications of the Division of Sewers, Bureau of Engineering Construction. The forms shall be of steel and the reinforcing steel shall be held at all times against displacement in tamping. Concrete shall be an accurate 1 : 2 : 4 mix. Each pipe shall be stamped as made with date of manufacture.

Joints.

The pipe shall be of the bell and spigot type, the bell not to project beyond the body of the pipe, but to be flush with it. No pipe having a butt joint will be considered. No variation over one-half ($\frac{1}{2}$) per cent from the hereinbefore mentioned dimensions will be permitted.

Jointing.

All joints to be made of 1 : 2 Portland cement mortar. The mortar shall be thoroughly trowelled in the recess in the interior of the pipe up to the spring line making a continuous invert. After this has been done, steel forms especially designed for the purpose shall be placed over and around the entire joint, and the mortar for sealing the arch portion grouted or poured through an opening in the crown of the pipe. Joints must be water-tight.

Laying pipe.

No pipe not marked with date of manufacture shall be laid or accepted. No pipe shall be laid in the trench which has not been seasoned for twenty-one (21) days, unless otherwise speci-

EXHIBIT C-8 (*continued*):

fically ordered by the Engineer-in-Charge, Engineering-Construction.

Steel for reinforcement.

10 Reinforcing steel may be either expended metal deformed bars, or wire mesh, such as American Steel and Wire Company's reinforcing shall be at distances not less than one (1") inch from the surface.

Spurs.

Reinforced concrete pipe shall have openings to receive spur and branch connection wherever required by the plans. The openings shall be made in a manner satisfactory to the Engineer-in-Charge of Engineering-Construction.

Disposal of water from trenches.

20 The provisions of paragraph No. 12 of the specifications shall be in full force and effect even though reinforced concrete or Clinton Wire Cloth. For all sizes of reinforced concrete pipe, pipe shall be furnished on this contract.

Rejection of defective pipe.

Pipe damaged from handling or any cause whatsoever, whether in or out of the trench, shall be replaced, and removed from site of the work at the expense of the contractor.

30 Side walls.

155. Concrete in the side walls of sewers shall be deposited continuously to the height directed and for such longitudinal distances as may be convenient.

Roof.

40 156. Concrete in the roofs of sewers shall be deposited continuously for the full depths and widths of the roofs and for such longitudinal distances as may be convenient. The outer surfaces of roofs shall be finished with an excess of mortar and left true and smooth. They shall be covered and protected as specified in paragraph 78, and such covering shall remain thereon until the backfilling or embankment is placed.

EXHIBIT C-8 (*continued*):

Bulkheads.

157. While being deposited the concrete for sewers shall be confined by temporary, vertical bulkheads placed at such intervals longitudinally as may be required for convenient working. The bulkheads shall be so designed as to give an approved shape to the end of the section of concrete under construction, shall be satisfactorily secured in place before the concrete is deposited, and shall remain in place until the concrete has set sufficiently to hold its shape.

Reinforcement.

158. Where shown on the plan concrete sewers shall be reinforced with metal of the dimensions and shapes shown, and of the quality and in the manner hereinbefore specified.

Minimum length of invert.

159. Unless otherwise permitted or ordered, not less than 16 feet of foundation or invert for concrete sewer shall be built at one operation.

Connections.

160. Connections and branches for lateral sewers and receiving basins shall be built in where shown on the plan or where directed. Such connections and branches shall be closed with bulkheads of brick masonry 8 inches thick unless otherwise shown on the plan. All necessary openings and bulkheads for branch sewers shall be built in concrete sewers where shown on the plan or where directed.

Measurements.

161. The lengths of concrete sewers will be determined by horizontal measurements, along their centre lines. No deductions will be made on account of openings at branches and manholes. The measurement of a branch concrete sewer will be made from the inner surface of the wall of the main sewer through which it enters. A reducer will be paid for at the contract price for the sewer at the larger end thereof.

Prices to cover.

162. The contract prices for concrete sewers shall cover the cost of all necessary excavation (except rock); of furnishing, maintaining and removing all forms, centres, templets and tem-

EXHIBIT C-8 (*continued*) :

porary bulkheads; of all openings and bulkheads; of all back-filling; and of all labor and materials required to construct concrete sewers as shown by the normal sections on the plan and as specified.

VITRIFIED PIPE SEWERS.

10 Vitrified pipe.

168. Vitrified pipe sewers shall be built of shale or clay hub and spigot pipes with deep and wide sockets. They shall be thoroughly and perfectly burned, without warps, cracks or other imperfections, and shall be fully and smoothly salt-glazed over the entire inner and outer surfaces, except that the inside of the hub and the outside of the spigot may be unglazed for two-thirds the depth of the hub. On all other portions of the pipe the glazing shall completely cover and form an integral part of the pipe body. If not left unglazed the inside of the hub and the outside of the spigot shall be scored in 3 parallel lines extending completely around the circumference. When it is broken, vitrified pipe shall show dense and solid material, without serious cracks or laminations; it shall be of such toughness that it can be worked with a chisel and hammer, and when struck with a hammer, it shall have a metallic ring.

Identification marks.

169. Each pipe shall have clearly impressed on its outer surface the name of the manufacturer and of the factory in which it was made.

Shape and dimensions.

170. The sizes of the pipes are designated by their interior diameters. Each pipe shall be a cylinder with a circular section, and shall have a uniform thickness. The minimum lengths, thicknesses, depths of hubs and annular spaces for the respective sizes of pipe shall be as follows :

40

| Size | Length | Thickness | Depth of Socket | Annular Space |
|---------|--------|-----------|-----------------|---------------|
| 6..... | 2 feet | 5/8 inch | 2 1/2 inches | 5/8 inch |
| 8..... | 3 " | 3/4 " | 2 3/4 " | 5/8 " |
| 10..... | 3 " | 7/8 " | 2 3/4 " | 5/8 " |
| 12..... | 3 " | 1 " | 3 " | 5/8 " |
| 15..... | 3 " | 1 1/4 " | 3 " | 5/8 " |

EXHIBIT C-8 (continued) :

| | | | | | | | | | |
|----|---------|----|---|-------|--------|----|---|-----|---|
| | 18..... | 3 | “ | 1½ | “ | 3¼ | “ | 5/8 | “ |
| | 20..... | 3 | “ | 1 2/3 | “ | 3½ | “ | 5/8 | “ |
| | 22..... | 3 | “ | 1 5/6 | “ | 3¾ | “ | 5/8 | “ |
| | 24..... | 3 | “ | 2 | inches | 4 | “ | 5/8 | “ |
| | 27..... | 2½ | “ | 2¼ | “ | 4 | “ | ¾ | “ |
| | 30..... | 2½ | “ | 2½ | “ | 4 | “ | ¾ | “ |
| | 33..... | 2½ | “ | 2⅝ | “ | 5 | “ | 1¼ | “ |
| 10 | 36..... | 2½ | “ | 2¾ | “ | 5 | “ | 1¼ | “ |
| | 42..... | 2½ | “ | 3½ | “ | 5 | “ | 1¼ | “ |

Curves, bends, etc.

171. Where curved pipes are required they shall be furnished in either one-eighth or one-quarter bends of their respective sizes. Curved pipe, bends, siphons, and special pipe of the sizes and forms shown on the plan shall be furnished and laid, and unless otherwise provided they will be paid for at the contract prices for the corresponding sizes of vitrified pipe sewers.

Samples for testing.

172. Any or all of the following tests may be applied to samples selected from the pipe delivered on the work. For the purposes of making such tests as may be required the Contractor shall furnish and deliver when and where directed one length of pipe for each 200 feet of pipe sewer to be laid.

Crushing tests.

173. When supported at the bottom upon a knife edge one inch in width in such manner that an even bearing is provided throughout the whole length, exclusive of the bell, and pressure is applied at the crown uniformly through a similar knife edge, the various sizes of pipe shall withstand the following pressures:

| | Diameter | | Pressure | | |
|----|----------|-------|----------|------|--------------|
| | 6 inches | ..... | 900 | lbs. | per lin. ft. |
| | 8 | “ | 900 | “ | “ “ “ |
| 40 | 10 | “ | 1,000 | “ | “ “ “ |
| | 12 | “ | 1,050 | “ | “ “ “ |
| | 15 | “ | 1,250 | “ | “ “ “ |
| | 18 | “ | 1,400 | “ | “ “ “ |
| | 20 | “ | 1,550 | “ | “ “ “ |
| | 22 | “ | 1,750 | “ | “ “ “ |
| | 24 | “ | 1,950 | “ | “ “ “ |
| | 27 | “ | 2,150 | “ | “ “ “ |

EXHIBIT C-8 (continued) :

| | | | | | | | |
|----|---|-------|-------|---|---|---|---|
| 30 | “ | ..... | 2,350 | “ | “ | “ | “ |
| 33 | “ | ..... | 2,500 | “ | “ | “ | “ |
| 36 | “ | ..... | 2,800 | “ | “ | “ | “ |
| 42 | “ | ..... | 3,200 | “ | “ | “ | “ |

Drop weight test.

10 174. When supported on a dry sand bed 2 inches deep, all pipe shall withstand without cracking the impact from 2 blows of a cast iron ball weighing 8 pounds falling 18 inches. Spurs shall resist without fracture the impact from 2 blows of such a ball falling 6 inches and striking on the extreme end of the hub of the spur.

Hydrostatic test.

20 175. When subjected to an internal hydrostatic pressure of 8 pounds per square inch, vitrified pipe shall show no percolation.

Absorption test.

176. After having been thoroughly dried and then immersed in water for 24 hours, sample pieces of pipe with all broken edges shall not absorb more than 4 per cent. of their weight of water.

Factory rejection.

30 177. 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 where the materials used are such as produce inferior pipe, as indicated by repeated failure to comply with the tests herein specified.

Without cradle.

40 179. When the sewer is to be laid without a cradle the trench shall be excavated as specified in paragraph 18 and the earth forming the bed carefully freed of stones. The pipe shall then be evenly bedded therein and the backfilling placed and firmly tamped in such a manner as to avoid disturbing the sewer.

How laid.

182. All pipes shall be laid with ends abutting and true to line and grade. The pipes shall be fitted together and matched so that when laid in the work they will form a sewer with a

EXHIBIT C-8 (*continued*):

smooth and uniform invert. Unless otherwise permitted or directed, not less than 12 feet of pipe sewer shall be laid in one operation.

183. Unless otherwise shown on the plan, the joints of vitrified pipe sewers shall be made as hereinafter specified in paragraph 185.

10 Gasket and mortar joints.

185. Gasket and mortar joints shall be made in the following manner: A closely twisted hemp or oakum gasket of suitable diameter, in no case less than $\frac{3}{4}$ -inch, and in one piece of sufficient length to pass around the pipe and lap at the top, shall be solidly rammed into the annular space between the pipes with a suitable calking tool. Before being placed, the gasket shall, if desired, be saturated with neat cement grout. The remainder of the space shall then be completely filled with plastic mortar mixed 1 to $1\frac{1}{2}$, and the joint wiped inside and finished to a smooth level outside.

Inspection of joints.

186. Unless otherwise permitted, at least 4 finished joints shall be left exposed for inspection throughout the working day, and the necessary staging for the protection of the exposed sewers and for the handling of excavated material shall be provided. A suitable ladder affording easy access for such inspection shall be furnished at every trench open for the proposed sewer.

Subgrade to be tested.

187. No pipe shall be laid or placed until the subgrade of the trench shall have been tested and found correct.

Sewer to be kept clean.

188. The interior of the sewer shall, as the work progresses, be cleared of all dirt, cement and superfluous materials of every description.

Backfilling.

189. Immediately after the sewer is laid the trench shall be backfilled as provided in paragraphs 30 to 38 inclusive and 186. No walking on or working upon the completed sewer (except as may be necessary in tamping the backfilling) will be per-

EXHIBIT C-8 (*continued*):

mitted until the trench has been backfilled to a height of at least 2 feet over the top of the sewer.

Temporary covers.

190. The exposed ends of pipe sewers shall be provided with approved temporary covers fitted to the pipe so as to exclude earth and other materials.

10

Branch pipes.

191. Branch pipes and connection pipes shall be of the same quality and dimensions, and laid in the same manner as specified for vitrified pipe sewers. Dead ends of pipes shall be closed with bulkheads of brick masonry 8 inches in thickness.

Connection with existing work.

192. Wherever the proposed sewer is to connect with an existing manhole in which there is a branch pipe which is damaged or of unsuitable size or in improper position, such pipe shall be removed and be replaced with a pipe of suitable size or be reset in the proper position. The pipe so substituted or reset will be paid for at the contract price, for the corresponding size of pipe sewer.

20

Pipes cut to fit masonry.

193. The ends of pipes which enter masonry shall be neatly cut to fit the face of the masonry. When directed, such cutting shall be done before the pipes are built in.

30

Measurement.

194. The length of pipe sewers to be paid for will be determined by horizontal measurements along their center lines, and no deductions will be made on account of openings at manholes.

Prices to cover.

195. The contract prices for vitrified pipe sewers shall cover the cost of all necessary excavation (except rock); of all necessary trimmings fitting and building into masonry; of all bulkheads; of all backfilling; of all samples furnished; and of all labor and materials required to furnish and lay the sewers complete in place, as shown on the plan and as specified.

40

EXHIBIT C-8 (*continued*) :

BASIN CONNECTIONS.

206. The connections between receiving basins or inlet basins and sewers or manholes shall be of 12-inch vitrified pipe, unless otherwise shown on the plan. The pipes shall be of the same quality and dimensions, and laid in the same manner as hereinbefore specified for vitrified pipe sewers.

10 Measurement.

207. The lengths of basin connections to be paid for will be determined by measurements along their axes.

Prices to cover.

208. The contract price for basin connections shall cover the cost of all necessary excavation (except rock); of all necessary trimming, fitting and building into concrete, or masonry; of all backfilling; and of all labor and materials required to furnish and lay the basin connections complete in place as specified.

SPURS FOR HOUSE CONNECTIONS.

213. Spurs for house connections shall be of vitrified pipe 6 inches in diameter, equal in quality and dimensions to that specified for vitrified pipe sewers.

30 In concrete sewers.

214. In concrete sewers spurs shall be built in as shown on the plan or as directed. They shall be hub and spigot pipes with the spigot end molded or cut to fit flush with the inner surface of the sewer, and of sufficient length to reach the exterior of the sewer.

In pipe sewers.

40 215. Pipes having 6-inch spurs with hubs molded thereon shall be furnished and laid in pipe sewers where shown on the plan or directed. Such pipes will be paid for at the contract prices for vitrified pipe sewers, and the spurs will be paid for in addition at the contract price for spurs.

Covers.

216. The ends of all spurs not connected with drains shall be closed with approved covers. If required such covers shall be

EXHIBIT C-8 (*continued*):

cemented in place, and when directed the covers shall be so cemented in place, and when directed the covers shall be so cemented before the pipes are lowered into the trench.

Price to cover.

10. 217. The contract price for spurs shall cover the cost of all labor and materials required to furnish and place the same as specified, and the cost of furnishing and cementing the covers for the same.

DRAINS FOR HOUSE CONNECTIONS.

218. Where shown on the plan or where directed, drains for house connections shall be built from the spurs in such a manner and for such distance as may be shown or directed.

20 Depth at curb.

219. House connections drains shall be laid with a minimum gradient of $\frac{1}{4}$ inch to a foot, and wherever possible the depth from curb grade to the inner bottom of the drain at curb line shall be at least 8 feet.

Material.

- 30 220. Unless otherwise shown on the plan, drains for house connections shall be of vitrified pipe of the quality and dimensions specified for vitrified pipe sewers. The ends of the drains shall be closed with approved covers.

How laid.

221. All the requirements, as hereinbefore specified, relating to excavation, laying and backfilling of vitrified pipe sewers shall apply, as far as they are applicable, to drains for house connections.

Measurement.

- 40 222. The lengths of pipe drains for house connections to be paid for will be determined by measurement along their axes.

Price to cover.

223. The contract price for drains for house connections shall cover the cost of all necessary excavation (except rock); the cost of all backfilling; the cost of all covers, bends and specials

EXHIBIT C-8 (*continued*):

required; and the cost of all labor and materials required to furnish and lay the drains for house connections complete in place, as specified.

RISERS.

10 224. Where shown on the plan or where directed risers for house connections shall be built from the spurs in such a manner and to such height as may be shown or directed. Unless otherwise shown on the plan they shall be of vitrified pipe of the quality and dimensions hereinbefore specified for vitrified pipe sewers. They shall be supported and surrounded by concrete as shown, and each shall be closed with an approved cover.

Measurement.

20 225. The lengths of risers to be paid for will be determined by measurements along their axes.

Price to cover.

226. The contract price for risers shall cover the cost of all necessary excavation (except rock); the cost of all concrete used in connection with the risers; the cost of all backfilling; the cost of all covers, bends and specials required; and the cost of all labor and materials required to construct the risers complete in place, as specified.

MANHOLES.

30 227. The masonry or concrete for manholes shall be built to within 13 inches of the established grade of the street or to within such distances of the existing surface of the ground as directed.

Brick manholes.

40 228. Brick manholes shall be formed by means of templets placed at top and bottom with not less than 8 lines drawn between them, and they shall be smoothly and evenly plastered on the outside with a layer of mortar $\frac{1}{2}$ -inch thick. When manholes extend above the existing surface of the ground, the entire exposed surface shall be coated with 2 coats of whitewash.

Concrete manholes.

229. Concrete manholes shall be built of the materials, sizes and dimensions shown on the plan.

EXHIBIT C-8 (*continued*):

Steps.

230. Galvanized wrought iron steps of the size and shape shown on the plan shall be firmly built into the manholes at vertical intervals of about 16 inches.

Head and cover.

- 10 231. The manhole head and cover shall be of cast iron, and unless otherwise shown on the plan, each head, exclusive of cover, shall weigh not less than 475 pounds and each cover shall weigh not less than 135 pounds. The weight of each head and cover shall be conspicuously painted thereon by the manufacturer with white oil paint. The head shall be set on the masonry or concrete in a full bed of stiff mortar.

Price to cover.

- 20 233. The contract price for manholes shall cover the cost of all necessary excavation (except rock); of all backfilling; of all plastering; of all whitewashing; of all steps; and of all labor and materials required to construct the same complete, in place, as shown on the plan and specified.

RECEIVING BASINS.

Brick basins.

- 30 234. Brick receiving basins shall be formed by means of templets placed at top and bottom with not less than 10 vertical lines drawn between them. If required, the mouths of receiving basins shall be closed with bulkheads of brick masonry and such bulkheads shall be removed when directed.

235. Where the walls of brick receiving basins are not built of two rings of brickwork with a mortar layer between, the inside of the brickwork shall be smoothly and evenly plastered with a layer of mortar $\frac{1}{2}$ -inch thick.

- 40 236. Where the wall of the receiving basin consists of two rings of brickwork, with a mortar layer between, the outer ring shall be carried up not less than 1 foot in advance of the inner ring, and the inner surface of the former shall be plastered with two coats of mortar. The second coat of mortar shall be applied before the first is set, and the total thickness of the mortar layer shall be 1 inch.

EXHIBIT C-8 (*continued*):

Concrete basins.

237. Concrete receiving basins shall, if required, be built in such a manner that the bottom and sidewalks shall be formed in one continuous operation. Concrete basins shall be coated with a grout of neat cement on the inside.

10 Concrete heads.

238. Where concrete cover slabs of receiving basins or their inlets are built in or adjoin concrete sidewalks the new work shall be made to correspond in pattern and color with the existing sidewalk.

Steps.

239. When galvanized wrought iron steps are required by the plan they shall be firmly built into the receiving basins at vertical intervals of about 18 inches.

20 Trap.

240. An iron hood or trap, of the size and dimensions shown on the plan, must be furnished by the Contractor for each receiving basin, and is to be built into the basin as shown on the plan.

Pavement at inlet to receiving basins.

30 241. The pavements adjoining the inlets to receiving basins shall be restored and adjusted to the extent and in the manner directed, and in accordance with paragraphs 255 to 260 inclusive. In unpaved streets and in macadamized streets, where the inlets to the receiving basins are approximately at the surface of the street, a space of 2½ feet adjoining such inlets shall, if required, be paved with approved paving blocks.

Price to cover.

40 242. The contract price for receiving basins shall cover the cost of all necessary excavation (except rock); of all back-filling; of all pavement required at the inlets to the basins; of the temporary brick bulkheads in the mouths of the basins when required; and of all labor and materials required to construct the receiving basins complete in place, as shown on the plan and specified.

EXHIBIT C-8 (*continued*):

INLET BASINS.

243. Inlet basins and the heads and covers therefor shall be of the materials, forms and dimensions shown on the plan. If required, the mouths of inlet basins shall be closed with bulkheads of brick masonry and such bulkheads shall be removed when directed.

10

Price to cover.

244. The contract price for inlet basins shall cover the cost of all necessary excavation (except rock); of all backfilling; of the temporary brick bulkheads in the mouths of the inlet basins, when required; and of all labor and materials required to construct the inlet basins complete, in place as shown on the plan and specified.

EMBANKMENT.

20

Quality.

247. Where indicated on the plan, embankment shall be made of the form and dimensions shown. It shall consist of clean steam ashes or filling of the quality specified in paragraph 31, which shall contain no stone over 6 inches in its largest dimension. When the material forming the embankment contains stones, the latter shall be so distributed through the mass that all interstices are filled with fine material, and the material within 2 feet of the sewer shall be free of stones.

30

How made.

248. The embankment shall be deposited and spread in horizontal layers to such an extent and at such times as may be directed. If required, such portion of the embankment as may be deemed necessary shall be made prior to the construction of the sewer or its foundation and any excavation that may be necessary for the building of the sewer and its foundation shall be made therein.

40

Approaches.

249. Where the embankment obstructs or interferes in any way with any public or private roadway the Contractor shall furnish and place all material necessary to provide suitable approaches, of such widths and to such extent as shown on the plan or as directed.

EXHIBIT C-8 (*continued*) :

250. All embankments and approaches shall be maintained at their full dimensions until the completion of this contract.
Cost covered.

10 251. The cost of all labor and materials required to prepare the ground, to make the embankment and approaches as specified, to make all necessary excavations and backfilling therein, and to maintain the embankments and approaches at their designated dimensions until the completion of this contract, shall be covered by the contract price for fill for sewer embankment.

RESTORATION OF SURFACE AND CLEANING UP.

Restoration of unpaved roadways, sidewalks, etc.

20 254. At such time as may be directed, all unpaved roadways, gutters and sidewalks affected by the work done under this contract shall be restored by the Contractor to the same condition in which they were at the time of the opening of bids for this contract.

Pavements, etc., restored by Contractor.

30 256. If required by the plan, roadway and sidewalk pavements, cross-walks, curbs, etc., shall be satisfactorily constructed and adjusted by the Contractor at such times as may be directed. Sidewalk pavements shall be restored in whole flags, squares or sections which shall correspond in quality and appearance with the original or adjoining flags, squares or sections. All work and materials used in such restoration of sidewalk pavement and adjustment shall conform in all respects to the standard specifications now in use by the President for similar work and materials.

40 Owing to the impossibility of making a macadam mixture over the trench area bond with the old macadam in the street, a slab of concrete (according to specifications of Bureau of Highways) shall be placed over the trench area, overlapping the trench as described in the specifications of the Highway Bureau and on this shall be laid the granite block pavement.

SPECIFICATIONS FOR THE RESTORATION OF GRANITE BLOCK PAVEMENTS WITH SAND FILLED JOINTS.

The trench shall be excavated to sub-grade and if any unsuitable, soft, or spongy material is exposed, it shall be removed and replaced with enough good acceptable material to bring the trench to the proper grade after compacting. The earth in the

EXHIBIT C-8 (*continued*):

trench shall then be compacted by tamping or flushing, or both, as directed by the Engineer, until a firm surface is obtained parallel with the surface of the finished pavement.

10 Any loose or depressed parts of the old concrete foundation adjacent to the trench shall be removed, and the face of the old foundation shall be cut back so that the upper edge slants back about two (2) inches. After the faces of the old concrete have been thoroughly washed and cleaned, a new concrete foundation consisting of 1-3-6 mix shall be deposited in the trench to a thickness of six (6) inches. The stone or gravel, sand and cement used in this concrete shall comply with the specifications appertaining thereto.

This concrete foundation must remain undisturbed until sufficiently set and be protected from traffic for at least forty-eight (48) hours.

20 No concrete shall be laid when the temperature is below thirty-two (32) degrees F., or shall be laid on frozen ground, except with the written permission of the Engineer, and then only under his direction.

30 On his concrete foundation shall be laid a bed of clean, coarse, dry sand, to a depth of one (1) inch. On the sand bed, the granite blocks shall be laid, and care shall be taken that the same interlock and break joints with the blocks adjacent with the trench, making with the end joints a lap of at least three (3) inches. The joints shall not exceed one-half ($1/2$) inch in width and shall be practically uniform. The blocks shall be laid to the contour of the street, and if any blocks adjacent to the trench are depressed or too high, they shall be removed and re-laid so that the surface of the finished pavement follows the contour of the street.

40 As the blocks are laid, they shall be covered with clean, sharp sand that will pass a ten (10) mesh screen, free from gravel, loam or other impurities. This sand shall be raked or brushed until all the joints become filled therewith. The blocks shall be thoroughly rammed to a firm, unyielding, bed, to a uniform surface to conform to the grade and contour of the street.

The blocks shall be covered with a good and sufficient second coat of clean, sharp sand and shall immediately thereafter be thoroughly rammed until the work is made solid and secure and so on until the whole of the work shall have been completed.

EXHIBIT C-8 (continued):

No truck or vehicle shall be allowed to pass over it until the final ramming has been completed.

The old granite block may be used in the work and if it is necessary to furnish new blocks to complete the work, they shall comply with the specifications for new granite block.

10 The paving blocks shall be of medium grained granite, showing an even distribution of constituent minerals, shall be of uniform quality and texture without seams, scales or discolorations showing disintegration, free from an excess of mica or feldspar, and equal in every respect to the samples in the office of the Engineer of Highways. No out-crop, soft, brittle or laminated stone will be accepted. The blocks to have a crushing strength of not less than sixteen thousand (16,000) pounds per square inch.

20 The size of the blocks shall be as follows: Not less than seven (7) inches nor more than eleven (11) inches in length; not less than three and one-half ($3\frac{1}{2}$) nor more than four and one-half ($4\frac{1}{2}$) inches in width and five (5) inches in depth. A variation of one-quarter ($\frac{1}{4}$) of an inch each way will be allowed in the depth of the blocks. The blocks are to be rectangular, with tops and sides uniform in thickness, to lay closely and with a fair and true surface, free from bunches and so cut or dressed that they can be laid with joints not to exceed one half ($\frac{1}{2}$) inch in width approximately uniform. Over special constructions the blocks may be of dimensions other than above specified when approved by the Engineer. The stones from each quarry shall be piled and laid separately in different sections of the work, and in no case shall the stones from different quarries be mixed.

30

SPECIFICATIONS FOR THE RESTORATION OF WATER-BOUND MACADAM PAVEMENT.

40 After the grading has been completed a trench four (4) inches in depth shall be excavated to the width as shown on the plans, or as may be directed by the Engineer. The trench shall be in the center of the street as graded. The cross-section of the trench shall be parallel to the surface of the unfinished pavement which shall have a circular cross-section with a rise of one-half ($\frac{1}{2}$) inch per foot of width from the edge of the pavement to the center of the roadway. Any improper material disclosed shall be removed and suitable material substituted therefor. The trench shall be rolled to a firm even surface throughout its cross-section and length with a steam roller.

Upon the completion of the rolling the surface of the trench shall have the required cross-section at the depth below

EXHIBIT C-8 (*continued*) :

the finished surface as stated heretofore. The intention it that the trench shall be kept free from water. If injury is done to material in bottom of trench by reason of water getting into it such material must be replaced by suitable material which shall then be rolled.

10 The new broken stone shall be trap rock roughly cubical or pyramidal fragments hard, sound, durable and with sharp edges. It shall be free from dust, dirt, loam, disintegrated stone or foreign matter of any kind. Such of the old stone found in the old pavement complying with the above requirements may be used after it has been cleaned.

The stone shall be composed of what is known as commercial one and one-half ($1\frac{1}{2}$) inch stone complying with the following requirements:—

20 One and one-half ($1\frac{1}{2}$) inch broken stone shall be the product of the crusher that will pass through a screen having square or circular openings two and one-half ($2\frac{1}{2}$) inches in diameter and be retained on screen with square or circular openings one and one-half ($1\frac{1}{2}$) inch in diameter.

This stone shall be spread upon the road to a depth of five (5) inches loose measurements, after which it shall be thoroughly rolled and sand added as needed to within an inch of the top of the finished roadway.

30 Trap rock screenings, complying with the following specifications shall then be added to the depth of one (1) inch and sufficient water used to insure the fillings of the voids and the rolling shall be continued until all motion ceases in the mass.

40 All screenings shall be the product of the crusher that will pass through a screen having square or circular openings five-eighths ($\frac{5}{8}$) inch in diameter. Not less than twenty (20) nor more than thirty (30) per cent by weight shall pass a twenty (20) mesh sieve. Not more than fifteen (15) per cent by weight of stone dust shall pass a one hundred (100) mesh sieve. All excess sand or screenings shall be removed from the surface of the pavement.

All the rolling shall be done with a ten (10) for steam roller. All rolling shall begin at the sides of the road and continued toward the center. The space between the edges of the pavement and the gutter line or edge of the embankment shall have a slope of one (1) inch per foot, or as directed by the Engineer.

EXHIBIT C-8 (*continued*) :

Temporary restoration.

258. At such times as may be directed roadway and sidewalk pavements, crosswalks, curbs, etc., which have been removed, whether under guarantee or not, shall be temporarily restored by the Contractor to the satisfaction of the Engineer.

When new pavement is laid.

- 10 260. If pavement, sidewalks, crosswalks, curbs, etc., are laid where none existed at the time the bids for this contract were opened, the Contractor shall excavate and remove such portions of the pavements, sidewalks, crosswalks, curbs, etc., and their foundations as may be necessary for the prosecution of the work, but he will not be required to make a permanent restoration of them.

Trenches flooded.

- 20 261. Before laying any pavements, sidewalks, crosswalks, curbs, etc., the trenches shall, if required, be flooded with water, as directed, and all resulting holes or depressions shall be filled and tamped solid.

Unnecessary cross gutters.

262. All cross gutters rendered unnecessary by the work under this contract shall be removed and the entire street intersection or so much thereof as may be necessary shall be regraded and repaved as herein specified.

- 30 Cleaning up.

263. At such times as may be directed the Contractor shall remove from the streets, all materials which were placed thereon by him as a consequence of performing this work and which are not required by the contract to be left as part of the finished work. The entire work and portions of the streets affected thereby shall be left in a satisfactory condition. The sidewalks and crosswalks shall be swept clean of all material which may have come thereon by reason of the work under this contract, and if required, they shall be sprinkled with water during the
40 sweeping.

Cost to be covered.

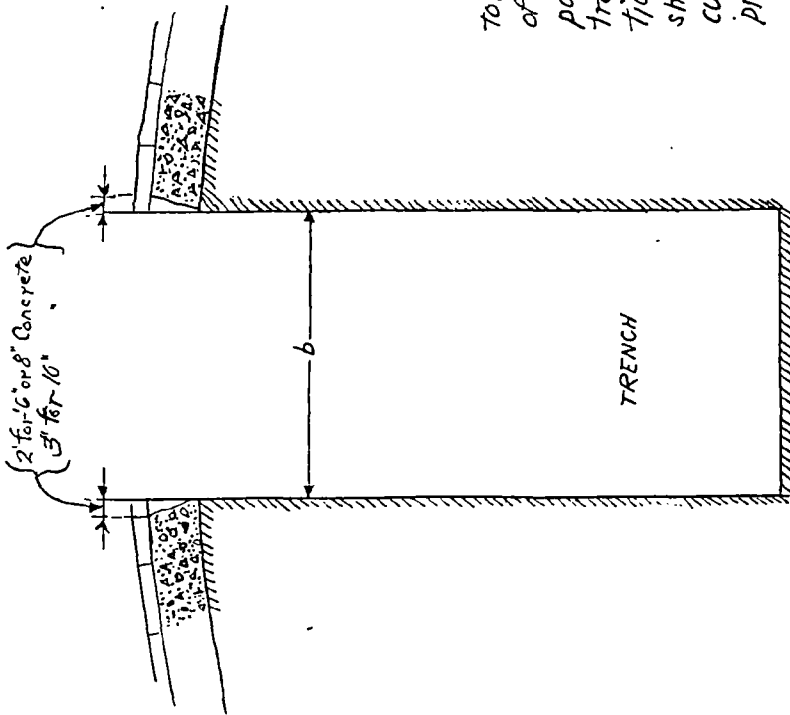
264. The cost of all the labor required to be done and all the materials required to be furnished in the performance of all the work specified in paragraphs 254 to 263 inclusive, shall be covered by all the contract prices for all the items for which there are contract prices.

EXHIBIT C-8 (continued):

CITY OF NEW YORK
OFFICE OF THE PRESIDENT, BOROUGH OF QUEENS
BUREAU OF HIGHWAYS

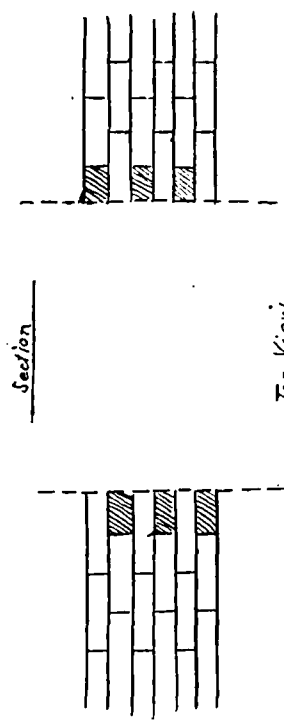
SKETCH SHOWING
 YARDAGE TO BE COMPUTED FOR RESTORING DIFFERENT
 CLASSES OF PAVEMENT OVER SEWER TRENCHES

JAN. 18TH 1916.



The figures below are the minimum dimensions to be added to the width "b" of the sewer trench when computing the amount of deposit required from the sewer contractor to pay for the repaving of the area disturbed by him, except when the sides of the trench have settled during construction, or where the foundation has been injured, in which amount of settlement of injury shall be added thereto; or where creeping of pavement has occurred, when an adequate amount shall be added to obtain proper bond with adjacent pavement

| | |
|---------------------|-------------------------------------|
| Brick - | 8 1/2 inches each side = 17 inches. |
| Wood Block | 8 " " = 16 " |
| Asph " | 12 " " = 24 " |
| Gran " | 9 " " = 18 " |
| Sheet Asphalt | 6 " " = 12 " |
| Bituminous Concrete | 6 " " = 12 " |
| Water Bound Macadam | 6 " " = 12 " |



Top View
 Not Drawn to Scale

J. J. Rice ENGINEER OF HIGHWAYS
 ENGINEER IN CHARGE - ENGINEERING CONSTRUCTION.

EXHIBIT C-28:

EXHIBIT C-28.

(Contract between Joseph L. Sigretto and The City of New York for construction of sewers and appurtenances in McComb Place (Wyckoff Avenue) from Central Avenue to Myrtle Avenue, Ridgewood Place from Central Avenue to Copeland Avenue, and in Copeland Avenue from Ridgewood Place to McComb Place, Second Ward of the Borough of Queens.)

THE CITY OF NEW YORK—DEPARTMENT OF FINANCE

Office of the Comptroller

CONTRACT SUMMARY

Contractor: JOSEPH L. SIGRETTO & CO. No. 47341

20 Names of Sureties: National Surety Co.

Amount of Bond: \$4800.00

Date of award: Apr. 10, 1917 Department: President, Borough of Queens; Date of contract: Apr. 23, 1917; Borough: Queens; Date of expiration: 60 days; Date of filing: Apr. 13, 1917; Damages: \$10.00 per day; Date paid in full: 5/9/18.

DESCRIPTION OF WORK

30 For the construction of a sewer and appurtenances in McComb Place, etc.

Original Estimate, \$12,219.36

R. E. 24.76

\$12,194.60

ACCOUNTS TO BE CHARGED

CFM 25

40 The obligation on this surety bond ceases as to anything occurring after March 19, 1918.

If the conditions of the contract have been complied with, the retained percentage (if any) is due on or after March 19, 1918.

GEO. W. MARTIN.

EXHIBIT C-28 (continued) :

PAYMENTS, AMOUNTS RETAINED AND EARNED

| | Date | ... % Payments | Amount paid to date | Amount retained to date | Amount earned to date |
|----|---------|----------------|---------------------|-------------------------|-----------------------|
| | | 2,208.30 | 2,208.30 | 389.70 | 2,598.00 |
| 10 | | 2,805.64 | 5,013.94 | 884.81 | 5,898.75 |
| | 8/ 9/17 | 3,197.70 | 8,211.64 | 1,449.11 | 9,660.75 |
| | 9/20/17 | 3,758.32 | 11,969.96 | 224.64 | 12,194.60 |
| | 4/23/18 | 224.64 | 12,194.60 | | 12,194.60 |
| | | <hr/> | | | |
| | | 12,194.60 | | | |

IN FULL

20

THE CITY OF NEW YORK

Department of Finance

Bureau of Audit—Division of Disbursements

Municipal Building Room 631

\$224.64

New York, 5/9/18.

30 Received from CHARLES L. CRAIG, Comptroller, Warrant No. 61894, for the sum of Two hundred twenty four 64/100 Dollars, on account of the within Contract numbered 47341, for and in full of repairing security on contract.

Mailed May 9, 1918.

R. O'CONNOR.

40

EXHIBIT C-28 (*continued*) :

THE CITY OF NEW YORK

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

10 Mason O. Smedley
Borough Secretary

Hugh Hall
Secretary to President

Long Island City, May 5, 1917.

Hon. William A. Prendergast, Comptroller,
Department of Finance, City of New York,
20 Municipal Building, Borough of Manhattan.

Sir:—

Referring to contract No. 47341;—

30 “For the construction of a sewer and appurtenances
in McCOMB PLACE (Wyckoff Avenue) from Central
Avenue to Myrtle Avenue; RIDGEWOOD PLACE from
Central Avenue to Copeland Avenue, and in COPELAND
AVENUE from Ridgewood Place to McComb Place, Second
Ward, Borough of Queens.”

I beg to inform you that the contractor, Joseph L. Sigretto
& Co., 1455 Woodhaven Avenue, Woodhaven, N. Y., have been
ordered to commence the work embraced in said contract on May
21, 1917, or before five days from the receipt of his notice.

Yours very truly,

WPB-PJH

.....
Acting President of the Borough of Queens.

40

EXHIBIT C-28 (*continued*):

Contract No. 47341

(To be filled in by the Dept. of Finance)

The City of New York

ADVICE OF AWARD OF CONTRACT

(This copy to be retained by Bookkeeping Division,
Department of Finance)

10 Dep't of President, Borough of Queens

*Date April 10, 1917.

Comptroller of The City of New York:

Please take notice that the following described contract has this day * been awarded to Contractor Joseph L. Sigretto & Company, Address 1455 Woodhaven Avenue, Woodhaven, L. I.

SURETIES

AMT. OF BONDS

National Surety Company, 115 Broadway
15856

\$4800.00

20

DETAILS OF PURPOSE OF CONTRACT

For the construction of a sewer and appurtenances in McComb Place (Wyckoff Avenue) from Central Avenue to Myrtle Avenue; Ridgewood Place from Central Avenue to Copeland Avenue, and in Copeland Avenue from Ridgewood Place to McComb Place, Second Ward.

| Contract Chargeable to Code No. | Estimated Amount | Contracts Previously Awarded (Including Adjustments) | Open Market Orders Issued To Date (Including Adjustments) | Misc. Vouchers, Payrolls, and Other Charges |
|---------------------------------|------------------|--|---|---|
| 30 CFM 25 | 12,219.36 | 1,545,789.87 | 28,091.52 | 89,685.23 |

Enter full titles of accounts below and refer to code numbers by means of line numbers in margins.

Street Improvement Fund.

The within expense is properly payable from the fund or funds shown hereon.

JAS. P. McINERNEY,

4/12/17

Auditor of Accounts.

40

Yours respectfully,

MAURICE E. CONNOLLY,

President, Borough of Queens.

Head of Dept.

* This will be the date of the entry by which the fund is charged with the estimated amount of the contract both in the department making the award and by the Department of Finance. There must therefore be no delay in forwarding this advice.

EXHIBIT C-28 (*continued*):

CORPORATION.

General Release.

To all to whom these Presents shall come or may concern,
Greeting:

KNOW DE, That JOSEPH L. SIGRETTO & CO., for and
10 in consideration of the sum of THREE THOUSAND, SEVEN
HUNDRED AND FIFTY EIGHT 32/100 Dollars, lawful money
of the United States of America, to it paid by The City of
New York, the receipt of which is hereby acknowledged, have
remised, released and forever discharged, and by these presents
does for itself, its successors and assigns, remise, release and for-
ever discharge the said The City of New York, their successors
and assigns, of and from all and all manner of action and actions.
cause and causes of action, suits, debts, dues, sums of money, ac-
20 counts, reckonings, bonds, bills, specialties, covenants, contracts,
controversies, agreements, promises, variances, trespasses, dam-
ages, judgments, extents, executions, claims and demands what-
soever in law or in equity, which against them it ever had, now
has or which it or its successors or assigns hereafter can, shall
or may have, for, upon or by reason of a certain contract or agree-
ment made the 23rd day of April, A. D. 1917, by and between
JOSEPH L. SIGRETTO & CO., and the said The City of New
York for Contract No. 47341, Sewer, McComb Place, &c., or by
reason of any matter, cause or thing whatsoever resulting or aris-
30 ing therefrom from the beginning of the world to the day of the
date of these presents, excepting the sum of \$224.64 retained as
repairing security.

IN WITNESS WHEREOF, JOS. L. SIGRETTO & CO.,
has caused its corporate seal to be affixed hereto and its cor-
porate name to be signed to these presents by its President this
24th day of October, in the year one thousand, nine hundred and
seventeen.

Sealed and delivered in the presence of
40 WM. F. HEFFERNAN.

JOSEPH L. SIGRETTO & CO.,

(Signed) Joseph L. Sigretto.

Seal—1909

President.

Original delivered to Chief Auditor.

J. C.

EXHIBIT C-28 (*continued*) :

State of New York,
County of New York, ss.:
City of New York,

10 On this 24th day of October 1917, before me personally came JOSEPH L. SIGRETTO, to me known, who being by me duly sworn, did depose and say that he resided in Queens, L. I., that he is the President of the Joseph L. Sigretto & Co., the Corporation described in and which executed the above instrument, that he knew the seal of said Corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

(Signed) WM. F. HEFFERNAN.
Com. of Deeds, N. Y. City
N. Y. Co. Clerks No. 22, Expires Jan. 25, 1918.

20

NOTICE.—Bidders are particularly requested to carefully examine the Proposal for Bids, Form of Agreement, Specifications, Plan and the location of the work and the surroundings thereof before bidding.

No.....

THE CITY OF NEW YORK
Office of
THE PRESIDENT OF THE BOROUGH OF QUEENS

30

BUREAU OF SEWERS
1917

ASSESSMENT WORK

40 Proposal for Bids, Bid, Bond, Agreement and Specifications for Constructing Sewers and Appurtenances in
McCOMB PLACE (Wyckoff Avenue) from Central Avenue to Myrtle Avenue;
RIDGEWOOD PLACE from Central Avenue to Copeland Avenue, and in
COPELAND AVENUE from Ridgewood Place to McComb Place,
Second Ward of the Borough of Queens,
together with all the work incidental thereto.

EXHIBIT C-28 (*continued*) :

THE CITY OF NEW YORK

Office of

PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

10 Mason O. Smedley
Borough Secretary

Hugh Hall
Secretary to President

Long Island City, September 17, 1917.

Hon. William A. Prendergast, Comptroller,
City of New York.

20 Sir:—

Referring to contract No. 47341;—

“For constructing a sewer and appurtenances in McCOMB PLACE from Central Ave. to Myrtle Ave., RIDGEWOOD PLACE from Central Ave. to Copeland Ave., and in COPELAND AVENUE from Ridgewood Place to McComb Place, 2nd Ward, Borough of Queens.”

30 I beg to inform you that in accordance with the recommendation of the Engineer in Charge, Engineering-Construction, and the Engineer of Sewers, this Department, I have this day granted an extension of twenty-five and $\frac{1}{4}$ days time to the contractor, Joseph L. Sigretto & Co., 1455 Woodhaven Avenue, Woodhaven, N. Y., in which to complete the work in connection with this contract.

40 The contractor was delayed on this work by not being able to obtain the necessary material, when ordered, and also by the scarcity of labor.

Yours very truly,

WPB-PJH

.....
Acting President of the Borough of Queens.

EXHIBIT C-28 (continued):

NATIONAL SURETY COMPANY

Capital and Surplus over \$6,000,000.00

LWF-mr

115 Broadway

Address reply to

10

CONTRACT DEPARTMENT

Howard Abrahams, vice president
Joseph R. Wells, vice president
Robert C. Carson, assistant secretary
Frank T. Gilson, supt. of western division

New York, April 13th, 1917.

Hon. William A. Prendergast,
Comptroller.

20

SIR:

Joseph L. Sigretto, has been awarded a contract by the Department of President of the Borough of Queens, for the construction of a sewer and appurtenances in McComb Pl., from Central Ave. to Myrtle Ave., et al, Borough of Queens, and he has requested this company to prepare the surety bond in the sum of \$4800.00.

30

We desire to furnish the bond as requested subject to your approval as to its adequacy and sufficiency.

Respectfully yours,

FRANK T. GILSON,
Resident Vice-President.

Department of Queens

40

The adequacy and sufficiency of the above bond is herein approved and the NATIONAL SURETY COMPANY, may now be notified to execute the surety bond and attach it to the contract.

This letter of approval should be affixed to part of the original contract to be hereafter filed in the Department of Finance.

ETC-JM Apr. 16 1917

.....
Deputy and Acting Comptroller.

EXHIBIT C-28 (continued) :

Time for presenting bids.

1. *Sealed bids* for the above-entitled work will be received at the office of the President of the Borough of Queens, Long Island City, in The City of New York, until 11 o'clock A. M., on WEDNESDAY APRIL 4th, 1917.

10 Time allowed for completion.

2. The time allowed for the full completion of the work herein described will be SIXTY (60) CONSECUTIVE WORKING DAYS.

Security required.

3. The amount of security required will be FOUR THOUSAND EIGHT HUNDRED 00/100 Dollars (\$4800 00/100).

20 Bidders referred to form of agreement, etc.

4. Bidders are referred to the form of agreement, to the specifications and to the plan and drawings of Standard Details on file at the office of the President, and to the following Engineer's estimate of the quantity and kind of work required, the items whereof in all cases include all materials and labor necessary to fully complete said work. Prices for each item shall be named, upon the sum total of which the comparison and tests of bids will be made.

30 Engineer's estimate.

640 Linear Feet 2'-3" Plain Concrete Sewer

509 Linear Feet 22" Vitrified Pipe Sewer

37 Linear Feet 22" Vitrified Pipe Sewer, including concrete cradle.

645 Linear Feet 15" Vitrified Pipe Sewer

201 Linear Feet 12" Vitrified Pipe Sewer

17 Manholes, Complete

2 Basin Manholes, Complete

2 Inlets, Complete

40 80 Linear Feet 12" Vitrified Pipe for Basin Connections

35 Linear Feet 10" Vitrified Pipe for Basin Connections.

38 Six-inch Spurs, 24" long, on Concrete Sewer

35 Six-inch Spurs, on 22" Vitrified Pipe Sewer

37 Six-inch Spurs, on 15" Vitrified Pipe Sewer

16 Six-inch Spurs, on 12" Vitrified Pipe Sewer

862 Linear Feet 6" Vitrified Pipe for House Connection Drains

1 Junction Chamber at Ridgewood Pl. & Central Ave.

EXHIBIT C-28 (*continued*) :

Personal examination of work.

10 5. The foregoing Engineer's Estimate is *approximate only* and is not to be considered as a binding feature of the contract. Bidders are required to submit their bids upon the following express conditions which apply to and become a part of every bid received. Bidders must satisfy themselves by personal examination of the location of the proposed work and surroundings thereof, and by such other means as they may prefer as to the accuracy of the foregoing estimate, and shall not at any time after submission of their bids, dispute or complain of such estimate of the engineer, nor assert that there was any misunderstanding in regard to the quantity or kind of materials to be furnished or work to be done.

Prices to be stated in writing and in figures.

20 6. Any bid which fails to name a price, written both in words and in figures, per unit of measurement for each of the items for which quantities are given, will be held to be informal and will be rejected. In case of any discrepancy between the price in words and that in figures, the price in words will be considered as the bid.

Prices bid to cover.

30 7. The prices bid must cover the cost of furnishing *all necessary materials and labor for and the complete performance of all the work* set forth in this proposal, described in the form of agreement and specification annexed hereto, and indicated by the plan of the work on file in the office of the President, to all of which information the bidders are referred.

Rock excavation.

8. The attention of the bidders is particularly directed to the specifications relating to rock excavation.

Bids may be rejected.

40 9. Permission will not be given for the withdrawal of any bid and the right is expressly reserved by the President to reject all bids if he shall deem it to the public interest so to do. No bid will be accepted from, or contract awarded to, any person who is in arrears to The City of New York upon debt or contract or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

EXHIBIT C-28 (*continued*):

Times and places for commencing and prosecuting work to be determined by the President.

10 10. Bidders are especially notified that the President reserves the right to determine the times and places for commencing and prosecuting the work, and that postponement or delay on the whole, or any part thereof, occasioned by the precedence of other contracts, which may be either let or executed before the opening of the bids for this work, can constitute no claim for damages nor for a reduction of the damages fixed for delay in completing the work beyond the time allowed.

No extra compensation.

20 11. The Contractor will be required to complete the entire work to the satisfaction of the President and in accordance with the agreement, the specifications and the plan of the work. No extra compensation beyond the amount payable for the several classes of work hereinbefore enumerated, which shall be actually furnished and performed at the prices bid therefor by the bidder to whom the contract is awarded, shall be due or payable for the entire materials and work.

Deposit to accompany bid.

30 12. No bid will be received or considered unless accompanied by either a certified check upon one of the National or State Banks of The City of New York, drawn to the order of the Comptroller, or money or corporate stock or certificate of indebtedness of any nature issued by The City of New York, which the Comptroller shall approve as of equal value with the security required, to an amount of five per centum of the amount of the bond required for the faithful performance of the contract (as provided by section 420 of The Greater New York Charter, as amended). Such check or money or other form of security must not be inclosed in the sealed envelope containing the bid, but must be handed to the officer or clerk who has charge of the bidding, and no bid can be deposited in the box provided for that purpose until such check or money or other form of security has been examined by said officer or clerk and found to be correct. All such deposits, except those of the lowest three bidders, will be returned to the persons making the same within ten days after the opening of the bids; within three days after the awarding of the contract, the remaining deposits, except that made by the bidder whose bid has been accepted, will be returned to the persons making the same. If the successful bidder shall refuse or

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EXHIBIT C-28 (*continued*) :

neglect to execute the contract within five days after notice that it has been awarded to him, and that the adequacy and sufficiency of the security offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York, but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

10 Names of persons interested.

13. Bidders are required to state in their bids, under oath, their names and places of residence or business, the names of all persons interested with them therein, and if no other person be so interested, they shall distinctly state that fact; also, that it is made without any connection with any other person making any bid for the same purpose, and that it is in all respects fair and without collusion or fraud; and that no member of the Board of Aldermen, head of a department, chief of a bureau, deputy thereof or clerk therein or officer or employee of The City of New York, is, shall be or become interested, directly or indirectly, as contracting party, partner, stockholder, surety or otherwise, in or in the performance of the contract or in the material, work or business to which it relates, or in any portion of the profits thereof. Bidders must verify by oath, in writing, the several matters stated in their bids.

Sealed bids to be submitted.

30 14. Each bid must be delivered in a sealed envelope, endorsed with the *title* given above of the work for which the bid is made, with the name of the bidder, and the date of presentation to the President at his office, on or before the date and hour hereinbefore named, at which time and place the bids received will be publicly opened by the President and read and the award of the contract made according to law as soon thereafter as practicable. The person or persons to whom the contract may be awarded will be required to attend at said office with the sureties offered by him or them and execute the contract within five days from the date of the service of a notice to the effect that the contract has been so awarded and the surety accepted; and in case of failure or neglect so to do he or they will be considered as having abandoned the contract and as being in default to the City.

EXHIBIT C-28 (*continued*) :

Bidders shall use blank forms to be furnished by the President.

15. Bidders shall make their bids upon the forms prepared by the President, a copy of which with the proper envelope in which to enclose the same can be obtained upon application therefor at the office of the President, Long Island City, where the plan can be seen, as also the form of contract, including the specifications in the form approved by the Corporation Counsel.

MAURICE E. CONNOLLY,
President of the Borough of Queens.

The City of New York,....., 191

20

THE CITY OF NEW YORK
OFFICE OF THE PRESIDENT OF THE BOROUGH
OF QUEENS
BUREAU OF SEWERS
CONTRACT FOR

- the construction of a sewer and appurtenances in
McCOMB PLACE (Wyckoff Avenue) from Central Avenue to
Myrtle Avenue;
RIDGEWOOD PLACE from Central Avenue to Copeland Avenue and in
COPELAND AVENUE from Ridgewood Place to McComb Place,
Second Ward of the Borough of Queens.

together with all the work incidental thereto.

Parties.

- THIS AGREEMENT, made and entered into this 23rd day of April, in the year one thousand nine hundred and seventeen by and between The City of New York, party of the first part, by the President of the Borough of Queens, and Joseph L. Sigretto & Co., 1455 Woodhaven Avenue, Woodhaven, L. I., Contractor, party of the second part, pursuant to the provisions of The Greater New York Charter, and the resolution of The Board of Estimate and Apportionment adopted on the 24th day of November, 1916, of which resolution the following is a copy:

EXHIBIT C-28 (*continued*):

BOARD OF ESTIMATE and APPORTIONMENT

CITY OF NEW YORK

(Cal. No. 92)

10 A copy of a resolution of the Local Board of the Newtown District, duly adopted by said Board on the 2nd day of June, 1916, and approved by the President of the Borough of Queens on the 26th day of October, 1916, having been transmitted to the Board of Estimate and Apportionment, as follows, to wit:

“RESOLVED, That this Board does hereby initiate proceedings for the said local improvement, to wit:

20 For the construction of a sewer and appurtenances in McComb Place (Wyckoff Avenue) from Central Avenue to Myrtle Avenue, Ridgewood Place from Central Avenue to Copeland Avenue, and in Copeland Avenue, from Ridgewood Place to McComb Place, Second Ward of the Borough of Queens,”

and thereupon, on the 24th day of November, resolutions having been adopted by the Board of Estimate and Apportionment authorizing the President of the Borough of Queens to prepare the necessary plans, specifications and an estimate of the cost of the proposed improvement based on actual survey and further resolving that the Board of Estimate and Apportionment will consider the authorization of the construction of the proposed improvement after the President of the Borough of Queens has submitted certain statements as provided in the said resolution, and the said resolution having been duly complied with by the President of the Borough of Queens, as appears by papers and documents on the files of the Board of Estimate and Apportionment, and there having been presented to the Board of Estimate and Apportionment an estimate in writing in such details as the Board has directed, that the cost of the proposed work or improvement, together with the preliminary expenses will be the sum of \$10,900; and a statement of the assessed value according to the last preceding tax roll of the real estate included within the probable area of assessment, to wit, the sum of \$218,950. having also been presented, it is

40 RESOLVED, That the said resolution of the Local Board be and the same is hereby approved and the construction of the local improvement therein provided for is hereby authorized. This Board does hereby determine that no portion of the cost and expense thereof shall be borne and paid by The City of New

EXHIBIT C-28 (*continued*):

York, but that the whole of such cost and expense, including the aforesaid preliminary expenses, shall be assessed upon the property deemed to be benefited by the said local improvement.

I hereby certify that the foregoing is a true copy of a resolution adopted by the Board of Estimate and Apportionment at a meeting of said Board held on March 2, 1917.

10 Dated, New York, March 5, 1917.

(Signed) JAMES MATTHEWS,
Assistant Secretary,
JCD. Board of Estimate and Apportionment.

RESOLUTION

BOARD OF ESTIMATE AND APPORTIONMENT

20 City of New York

(Cal. No. 94)

WHEREAS, The President of the Borough of Queens has transmitted to the Board of Estimate and Apportionment a copy of a resolution of the Local Board of the Newton District, duly adopted by said Board on the 22nd day of June 1916, and approved by the President of the Borough of Queens on the 26th day of October, 1916, as follows, to wit:

30 "RESOLVED, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For the construction of a sewer and appurtenances in McComb Place (Wyckoff Avenue) from Central Avenue to Myrtle Avenue, Ridgewood Place from Central Avenue to Copeland Avenue, and in Copeland Avenue, from Ridgewood Place to McComb Place, Second Ward of the Borough of Queens,"

40 and which resolution is accompanied with an approximate estimate of the cost of work and the assessed value of the property benefited.

RESOLVED, That the Board of Estimate and Apportionment hereby authorizes the President of the Borough of Queens to prepare plans, specifications and an estimate of cost based on actual survey, and also to secure a determination of the boundary of the district of assessment; the entire expense of the work done

EXHIBIT C-28 (*continued*):

subsequent to the date of this authorization to be charged against the Street Improvement Fund and later included in the assessment.

10 RESOLVED, That the Board of Estimate and Apportionment will consider the authorization of the construction of the said proposed improvement after the President of the Borough
of Queens has submitted a statement showing that all of the above described work has been done, that he has secured the approval
of the form of contract by the Corporation Counsel, that he is prepared to place the improvement under contract as soon as he
receives the consent of the Board, and that the assessment map will be completed on or before the date of payment on acceptance;
this report being accompanied by a further statement showing the quantity of work to be performed under each item and the
unit price thereof, the expense incurred for preliminary work, the allowance to be made for additional engineering and contingencies,
20 the total probable cost, and the number of working days to be allowed the contractor for carrying out the work.

I hereby certify that the foregoing is a true copy of a resolution adopted by the Board of Estimate and Apportionment at a meeting of said Board held on November 24, 1916.

Dated, New York, November 27, 1916.

(Signed) JAMES MATTHEWS,
Assistant Secretary,
30 JCD. Board of Estimate and Apportionment.

Covenant.

40 WITNESSETH, That the parties to these presents, each in consideration of the agreements on the part of the other herein contained, have mutually agreed, and hereby mutually agree, the party of the first part for itself and its successors, and the party of the second part for itself, himself, or themselves, and its, his or their executors, administrators, successors, and assigns, as follows:

Contract.

I. The contract for the hereinbefore entitled work shall include the following, which are hereby agreed upon as forming part and parcel thereof: the Proposal for Bids, the Bid, the Bond,

EXHIBIT C-28 (*continued*):

this Agreement and the Specifications hereto annexed; also the Plan of the Work dated Feb. 7, 1917, filed in the office of the President of the Borough, entitled: Plan, Profile and Details for the construction of a sewer in

- McCOMB PLACE (Wyckoff Ave.) from Central Avenue to Myrtle Avenue;
10 RIDGEWOOD PLACE from Central Avenue to Copeland Avenue, and in
COPELAND AVENUE from Ridgewood Place to McComb Place, Second Ward of the Borough of Queens.

and also the Drawings of Standard Details pertinent thereto on file in the office of the Engineer.

Party of the first part.

- 20 II. Whenever the term "The City" or a word "President," or a pronoun in place of either, is used, it refers to and means The City of New York, the party of the first part hereto, or the President of the Borough of Queens, or his authorized representative.

Party of the second part.

Whenever the word "Contractor," or a pronoun in place thereof, is used, it refers to and means the party of the second part hereto.

- 30 Engineer described.

III. Whenever the word "Engineer," or a pronoun in place thereof, is used, it refers to and means the Engineer in Charge of Sewers, Borough of Queens, acting either directly or through assistants designated by him to act in the premises, limited to the particular duties entrusted to them. In case said Engineer may not be able to act, then such Engineer as may be designated by the President shall act in his place.

- 40 Terms defined.

IV. Whenever the word "plan" is used it refers to and means the plan of this work and the standard drawings pertinent thereto. Whenever it is provided that anything is "to be done," "if" or "as," or "when" or "where approved," "required," "directed," "permitted," "ordered," "designated" or "deemed necessary" it shall be taken to mean approved, required, permitted, ordered, designated or deemed necessary as the case may

EXHIBIT C-28 (continued) :

be by the Engineer. Whenever the words "desirable," "suitable," "sufficient," "satisfactory" or others of a similar purport are used it is hereby agreed that the desirability, suitability, sufficiency, satisfactoriness or other denominated condition shall be as determined by the Engineer.

Contractor to furnish tools, proper appliances, etc.

10 V. The Contractor hereby agrees to furnish and provide all materials, labor, and appliances necessary and proper for the purpose, to excavate for, build, complete and connect in a good substantial manner, to the satisfaction of the President, and in conformity with the contract, the hereinbefore entitled work and all the work incidental thereto, and the Contractor hereby agrees to receive and accept as and for his full compensation the following prices, which are the amounts or rates at which this contract was awarded to the Contractor at the public letting thereof :

20 Prices.

- 640 Linear Feet 2'-3" Plain Concrete Sewer, Per Linear Foot, Seven and 00/100 Dollars (\$7.00).
- 509 Linear Feet 22" Vitrified Pipe Sewer, Per Linear Foot, Four and 74/100 Dollars (\$4.74).
- 37 Linear Feet 22" Vitrified Pipe Sewer, including concrete cradle, Per Linear Foot, Seven and 00/100 Dollars (\$7.00).
- 645 Linear Feet 15" Vitrified Pipe Sewer, Per Linear Foot, Two and 55/100 Dollars (\$2.55).
- 30 201 Linear Feet 12" Vitrified Pipe Sewer, Per Linear Foot, Three and 30/100 Dollars (\$3.30).
- 17 Manholes, Complete, Each, Sixty and 00/100 Dollars (\$60.00).
- 2 Basin Manholes, Complete, Each, Eighty and 00/100 Dollars (\$80.00).
- 2 Inlets, Complete, Each, Forty and 00/100 Dollars (\$40.00).
- 80 Linear Feet 12" Vitrified Pipe for Basin Connections, Per Linear Foot, One and 35/100 Dollars (\$1.35).
- 35 Linear Feet 10" Vitrified Pipe for Basin Connections, Per Linear Foot, One and 25/100 Dollars (\$1.25).
- 40 38 Six-inch Spurs, 24" long, on Concrete Sewer, Each, Fifty Cents (\$0.50).
- 35 Six-inch Spurs on 22" Vitrified Pipe Sewer, Each, Four and 50/100 Dollars (\$4.50).
- 37 Six-inch Spurs on 15" Vitrified Pipe Sewer, Each, Two and 00/100 Dollars (\$2.00).

EXHIBIT C-28 (*continued*):

16 Six-inch Spurs on 12" Vitrified Pipe Sewer, Each, One and 35/100 Dollars (\$1.35).

862 Linear Feet 6" Vitrified Pipe for House Connection Drains, Per Linear Foot, Ninety Cents (\$0.90).

1 Junction Chamber at Ridgewood Pl. and Central Ave., Complete, Three hundred and 00/100 Dollars (\$300.00).

10 No extra compensation.

20 VI. The Contractor admits that the quantities of materials to be furnished and the amount of work to be done, as stated in the proposal for bids for the work, are approximate only. The Contractor agrees that The City is not to be held responsible that any of said quantities and amounts shall obtain in the construction of the work, as he has judged for himself as to such quantities and amounts and each of them, and as to the other circumstances affecting the cost of the performance of this contract; and that he will not at any time dispute or complain of such statement nor assert that there was any misunderstanding in regard to the character, size or depth of the excavations to be made or the kind or amount of the materials to be furnished or work to be done. The Contractor hereby agrees that he will not ask, demand, sue for, nor seek to recover for the entire work any extra compensation beyond the amount payable for the several classes of work and kinds of materials in this contract enumerated, which shall be actually performed and furnished, at the prices therefor herein agreed upon and fixed.

30 Sewers, etc., to be built as shown on the plan.

VII. The sewer and appurtenances will be built on the lines, at the depths and at the grades and in the manner shown on the plan of the work as the same will be designated on the ground by the Engineer.

Line may be changed.

40 The President may change the line of the sewer or the location of the receiving basins, or other sewer appurtenances provided such changes do not materially affect either the character or the amount of the work to be done, or the conditions under which it is to be performed, and the Contractor hereby agrees to make no claim for damages or extra compensation on account thereof.

EXHIBIT C-28 (*continued*) :

Preservation of points, stakes, etc.

10 The Contractor will safeguard all points, stakes, grade marks, monuments and bench marks made or established on or near the line of work, and he agrees to accept responsibility for and to remedy at his cost any mistakes that may be caused by the unauthorized disturbance or removal of such points, stakes, grade marks, monuments and bench marks.

Written order for extra work.

20 VIII. No claim for additional work or materials shall be made by or allowed to the Contractor, unless before the performance of such additional work the President shall have first authorized the same, in writing, and the same shall have been done or furnished under a written order from the President, given before the performance of such additional work or the furnishing of such additional materials. The aggregate price to be paid for additional work or materials so authorized or ordered shall not exceed five per cent. (5%) of the contract price or the total cost of the work and materials.

Contract may be modified.

30 This contract may be modified and changed from time to time as may previously be agreed to, in writing, between the parties hereto, in a manner not materially affecting the substance thereof or increasing the contract price thereunder, in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed.

Limit to extras.

40 All claims for additional work or materials in any month shall be made to the Engineer, in writing, before the 15th day of the following month, and failing to make such claim within the time required, the rights of the Contractor to additional pay for such additional work or materials shall be deemed to have been waived and forfeited.

Inspection.

Work or materials may be condemned at any time.

IX. The Engineer shall inspect the materials furnished and the work done and see that the same correspond with the specifications. The Engineer is hereby authorized and empower-

EXHIBIT C-28 (*continued*):

ed to reject and refuse all labor and material or method of application, or any part thereof, offered under or in fulfillment of this contract, that do not comply in kind, quality or quantity with the terms thereof. Any material delivered or offered to be delivered under this contract, which shall be rejected by the Engineer as not conforming to the terms thereof, will be forthwith removed by the Contractor, and material which does so conform will be forthwith furnished and delivered by him in place thereof. The Contractor hereby agrees not to use any material which has not been inspected and accepted, nor to perform any work except under inspection, to which end he further agrees to notify the Engineer when lines, grades or inspection are required so that the Engineer may have time to provide for the same. No inspection, approval or acceptance of any part of the work herein contracted for or of the materials used therein, or any payment on account thereof, shall prevent the President from refusing to accept the work or materials at any time thereafter.

20 Engineer to be final arbiter.

X. To prevent all disputes and litigation, it is hereby agreed that the Chief Engineer in Charge of Sewers shall, in all cases determine the amount and the quality of the several kinds of work and materials which are to be paid for under this contract, and he shall determine all questions in relation to the work and materials and the construction thereof, and he shall in all cases decide every question which may arise relative to the execution of this contract on the part of the Contractor, and his decision will be final and conclusive; and such decision, in case any question shall arise, shall be a condition precedent to the right of the Contractor to receive any money under this contract.

Any doubt as to the meaning of this contract and the specifications thereof, or any obscurity as to the wording of them, or any discrepancy between them and the plan will be explained by the Engineer, and his explanation will be accepted by the Contractor, who hereby agrees to execute the work in accordance with such explanation, and to make no charge or claim for any extra work or damage on account thereof.

40 Work and materials must agree with specifications.

XI. The work will be performed in the best manner, and all materials of which the work is composed will be of the best kind, and a sufficient number of persons will be at all times employed to execute the work with due dispatch, the whole to be

EXHIBIT C-28 (*continued*) :

done to the satisfaction of the Engineer, and any materials furnished or work done not satisfactory to the Engineer will be immediately removed and satisfactorily replaced by the Contractor at his own expense; or if he shall neglect or refuse to remove and replace the same when notified so to do by a written notice to be served upon him, then the President may remove, or cause
10 or otherwise, as he may deem expedient, and charge the expense thereof to the Contractor; and the expense so charged shall be deducted and paid by The City out of such moneys as are or may become due under this contract.

Examinations.

During the progress or after the completion of the work, should the Engineer require it, for the purpose of examining the same, the Contractor will make such openings, and to such extent
20 through such part or parts of the work as the Engineer may direct, and the Contractor will satisfactorily restore the work so disturbed. Should the openings disclose defects in the work such defects shall be remedied in accordance with the provisions of the first paragraph of this section.

Use of patented articles.

XII. Wherever an article or any kind of material is specified by a trade name or by the name of a patentee, manufacturer or dealer, or by reference to the catalogue of a manufacturer
30 or dealer, it shall be taken as intending to mean and specify the article or kind of material designated, or any other equal thereto in quality, finish and durability, and equally serviceable for the purposes for which it is or they are intended. Nothing on the plan or in the specifications shall be interpreted or taken to violate the provisions of section 1554 of the Greater New York Charter, which provides that "except for repairs, no patented
40 pavement shall be laid and no patented article shall be advertised for, contracted for or purchased, except under such circumstances that there can be a fair and reasonable opportunity for competition, the conditions to secure which shall be prescribed by the Board of Estimate and Apportionment."

Claims for infringement.

The Contractor will be responsible for any claims made against The City for any infringement of patents, by the use of patented articles or processes in the construction and completion

EXHIBIT C-28 (*continued*):

of the work, and he will have harmless and indemnify The City against all costs, expenses and damages caused by reason of any infringement of patents used in the construction and completion of the work.

Commencement and completion.

10 XIII. The Contractor will begin the work herein agreed to be performed on such date as the President shall notify him to begin on and from which date the time hereinafter fixed for the completion of the work shall begin to run. The place where the work is to be begun will be either stated in said notice or designated on the ground by the Engineer. The commencement of work by the Contractor shall be deemed and taken to be a waiver on his part of notice to begin work, in which case the time for the completion of the work will begin to run on and from the date the work was commenced.

20 Time of performance.

XIV. The Contractor will carry on the work with such force and in such manner and order and at such places, times and seasons, including freezing weather, as may be directed by the Engineer, and will execute all the work in every respect in a thorough and workmanlike manner: and he will fully and entirely perform this contract on his part before the expiration of SIXTY (60) CONSECUTIVE WORKING DAYS.

30 Time important.

It is hereby agreed that the time designated for the performance of all the work under this Contract is of the essence of this agreement, in view whereof it is hereby further agreed that a rate of progress will be maintained so that the work performed up to any time will be at least the same percentage of the total work to be performed under this contract as the net elapsed time at such time is of the total time allowed for the performance of all the work under this contract.

40 In the computation of the number of consecutive working days, the time during which the completion of the work has been delayed in consequence of the condition of the weather, or tides, or by any act or omission of the party of the first part or during such period as the work has been suspended by written order of the President, or delays for which the Contractor is not responsible (all of which will be determined by the President, who shall

EXHIBIT C-28 (*continued*) :

certify to the same in writing, and whose determination and certificate thereof shall be binding and conclusive upon the Contractor), will be allowed to the Contractor and will be deducted in computation. Sundays and also holidays on which no work is done, will also be excluded from said computation. If the completion of the work to be done under this contract shall require work or materials or both in greater amounts than those set forth in the Engineer's Estimate of Quantities, or if unforeseen obstacles are encountered in the prosecution of said work, then the time which the Contractor is delayed on account thereof will be determined and allowed by the President at the completion of the work, upon the receipt by him of a written application from the Contractor for such determination and allowance. No demand by the Contractor that the President determine and certify the matters aforesaid shall be of any effect whatsoever unless the same be made in writing and duly served upon the President prior to the filing in the office of the Comptroller of The City of the final certificate of the completion and acceptance of the work.

End of time period.

The time shall run against this contract until all work called for in this contract is completed to the satisfaction of the Engineer.

Liquidated damages.

XV. In case the Contractor shall fail to complete the work hereunder in accordance with the contract within the time aforesaid, he agrees to pay to The City the sum of Ten Dollars (\$10.00) for each and every day the time consumed in said performance and completion exceeds the time hereinbefore allowed for that purpose; which said sum, in view of the difficulty of ascertaining the loss which The City will suffer by reason of delay in the performance of the work hereunder, is hereby agreed upon, fixed and determined by the parties hereto as the liquidated damages that The City will suffer by reason of said delay and default, and not as a penalty; and The City shall and may deduct and retain the amount of such liquidated damages out of the moneys which may be due or become due to the Contractor under this contract.

Work no provided for in contract.

XVI. If, before the completion of the work contemplated herein, it shall become necessary to do any other or further work

EXHIBIT C-28 (*continued*):

on or near the line thereof than is provided for in this contract, the Contractor will not in any way interfere with or molest such person or persons as the President may employ to do such work, and will carry on the work under this contract in such manner as may be ordered so as to afford all reasonable facilities for doing such other or further work; and no damage or claim by the Contractor shall be allowed therefor, except such allowance
10 of time for delay as the President may deem reasonable.

President's right to suspend work.

XVII. The President is hereby authorized to suspend the whole or any part of the work herein contracted to be done, if he shall deem it for the interest of The City so to do. During such suspension the trenches shall be backfilled, if required, and the roadways and pavements over the same satisfactorily restored, and all materials upon the work shall be neatly piled so as not to
20 obstruct public travel, or shall be removed from the line of the work, if directed.

No damages to be claimed for delay due to other contracts.

XVIII. Should postponement or delay be occasioned by the precedence of paving or other contracts, which may have been either let or executed before the opening of the bids for this contract, the Contractor will make no claim for damages therefor nor for any damages in consequence of the street or the adjoining
30 sewers not being in the condition contemplated by the parties at the time of making the contract; if, however, the Contractor shall be delayed in performance of his work by reason of the street or the adjoining sewers not being in such condition, or by reason of the work or any work or any part thereof being suspended as herein before provided, such allowance of time on account thereof as the President shall deem reasonable will be made.

If the work be suspended or delayed by any act or omission of The City, or for the reason that The City does not own or has
40 not obtained possession of, or the right to enter upon the land upon which the work is to be performed, or because of any act or omission of any employee or agent of The City or any other Contractor performing work for The City, the President, or whoever is directed by this contract, to make the certificate in reference to time, shall make such allowance of time for the completion of the work as the Engineer shall certify that the work has been delayed. No allowance whatever as damages will be made to the

EXHIBIT C-28 (*continued*) :

Contractor because of any such suspension or delays, and no claim shall be made by the Contractor on account thereof.

Allowance of time for delays.

10 XIX. No allowances of time for delays under the provisions of this contract nor the delivery and acceptance of any articles or materials called for by this contract, shall be deemed to be a waiver by the President of the right to abrogate this contract for abandonment or delay in the manner hereinafter provided.

Right to construct sewers, etc.

Permits for connections.

20 XX. Prior to the commencement of and during the progress of the work under this contract the President shall have the right to undertake, and to grant permits for, any construction, reconstruction, and repairing of any pipes, sewers, basins, subway ducts and railway tracks, and any appurtenances thereof located on and adjoining the line of the work, and for any connections with and additions to such pipes, etc., and for such purposes the President is hereby authorized to suspend work on any part of this contract, in accordance with Section XVII., and the Contractor will not interfere with nor place any obstructions in the way of any person or persons who may be engaged upon such work. The President is hereby authorized to connect, by contract
30 or otherwise, any sewers and drains with the work built under this contract and to grant permits to any person or persons to make connections therewith at any time before it is completed; and the Contractor will not interfere with nor place obstructions in the way of such persons as may be employed in building such sewers and drains, or in making such connections, and the flow from such sewers, drains and connections will be permitted by the Contractor to discharge into the work built under this contract and the Contractor agrees to make no claim for compensation, damages or delay on account thereof. The issuance of
40 such permits shall not be considered as an acceptance by The City of that part of the sewer into which such connections empty or flow, nor shall the Contractor on account thereof be relieved from the cleaning of the sewer prior to the final examination of the work. No new connections or drains will be allowed to be made or joined to the work built under this contract unless a permit therefor has been duly issued by the President, which permit shall be shown in all cases to the Inspector of the work.

EXHIBIT C-28 (*continued*):

Flow of sewer and drains, etc.

Drains, etc., interrupted.

Sewers, etc., to be kept clean.

10 XXI. The Contractor will provide at his own cost for the flow of the sewers, drains and water courses interrupted during the progress of the work, and will immediately cart away and remove all offensive matter. The flow throughout the entire length of such sewers and appurtenances as are to be replaced by the work to be done under this contract will be maintained by the Contractor. The Contractor will remove at his own cost and expense all such bulkheads, as may be directed, from the sewers with which the work under this contract will be connected. When the permanent removal of any existing pipe sewers and appurtenances and pipe drains is necessitated by the work to be done under this contract, such of the materials of such structures as
20 may be directed shall be carefully taken up, piled and left at the disposal of The City, and shall not be used in the work, and the remainder shall be removed from the work and disposed of by the Contractor. Wherever the work to be built under this contract, or the trenches in which it is to be constructed, follow the line, and occupy the place of or intercept the Fire Alarm Telegraph System of The City, or any existing sewers, drains, culverts, basin connections or house connections for which permits may have been granted prior to the opening of the bids for this contract, the Contractor will make the same good, and will rebuild the
30 Fire Alarm Telegraph System of The City and also said sewers, drains, culverts and connections, or connect the same with the sewer built under this contract, whichever he may be directed to do, at his own cost and expense. All sewers, drains, culverts, basins and basin connections rendered unnecessary by the construction of the work herein contemplated, shall be thoroughly broken up, except as otherwise hereinbefore provided, and satisfactorily filled in by the Contractor at his own cost and expense, as shall also all portions of water courses in, through or across any street that may be rendered unnecessary by the construction
40 of this work. During the progress of the work, and until the completion and acceptance thereof, the sewers, drains, basins, culverts and connections built under this contract shall be kept thoroughly cleaned throughout, and shall be left clean.

Sale of sand or earth.

XXII. The Contractor will not sell, nor permit to be removed from the line of the work, before the trench shall have

EXHIBIT C-28 (*continued*):

been backfilled, any building sand or earth thrown up, except upon written permission, and then only so much as shall remain after reserving a sufficient quantity to backfill the trench and complete the paving; and the Contractor will, in all cases, backfill the trench with the same material thrown out, provided it be suitable, then the same shall be removed from the line of work, and suitable material procured and used for backfilling the trench, and when required sand of proper quality and depth shall be spread on the surface to receive the pavement.

The Contractor hereby agrees that all excavated material and materials of construction placed by him or for him upon private property, unless by written permission of the owners or lessees thereof, will be removed by him and all damage to said property remedied by him at his own cost and expense. Unless such materials are removed and such damage remedied by the Contractor within 48 hours after the receipt by him of a written notice so to do, he agrees that the President shall be and is hereby authorized to dispose of such materials, and to remedy such damage and to deduct the expense thereof from the moneys due or to become due under this contract.

Contractor to give personal attention to work.

Not to assign or sublet.

XXIII. The Contractor will give his personal attention constantly to the faithful prosecution of the work; he will not assign, transfer, convey, sublet or otherwise dispose of this contract, or his right, title or interest in or to the same, or any part thereof, without the previous consent, in writing, of the President, indorsed hereon or hereto attached; and he will not assign, by power of attorney or otherwise, any of the moneys to become due and payable under this contract, unless by and with the like consent, signified in like manner. If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys due or to become due under this contract, to any other person, company or other corporation, this contract may, at the option of the President, be revoked and annulled, and The City shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the Contractor, and to his assignee or transferee; provided that nothing herein contained shall be construed to hinder, prevent or affect an assignment by the Contractor for the

EXHIBIT C-28 (*continued*):

benefit of his creditors, made pursuant to the statutes of the State of New York; and no right under this contract, or to any money to become due hereunder, shall be asserted against The City, in law or in equity, by reason of any so-called assignment of this contract, or any part thereof, or of any moneys due or to become due hereunder, unless authorized as aforesaid by the written consent of the President.

10

When Contractor is absent.

Disorderly workmen.

Contractor to provide assistance.

20

XXIV. Whenever the Contractor is not present on any part of the work where it may be necessary to give directions, orders will be given by the Engineer to and shall be received and obeyed by the superintendents and foremen who may have immediate charge of the men employed on the particular work in relation to which the order may be given; and at any time, if a foreman or workman employed by the Contractor shall be declared by the Engineer to be disobedient, incompetent or disrespectful, the Contractor, on receiving written notice to that effect, will forthwith dismiss such person, and will not again employ him on any part of the work. The Contractor will provide all necessary assistance for the Engineer when required, without charge or expense to The City or Engineer.

30

Contractor to plank and bridge for traffic.

XXV. The Contractor will observe the law and all ordinances of The City in relation to obstructing the streets, keeping open passageways and protecting the same where they are exposed and would be dangerous to the public travel, and such passageways shall, as may be required, be planked or bridged by the Contractor, at his own expense.

Guards and lights.

40

Indemnification of City.

XXVI. During the performance of the work herein set forth the Contractor will place proper guards upon and around the same for the prevention of accidents, and at night will put up and keep suitable and sufficient lights, and he will indemnify and save harmless The City against and from all claims, suits and actions, of every name and description, brought against it,

EXHIBIT C-28 (*continued*):

and all costs and damages to which it may be put on account or by reason of any injury or alleged injury to the person or property of another, resulting from the prosecution of the work or from negligence or carelessness in the performance of the work, or in guarding the same, or from any improper materials used in its prosecution, or by or on account of any act or omission of the Contractor or his agents; and the Contractor agrees that the
10 whole or so much of the moneys due to the Contractor under and by virtue of this contract, as shall or may be considered necessary by the Comptroller of The City, may, as its option, be retained by The City until all such suits and claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the Comptroller.

Contractor to make repairs.

20 XXVII. In case any injury is done to property along the line of the work, or to any sidewalk, in consequence of any act or omission on the part of the Contractor or his employees or agents in carrying out any of the provisions or requirements of this contract, the Contractor will make such repairs as are necessary in consequence thereof, at his own expense and to the satisfaction of the President, and in case of failure on the part of the Contractor to promptly make such repairs, they may be made by the President, and the expense thereof will be deducted out of the moneys due or to become due to the Contractor under this contract.

30 Loss or damage to be assumed by Contractor.

XXVIII. The Contractor agrees to assume, and to make no claim on account of, any and all loss or damages arising out of the nature of the work to be done under this contract, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the action of the elements, or from incumbrances on or near the line of the work, or from the breaking of water mains, sewer and gas mains on or near the line of the work.

40 Claims for labor, etc.

XXIX. The Contractor will pay promptly, and in cash, for all labor employed upon and all materials furnished and used in the work, and if at any time before or within thirty days after the whole work herein agreed to be performed has been completed and accepted by The City, any person or persons claiming to have

EXHIBIT C-28 (*continued*):

performed any labor or furnished any materials toward the performance and completion of the contract, shall file with the President and with the Comptroller of The City any such notice as is described in the Lien Law or any act of the Legislature of the State of New York, then, and in every such case, The City shall retain—anything herein contained to the contrary thereto notwithstanding—from the moneys under its control, and due or
10 to become due under this contract, so much of the moneys as shall be sufficient to pay off, satisfy and discharge the amount in such notice alleged or claimed to be due to the person or persons filing such notice, together with the reasonable cost of any action or actions brought to enforce such claim or the lien created by the filing of such notice. The money so retained shall be retained by The City until the lien thereon created by the said act and the filing of the said notice shall be discharged, pursuant to the provisions of the said act.

20 Contractor will prevent filing of liens, etc.

XXX. The Contractor will not, at any time, suffer or permit any lien, attachment, or other incumbrances, under the law of this State or otherwise, by any person or persons whomsoever, to remain on file in the Finance Department or at the office of the City Department having supervision of the work against any money due or to become due for any work done or materials furnished under this contract, or by reason of any other claim or demand against the Contractor; and that any such lien,
30 attachment, or other incumbrance, until it is removed, shall preclude any and all claim or demand for any payment whatsoever under or by virtue of this contract.

Evidence of satisfaction of liens, etc.

The Contractor further agrees that he will present to the party of the first part satisfactory evidence that all just liens, claims and demands of his employees, or of parties from whom materials used in the construction of the work may have been
40 purchased or procured are fully satisfied and that the materials furnished and work done under this contract are fully released from all such liens, claims and demands before said party of the second part will demand or shall receive the sums due one final payment under this contract.

EXHIBIT C-28 (*continued*) :

Notice to gas companies, etc.

Not to hinder other companies.

10 XXXI. The Contractor will give notice in writing to all gas, railroad and other companies owning or controlling any pipe, tracks or other structures which during the progress of the work may be affected by the prosecution of the same so that said com-
panies may protect or remove their structures, and he will not
cause any hindrance to, or interference with, any such gas com-
pany or other company or companies in protecting their said
pipes, tracks or other structures, nor in removing or otherwise
protecting and replacing the main and service pipe, lampposts,
lamps, tracks or other structures where necessary, but the Con-
tractor will suffer the said company or companies to take all such
measures as are requisite for the purpose aforesaid. But if said
20 gas, railroad, or other companies, within five days after receipt
of such notice, fail to support, remove or otherwise protect their
structures (except such railroad tracks or other railroad struc-
tures upon or within a right of way owned by a railroad company
(see Section XXXIV), the Contractor will upon the approval of
the President protect or remove the same, it being expressly un-
derstood that the cost thereof shall not be a charge against The
City, but shall be a matter for adjustment between the Contractor
and the company or companies concerned.

Pipes, conduits, etc., of private companies.

30 XXXII. It is hereby agreed that The City is not respon-
sible or liable for the support, protection or reconstruction of
such gas pipes, conduits, water pipes, tracks or structures owned
by private companies enjoying special franchises or occupying
any portion of the street or way on or below the surface in its
streets or ways, as the Contractor admits that he has carefully
examined the location of work, has made special inquiry at the
offices of the companies owning, controlling or operating said
pipes, conduits, tracks and structures, and he has determined to
his satisfaction the character, size, location and length of such
40 pipes, conduits, tracks and structures; that he has inspected the
public records of the various City Departments having cognizance
and control of pipes, conduits, and other subsurface structures.
and of The City's water pipes, conduits and sewers, and he has
made such further personal inspection and investigation as he
deemed proper to determine the correctness of the information
so obtained; and he clearly understands that The City does not

EXHIBIT C-28 (*continued*):

insure the accuracy of such reports or information, and agrees that he will not make any claim against The City for damages or extra work caused or occasioned by his relying upon such records, reports or information furnished by any City Department or any companies, either as a whole or in part.

- 10 Protection and restoration of pipes, etc., of private companies.

20 XXXIII. The Contractor agrees to confer with and to make to or entertain an offer from such private companies as own the said pipes, conduits, tracks or structures, except such railroad companies whose tracks or other railroad structures are upon or within a right of way owned by said companies (see Section XXXIV); and the Contractor further agrees to enter into an agreement with said companies by what terms and at what prices the support, protection, removal and reconstruction of the pipes, conduits, tracks and structures will be undertaken and accomplished, and in the event of the failure to make such an agreement with said companies, he will not complain nor make any demand on The City for additional compensation or pay for supporting, protecting, removing or restoring the said pipes, conduits, tracks or other structures.

Agreement between City and railroad company, etc.

30 XXXIV. If for the purpose of performing the work required by this contract The City has entered into an agreement with any railroad company owning a right of way, or with the owners of any property through or across which the work, or any part thereof, is to be constructed, the Contractor agrees to carry on such work or such part thereof as directed in accordance with the terms of such agreement, a copy whereof is hereto annexed and is hereby agreed upon as forming part of this contract.

Contractor to notify Department Water Supply,
Gas and Electricity.

40 XXXV. At least twenty-four hours before breaking ground, for the purpose of constructing the work of this contract, the Contractor agrees to give notice thereof in writing to the Department of Water Supply, Gas and Electricity.

City's water pipes, etc.

XXXVI. If upon excavating it shall be found that any existing water pipes or appurtenances owned or controlled or

EXHIBIT C-28 (*continued*) :

operated by The City follow the lines, or occupy the place, of the sewer or sewers and appurtenances to be laid or built as shown on the plan, such existing water pipes and appurtenances will be removed and relaid, or rebuilt, by and at the cost of the Department of Water Supply, Gas and Electricity of The City of New York; if, however, in order to facilitate the work to be done under this contract, it be found desirable to temporarily remove any
10 water pipes or appurtenances owned or controlled or operated by The City, the removal and replacing in their original positions of such water pipes and appurtenances will be done by the Department of Water Supply, Gas and Electricity for the Contractor at his cost and expense.

Protection of City's water pipes, etc.

XXXVII. The Contractor agrees to protect all water mains and service water pipes owned, controlled or operated by
20 The City which may be affected in any manner by the work done under this contract, except as hereinbefore provided, and to protect all such water and service pipes from freezing, and if he fails to do so, the Commissioner of Water Supply, Gas and Electricity is hereby authorized to protect such main and service pipes, or in the event of their having suffered injury to replace such pipes, and recalk and repair the same immediately, as the work progresses, and the cost thereof shall be charged to the Contractor; the cost so charged shall be deducted from any sum or sums due or to become due to the Contractor under this contract, and in
30 case such sum or sums shall be insufficient to cover such cost, the Contractor will be liable for the balance.

Protection of gas and water mains and pipes, etc.

XXXVIII. The Contractor agrees to sustain in their places and protect from injury all water or gas mains, conduits, subways or service pipes, steam pipes and pneumatic pipes, and all sidewalks, curbs, stoops, areas, and all other property in the vicinity of his work, from direct or indirect injury by caving or otherwise, and he hereby assumes all expenses for direct or
40 indirect damage which may be occasioned by injury to any of them, and he agrees to have at all times a sufficient quantity of timber and other necessary materials and appliances on the ground, and will use the same, as required, for bracing and sheeting the sides and ends of excavations, and for sustaining and supporting any and all pipes, conduits, subways, lamp-posts and lamps or other structures that are undermined, weakened, endangered or threat-

EXHIBIT C-28 (*continued*):

ened; and in case any damage or injury shall or may result to said pipes, conduits, subways, lamp-posts and lamps and other works or structures or any gas, electric, railroad or other company whatsoever, or to any private property, through or by reason of any negligence, wilfulness, carelessness or want of skill on the part of the Contractor, his agents or servants, the Contractor hereby agrees to pay such amount as may be sufficient to cover the expense and damages occasioned by such negligence, wilfulness, carelessness or unskillfulness, and that such amount shall be charged against him; and the President is hereby authorized to deduct and retain from any moneys which may be due, or which shall become due, under this Contract, a sum sufficient, in his judgment, to cover the cost of making good any such damages, expense or loss, and to apply said sum so deducted and retained to the requisite repairs or renewals, or to reimburse the parties damaged or injured.

20 Old water and gas pipes.

XXXIX. All iron, water and gas pipes which it becomes necessary to remove shall be considered the property of The City and will be piled by the Contractor in such part or parts of the streets as may be directed, unless notice to the contrary is given him in writing, in which case he will remove the same at his own expense.

Change of grade.

30 XL. In case the grade of the street shall be changed during the progress of the work, the Contractor will conform to the altered grade at the contract prices, as far as they are applicable; and for any work for which there is no contract price, the provisions in relation to work not provided for in this contract shall apply.

Measurement of work and material.

40 XLI. All quantities of work and materials to be paid for will be measured and determined, according to the plan and the working lines that may be given, and the specifications, when the work conforms thereto. No allowance will be made on any part of the work for any excess above the quantities required by such plan, lines and specifications. Should the dimensions of any part of the work, or of the materials, be less than those required by the plan, the actual quantities only will be allowed in measurement.

EXHIBIT C-28 (*continued*) :

Payment on acceptance of work.

XLII. The Contractor will not be entitled to demand or receive payment for any portion of the work or materials unless the same has been fully completed in the manner set forth in this contract, and such completion duly certified by the Engineer in Charge of Sewers, and until each and every one of the stipulations
10 hereinbefore mentioned is complied with, and the work completed to the satisfaction of the President and accepted by him, and the final certificate of completion and acceptance thereof, signed by the President and said Engineer, filed with the Comptroller. The City will pay to the Contractor on or before the expiration of thirty days from the filing of said final certificate of completion and acceptance in the office of the Comptroller, the whole of the moneys accruing to the Contractor, under this contract, except
20 such sum or sums of money as shall be retained under any of the provisions herein contained for that purpose, or in any law of the State, or under any ordinance of The City passed prior to the date of this contract and now in force.

Moneys to be retained for repairs to unpaved streets.

It is hereby further agreed that The City shall be and is hereby authorized to retain out of the moneys payable to the Contractor, during a period of six months from the date of the final completion and the acceptance by the President of the work done under this contract, the sum of \$0 09/100 for each linear foot of
30 sewer, basin connection, and house connection constructed under this contract within unpaved streets, and the sum of \$0 25/100 for each linear foot constructed within streets repaired by the Contractor. And should the Contractor fail to make such repairs to the street surface as may become necessary by reason of the work done under this contract within two days of the date of service of notice upon him so to do, then the President may expend such sum or any part thereof in making such repairs.

Payment of retained moneys to be made after six months.

40 It is hereby further agreed that The City, upon the expiration of the said period of six months, will pay to the said party of the second part the whole or such part of the moneys retained as may remain after the expenses of making said repairs, in the manner aforesaid, shall have been paid therefrom.

EXHIBIT C-28 (*continued*):

Termination of six months' period.

10 It is hereby further agreed that if the termination of the said period of six months after the completion and acceptance of the work done under this contract shall fall within the months of December, January, February or March, then and in that case the said months of December, January, February and March, or such part thereof as the President may determine, will not be included in the computation of said period of six months.

Final certificate to control.

20 XLIII. The action of the Engineer in Charge of Sewers, by which the Contractor is to be bound and concluded according to the terms of this Contract shall be that evidenced by said Engineer's final certificate, all prior certificates upon which eighty-five per centum (85%) payments may have been made being merely estimates, and subject to the corrections of such final certificate, which may be made without notice to the Contractor thereof, or of the measurements upon which the same is based.

85% payments.

30 XLIV. In case the amount of this contract, based on the Engineer's estimate and the contract prices, shall be five thousand dollars (\$5,000.00) or over, payment will be made to the Contractor by monthly installments of eighty-five Per Cent. (85%) of the estimated value of the work performed, provided the work is being prosecuted in conformity with the provisions of the contract, and in a manner satisfactory to the Engineer, in which case, however, the quantity returned shall be such that the amount paid will be fairly due and in accordance with the provisions and stipulations of this contract; provided, the amount of work done on each installment shall not be less than fifteen hundred dollars (\$1,500.00); and provided that The City may at all times reserve and retain out of said installments, or any of them, all such sum or sums as by the terms hereof or any act of the Legislature of the State of New York, or of any ordinance of The City of New York, 40 now in force, it is or may be authorized to reserve or retain; and provided that where the Contractor, although the lowest bidder in the gross calculation, is to receive unusual or extraordinary prices for any of the different items of the work when considered separately, nothing herein contained shall be construed to affect the right of the President to determine the amount that may be due from time to time, not necessarily by the prices agreed upon in this contract, but by causing an estimate to be made of the

EXHIBIT C-28 (*continued*):

value of the work done, taking as a basis of the calculations the whole amount of money that will have become due, according to the terms of this contract, when the whole work shall be completed.

If abandoned, etc.

10 Contract may be declared abandoned.

Completion of work to be undertaken by President.

20 XLV. The Contractor hereby agrees that if the work to be done under this contract shall be abandoned by him, or if this contract shall be assigned or the work sublet by him otherwise than as provided by the terms hereof, or if at any time the Engineer shall be of the opinion, and shall so certify, in writing, to the President that the performance of the contract is unnecessarily or unreasonably delayed, as evidenced by its actual rate of progress compared with the required progress (See Section XIV); or that the Contractor is wilfully violating any of the conditions or covenants of this contract or the specifications thereof, or is executing the same in bad faith, or not in accordance with the terms thereof, or that the work is not fully completed within the time designated in this contract for its completion, the President may declare this contract or any part thereof abandoned and notify the Contractor to discontinue all work or any part thereof under this contract, by a written notice to be served upon the Contractor either personally, or by leaving said
30 notice at his residence, or with his agent in charge of the work, or in the manner provided in Section XLVI., or with any employee found on the work, and the Contractor agrees to thereupon discontinue said work or such part thereof, and he further agrees that the President shall thereupon have the power to contract for the completion of the contract in the manner prescribed by law, or to place such and so many persons as he may deem advisable, by contract or otherwise, to work at and complete the work declared abandoned, and to use such materials as he may find upon the line of the work, and to procure other materials
40 for the completion of the same, and to charge the expense of said labor and materials to the Contractor; and it is further agreed that the expense so charged shall be deducted and paid by The City out of such moneys as may be due or may at any time thereafter become due to the Contractor under and by virtue of this contract, or any part thereof. And in case such expense shall exceed the amount which would have been payable under the con-

EXHIBIT C-28 (*continued*):

tract if the same had been completed by the Contractor, he shall and will pay the amount of such excess to The City. Should the Contractor fail to complete the work as stipulated herein, or should the contract be declared abandoned, he agrees to forfeit all money earned, but unpaid whether certified or not at the time of the abandonment of the contract. In case such expense shall be less than the sum which would have been payable under the

10 Contract if the same had been completed by the Contractor, he agrees to forfeit all claim to the remainder; and when any particular part of the work is being carried on by the President, by contract or otherwise, under the provisions of this clause of the contract, the Contractor agrees to continue the remainder of the work in conformity with the terms of this contract and in such manner as in nowise to hinder or interfere with the persons or workman employed, as above provided, by the President, by contract or otherwise, to do any part of the work, or to complete the

20 same under the provisions of this section of the contract.

Notice to Contractor.

XLVI. It is agreed that the residence or place of business, given in the bid upon which this contract is founded, is hereby designated as the place where all notices, letters and other communications shall be served, mailed or delivered. It is further agreed that any notice, letter or other communication addressed to the Contractor and delivered at the above-named place, or deposited in a post-paid wrapper in any post-office box regularly

30 maintained by the post-office, shall be deemed sufficient service thereof upon the Contractor. It is also further agreed that the place named may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the President. It is also further agreed that nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

Labor law.

40 XLVII. The Contractor agrees that he will comply with the provisions of "The Labor Law." He further agrees that no laborer, workman or mechanic in the employ of the Contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be permitted or required to work more than eight hours in any one calendar day, except in cases of extraordinary emergency, caused by fire, flood or danger to life or property; that the wages

EXHIBIT C-28 (*continued*) :

to be paid for a legal day's work to all classes of such laborers, workmen or mechanics upon public work or upon any material to be used thereupon shall not be less than the prevailing rate for a day's work in the same trade or occupation in the locality where such public work is being constructed. Each such laborer, workmen or mechanic shall receive the prevailing rate of wages. This contract shall be void and of no effect, unless the person or corporation, making or performing the same shall comply with the provisions of section 14 of the Labor Law.

No estoppel.

XLVIII. The City shall not, nor shall any Department or officer thereof be precluded or estopped by any return or certificate made or given by the President, any Engineer or other officer, agent or appointee of The City under any provision of this contract from at any time (either before or after the final completion and acceptance of the work and payment therefor pursuant to any such return or certificate) showing the true and correct amount, quality and character of the work done and materials furnished by the Contractor, or any other person under this contract, or from showing at any time that any such return or certificate is untrue and incorrect or improperly made in any particular, or that the work and materials, or any part thereof do not in fact conform to the contract; and The City shall not be precluded or estopped, notwithstanding any such return or certificate or payment in accordance therewith, from demanding and recovering from the Contractor such damages as it may sustain by reason of his failure to comply with the contract.

Understanding of plans and specifications.

XLIX. The Contractor hereby distinctly and expressly declares and acknowledges that, before the signing of this contract, he has carefully read the same, and the whole thereof, together with and in connection with the plan and specifications, and that he has made such examination of this contract and of said plan and specifications, and the location where said work is to be done, and such investigation of the work required to be done, and in regard to the material required to be furnished, as to enable him to thoroughly understand the intention of the same, and the requirements, covenants, agreements, stipulations and restrictions contained in this contract and in said plan and specifications; and distinctly agrees that he will not hereafter make any claim or demand upon The City, based upon or arising out of any alleged misunderstanding or misconception on his part of

EXHIBIT C-28 (*continued*):

the said requirements, covenants, stipulations and restrictions: and that any information given to the Contractor by the Engineer or others as to the quantities in the work, prior to, or during the progress of the work, shall have no bearing or effect whatsoever, upon the total amount of work to be paid for, in the final settlement.

10 Chap. 478, Laws 1916.

This contract shall be void and of no effect unless the person or corporation making or performing the same shall secure compensation for the benefit of, and keep insured during the life of this contract, the employees engaged thereon, in compliance with the provisions of Chapter 41 of the laws of 1914, known as the Workmen's Compensation Law, and acts amendatory thereof.

20 Substitution of sureties.

L. Should the Comptroller at any time deem the sureties under the contract to be unsatisfactory he shall notify the Contractor to that effect and the Contractor shall when so notified forthwith submit in substitution new sureties acceptable to the Comptroller. No further payment shall be deemed due or shall be made until the new sureties shall qualify and be accepted by the Comptroller.

30 IN WITNESS WHEREOF, The President of the Borough of Queens has hereunto set his hand for and on behalf of The City of New York, and the Contractor has also hereunto set his or its hand the day and year herein first above written; and the President and Contractor have executed this agreement in triplicate; one part of which is to remain with the President, one other to be filed with the Comptroller of The City of New York, and the third to be delivered to the Contractor.

.....
Acting President of the Borough of Queens.

40

JOSEPH L. SIGRETTO & CO.,

By Joseph L. Sigretto,
President.

(Contractor (s)).

EXHIBIT C-28 (*continued*):

The City and State of New York, ss:
County of Queens

On this 27th day of April 1917, before me personally came Richard S. Newcombe to me known and known to me to be the Acting President of the Borough of Queens, of The City of New York, the person described as such in and who as such executed
10 the foregoing instrument, and he acknowledged to me that he executed the same as said Acting President for the purposes therein mentioned.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

The City and State of New York, ss:
County of Queens

20 On this 23rd day of April, 1917, before me personally came Joseph L. Sigretto to me known and known to me to be the President of Joseph L. Sigretto and Co. who being by me duly sworn, did depose and say for himself that he resides in Orange, N. J.; that he is the President of Joseph L. Sigretto and Co., the corporation described in and which executed the above instrument; that he knew the corporate seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said
30 Joseph L. Sigretto and Co., and that, by like order, he thereunto signed his name and official designation.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

KNOW ALL MEN BY THESE PRESENTS, That we Joseph L. Sigretto and Co., as principal, and National Surety Company as surety are held and firmly bound unto The City of New York, in the sum of FORTY EIGHT HUNDRED DOLLARS.
40 lawful money of the United States of America, to be paid unto THE CITY OF NEW YORK, or to its certain attorneys, successors or assigns; for which payment, well and truly to be made, we and each of us do bind ourselves, and our several and respective heirs, executors, administrators and assigns, jointly and severally, firmly by these presents.

Signed, sealed and dated this 23rd day of April, 1917.

EXHIBIT C-28 (*continued*):

10 WHEREAS, The above bounden Joseph L. Sigretto and Co., by an instrument in writing, under their hands, and bearing even date with these presents, one part whereof is hereto annexed, have contracted with The City of New York, by the President of the Borough of Queens, to furnish all the labor and materials, and to excavate for, build, construct and in all respects complete sewer and appurtenances in McComb Place (Wyckoff Avenue) from Central Avenue to Myrtle Avenue; Ridgewood Place from Central Avenue to Copeland Avenue, and in Copeland Avenue from Ridgewood Place to McComb Place, Second Ward, together with all the work incidental thereto, as is fully and at large set forth and described in the contract aforesaid.

20 NOW, THEREFORE, The condition of the above obligation is such that if the said above bounden Joseph L. Sigretto and Co and its, his or their heirs, executors, administrators and assigns, or any or either of them, shall well and truly, and in a good, sufficient and workmanlike manner, perform or cause to be performed the said contract, and each and every of the covenants, promises, agreements and provisions therein contained on their part to be performed, and complete the same within the period therein stipulated, and in each and every respect comply with the conditions therein contained, then this obligation to be void; otherwise, to remain in full force and virtue.

Joseph L. Sigretto & Co. [L. S.]

30 By JOSEPH L. SIGRETTO [L.S.]
President.

National Surety Company [L. S.]

By FRANK T. GILSON [L. S.]
Resident Vice-President.

Attest L. W. FITZGERALD
Res. Asst. Secretary.

EXHIBIT C-28 (continued) :

The City and State of New York, ss.
County of Queens

On this 23rd day of April, 1917, before me personally came Joseph L. Sigretto to me known and known to me to be the President of Joseph L. Sigretto and Co. who, being by me duly sworn, did depose and say for himself that he resides in Orange, N. J.;
10 That he is the President of the Joseph L. Sigretto and Co., the corporation described in, and which executed the above instrument, that he knew the corporate seal of said corporation; that the seal affixed to the said instrument is such corporate seal: that it was so affixed by order of the Board of Directors of said Joseph L. Sigretto and Co., and that by like order he thereto signed his name and official designation.

WILLIAM P. BUCKLEY,
Commissioner of Deeds, New York City.

20

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

On April 25, 1917, before me personally appeared FRANK T. GILSON, Resident Vice-President of the NATIONAL SURETY COMPANY, with whom I am personally acquainted, who, being by me duly sworn, said that he is the Resident Vice-President of the NATIONAL SURETY COMPANY, the corporation described in and which executed the within instrument; that
30 he knows the corporate seal of said Company; that the seal affixed to the within instrument is such corporate seal; that it was affixed by order of the Board of Directors of said Company, and that he signed said instrument as Resident Vice-President of said Company by like authority; and that the liabilities of said Company, do not exceed its assets as determined by an audit of the Company's annual statement filed with the Superintendent of Insurance of the State of New York and certified to by said Superintendent, pursuant to Section 2 of Chapter 182 of the Laws
40 of the State of New York for the year 1913, amending section 182 of chapter 33 of the Laws of the State of New York for the year 1909 constituting chapter 28 of the Consolidated Laws of the State of New York. And said FRANK T. GILSON further said that he is acquainted with L. W. FITZGERALD and knows him to be the Resident Assistant Secretary of said Company; that the signature of the said L. W. FITZGERALD subscribed to the said instrument is in the genuine handwriting of the said L. W.

EXHIBIT C-28 (*continued*):

FITZGERALD and was thereto subscribed by the like order of the said Board of Directors and in the presence of him, the said Resident Vice-President.

CHARLES J. KOCH,

10

Notary Public, For Kings County, No. 33; Certificate filed in New York Co. No. 156; Bronx No. 10, Queens No. 76, Richmond & Westchester Counties; Kings County Register's Office No. 8025; New York County Register's Office No. 8139; Bronx County Register's Office No. 823; My Commission expires March 30, 1918.

COPY OF BY-LAW

20

BE IT REMEMBERED: That at a regular meeting of the Board of Directors of the NATIONAL SURETY COMPANY, duly called and held on the sixth day of February, 1912, a quorum being present, the following By-Law was adopted:

ARTICLE XIII.

30

40

Section I. *Signatures required*.—All bonds, recognizances, or contracts of indemnity, policies of insurance, and all other writings obligatory in the nature thereof, shall be signed by the President, a Vice-President, a Resident Vice-President, or Attorney-in-Fact, and shall have the seal of the Company affixed thereto, duly attested by the Secretary, an Assistant Secretary, or Resident Assistant Secretary. All Vice-Presidents and Resident Vice-Presidents shall each have authority to sign such instruments, whether the President be absent or incapacitated, or not, and the Assistant Secretaries and Resident Assistant Secretaries shall each have authority to seal and attest such instruments, whether the Secretary be absent or incapacitated, or not; and the Attorneys-in-Fact shall each have authority, in the discretion of such Attorneys-in-Fact, to affix to such instruments an impression of the Company's seal, whether the Secretary be absent or incapacitated, or not, or to attach the individual seal of the Attorney-in-Fact thereto, or to use the scroll of the Attorney-in-Fact, or a wafer, wax, or other similar adhesive substance affixed thereto, or a seal of paper or other similar substance affixed thereto by mucilage, or other adhesive substance, or use the word "seal" or the letters "L. S." opposite the signature of such Attorneys-in-Fact, as the case may be.

EXHIBIT C-28 (continued):

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

10 I, L. W. FITZGERALD, Resident Assistant Secretary of
the NATIONAL SURETY COMPANY, have compared the fore-
going By-Law with the original thereof, as recorded in the Minute
Book of said Company, and do certify that the same is a correct
and true transcript therefrom, and of the whole of Article XIII.
Section I of said original By-Law.

Given under my hand and the seal of the Company,
in the County of New York, April 25, 1917.

L. W. FITZGERALD,
Resident Assistant Secretary.

20 For use in New York and other states which do not require
published figures to conform to statement furnished the depart-
ment of such state after audit by them.

NATIONAL SURETY COMPANY OF NEW YORK

Financial Statement, December 30th, 1916.

WM. B. JOYCE, President. HUBERT J. HEWITT, Secretary.

ASSETS

| | |
|--|------------------------|
| Cash in Banks and Offices | \$2,475,272.31 |
| Government, Municipal and Other Bonds, and Stocks | 8,734,216.18 |
| Real Estate, Mortgages and Collateral Loans | 264,157.99 |
| 30 Unpaid Premiums (excluding Premiums 90 days overdue) | 962,208.57 |
| Accrued Interest and Accounts Receivable | 505,057.52 |
| Total, | <u>\$12,940,912.57</u> |

LIABILITIES.

| | |
|--|------------------------|
| Unearned Premium Reserve | \$2,780,723.87 |
| Contingent Claim and Expense Reserve (Less Re- insurance) | 1,079,726.62 |
| 40 Reserve for taxes and Unpaid Commissions (not due) | 287,026.46 |
| Accounts Payable and Expenses Incurred (not due) | 157,339.87 |
| Dividend Declared (Payable Jan. 2nd, 1917) | 90,000.00 |
| Capital Stock | 4,000,000.00 |
| Surplus | 4,546,095.75 |
| Total, | <u>\$12,940,912.57</u> |

EXHIBIT C-28 (continued) :

STATE OF NEW YORK,
COUNTY OF NEW YORK, ss :

10 L. W. FITZGERALD being duly sworn, says: That he is Resident Assistant Secretary of the NATIONAL SURETY COMPANY, that said Company is a Corporation duly organized, existing, and engaged in business as a Surety by virtue of the Laws of the State of New York, and has duly complied with all the requirements of the Laws of said State and of the Laws of the State of New York applicable to said Company, and is duly qualified to act as Surety under such Laws; that said Company has also complied with and is duly qualified to act as Surety under the Act of August 13, 1894, entitled, "An Act Relative to Recognizances, Stipulations, Bonds and Undertakings, and To Allow Certain Corporations To be Accepted As Surety Thereon," as amended by the Act of Congress of March 23, 1910. That the
20 foregoing is a full, true and correct statement of the financial condition of said Company on the 30th day of December, 1916.

L. W. FITZGERALD,
Resident Assistant Secretary.

Sworn to before me this April 25, 1917,

CHARLES J. KOCH,
Notary Public For Kings County, No. 33; Certificate filed in New York Co. No. 156; Bronx No. 10, Queens No. 76, Richmond & Westchester Counties; Kings
30 County Register's Office No. 8025; New York County Register's Office No. 8139; Bronx County Register's Office No. 823; My Commission expires March 30, 1918.

FUNDS

PRESIDENT'S CERTIFICATE

40 It is hereby certified that the estimated cost of the work and materials required by the within contract is TWELVE THOUSAND AND NINETEEN AND 36/100 DOLLARS. (\$12,219 36/100), and is chargeable to the Street Improvement Fund of The City of New York.

.....
Acting President of the Borough of Queens.

The City of New York, April 27th, 1917.

EXHIBIT C-28 (*continued*):

SPECIFICATIONS

TRENCHES

Length of trench.

- 10 1. Unless otherwise directed or permitted not more than 200 feet of any trench in advance of the end of the built sewer shall be open at any time, and unless written permission to the contrary is given, the trench shall be excavated to its full depth for a distance of at least 20 feet more than the minimum length of sewer permitted to be laid in it. (See paragraphs 159 and 182.) Trenches for house connection drains shall not be open on both sides of the street at the same time, unless permission has previously been given to close the street. Unless otherwise directed each trench for basin connections and house connection drains shall be fully excavated for its entire length before any pipes are laid therein.

20 **Sheeting and bracing.**

2. Where necessary the sides of the trenches and excavations shall be supported by adequate sheeting and bracing. Steel sheeting may be used only where shown on the plan or directed. Unless specially permitted sheeting against which concrete is placed shall not be removed and will not be paid for. The Contractor will be held accountable and responsible for the sufficiency of all sheeting and bracing used, and for all damage to persons or property resulting from the improper quality, strength, placing, maintaining or removing of the same.

Sheeting in soft material.

3. Where the material to be excavated is of such a character as to render it necessary, the sheeting shall be closely driven and to such depth below the bottom of the sewer as may be directed.

Tunneling.

- 40 4. All work shall be done in open trenches or excavations; no tunneling shall be done except with the consent of the Engineer.

Trees and stumps.

5. The Contractor shall grub and clear the surface over the trenches and excavations of all trees and stumps and remove the same from the work.

EXHIBIT C-28 (*continued*):

Material to be disinfected.

6. If required, any or all of the excavated material shall be satisfactorily disinfected or deodorized or immediately removed from the work.

Roadway, sidewalks, etc., to be kept clear.

- 10 7. The excavated material and materials of construction shall be so deposited, and the work shall be so conducted as to leave open and free for traffic all crosswalks, a space on each sidewalk not less than one-third the width of such sidewalk and unless permission is given to the contrary a roadway not less than 8 feet wide for the free passage of vehicles. Street hydrants, water gates, fire alarm boxes and letter boxes shall be kept accessible for use. During the progress of the work the Contractor shall maintain such crosswalks, sidewalks and roadways in satisfactory condition, and the work shall at all times be so conducted
20 as to cause a minimum of inconvenience to public travel, and permit of safe and convenient access to private and public property along the line of the work.

Surplus material.

- 30 8. If all of the excavated material cannot be stored on the street in such a manner as to maintain the traffic conditions hereinbefore specified, the surplus shall be removed from the work and stored. After the construction of the sewer, so much of this material as is of satisfactory quality and necessary for the purpose shall be brought back and used for backfilling the trench.

Fence.

10. Where necessary a suitable fence shall be placed along the sides of the trench to keep the street safe for traffic.

Temporary bridges.

- 40 11. Where any crosswalk is intersected by the trench, it shall be temporarily replaced by a substantial timber bridge not less than 3 feet wide, with side railings. Where required, suitable temporary bridges for vehicles shall be provided and maintained across the trench.

Disposal of water from trenches.

12. The Contractor shall at all times during the progress of the work keep the trenches and excavations free from water.

EXHIBIT C-28 (*continued*):

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

Cost to be covered.

10

13. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 1 to 12 inclusive, except as otherwise provided, shall be covered by all the contract prices for all the items for which there are contract prices.

EARTH EXCAVATION.

20

14. Earth excavation shall include the removal of all material other than rock as hereinafter defined.

Width of trench for sewers, etc.

30

15. The minimum widths of trenches in earth, for pipe sewers, basin connections, house connection and other drains not over 18 inches in diameter, shall be such as to give a clearance inside the sheeting of 8 inches on each side of the pipe, and for those of larger diameters 10 inches on each side of the pipe, exclusive of spurs and hubs. The minimum widths of trenches in earth, inside the sheeting, for other sewers shall be the greatest external width of the structures, including the necessary forms, to be built therein.

16. Where a riser, manhole or other appurtenance or the foundation therefor extends beyond the exterior lines of the sewer or its foundation, the minimum excavation in earth, required for the same shall be that contained in a prism with vertical sides and a horizontal section equal to the smallest rectangle which will enclose such appurtenance and its foundation.

40

Excavation for receiving basins, etc.

17. The minimum dimensions of the excavation in earth, brick basin manholes and inlets, shall be such as to give a clearance inside the sheeting of 1 foot on all sides, above the foundation, but in all such cases the excavation shall be large enough to include the foundations for such structures shown on the plan. The excavation for concrete basin manholes and inlets shall be

EXHIBIT C-28 (*continued*):

of such dimensions as to permit the proper placing and removal of the necessary forms.

Depth of trenches.

10 18. The trenches shall be excavated to the depths required for the foundations of the sewers and appurtenances shown on the plan, and where the conditions are such as to make it necessary, to such additional depths as may be directed. Where pipe is laid without a cradle the bottom of the trenches shall be excavated to fit the lower third of the pipe, and excavations shall be made to receive the hubs. All irregularities in the bottoms of the trenches shall be filled up to the required grade with suitable material.

Cost to be covered.

20 19. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 15 to 18 inclusive, except as otherwise provided, shall be covered by all the contract prices for all the items for which there are contract prices.

ROCK EXCAVATION.

20. Rock excavation shall include the excavation and removal of the following materials:

30 (a) Rock which shall be determined to be of such a character as to warrant its removal by blasting, in order to insure the prompt and proper prosecution of the work.

(b) Boulders and pieces of rock, masonry in mortar and concrete, each of which contains 1 cubic yard or more, except the masonry and concrete of old sewers and their appurtenances.

40 21. Pieces of rock, masonry, concrete or boulders, which fall or slide into the trench from beyond the lines thereof, as herein defined, will not be measured, and the cost of the removal of the same shall be covered by all the contract prices for all the items for which there are contract prices.

BACKFILLING.

Backfilling around sewers, etc.

30. Unless otherwise specified or directed, all trenches and excavations shall be backfilled immediately after the struc-

EXHIBIT C-28 (*continued*):

tures are built therein. For a depth of at least 2 feet over the top of the sewer, basin connection, house connection or other drain, the material for backfilling trenches as excavated, shall be clean earth, sand or rock dust. It shall be carefully deposited in uniform layers not exceeding 6 inches in depth, and unless otherwise permitted, each layer shall be carefully and solidly tamped with appropriate tools in such a manner as to avoid injuring or disturbing the completed work.

Backfilling for remainder of trench.

31. Backfilling for the remainder of the trenches as excavated, shall be proved material free from organic matter and containing no stone over 10 inches in their largest dimensions. Any stones shall be so distributed through the mass that all interstices are filled with the fine material. This backfilling shall be deposited as directed, and unless otherwise permitted, shall be spread in layers and solidly tamped.

Backfilling around manholes, receiving basins, etc.

32. Backfilling within 2 feet of manholes, house connection drains, receiving basins, inlet basins, and other structures shall be of the same quality as that specified in paragraph 30. 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 thereon.

30 Puddling.

33. Backfilling shall, if required, be flooded or puddled with water as the work progresses, instead of being tamped.

34. When sheeting is drawn, 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 as directed.

Deficiency of filling.

40 35. Unless otherwise shown on the plan, the trenches shall be backfilled to the height of the surface of the ground as it existed at the commencement of the work. Should there be a deficiency of proper material for the purpose, the Contractor shall furnish and place such additional material as may be required.

EXHIBIT C-28 (*continued*):

Temporary bulkheads.

36. For retaining the backfilling only temporary bulkheads will be allowed over sewers, basin connections and drains. Such bulkheads shall not be of stone, and they shall be removed as the trenches are backfilled.

10 Curves, branches, etc., not to be covered.

37. Basin connections, house and sewer connections and intersections, ends of sewers and branches shall not be covered until the Engineer shall have inspected, measured and located the same, and given permission to backfill the trenches over them.

Removal of surplus material.

20 38. As the trenches are backfilled, the Contractor shall remove all surplus material and regrade and leave free, clear and in good order all roadways and sidewalks to within feet of the end of the completed work. During the progress of and until the final acceptance of the work, he shall maintain in good and safe condition the surface of the street over all the trenches, and promptly fill all depressions over and adjoining the trenches caused by settlement of the backfilling. In case of failure or neglect on the part of the Contractor to comply with the requirements of this paragraph within 24 hours after the service upon him of a written notice so to do, the President may furnish all materials and do all work required, and the cost thereof will be charged to the Contractor and deducted from any 30 moneys due or to become due him under this contract. All surplus material or any part thereof shall, if required, be deposited as directed on the streets and avenues within the limits of this contract where the same are below grade, and in such a manner as to leave the surfaces of the filled material even.

Cost covered.

40 39. The cost of all labor required to be done and all materials required to be furnished in the performance of all the work specified in paragraphs 30 to 38 inclusive, shall be covered by all the contract prices for all the items for which there are contract prices.

EXHIBIT C-28 (continued) :

CEMENT.

40. All cement used in the work shall be a high grade Portland cement of a well-established and approved brand. It shall be the product obtained by finely pulverizing clinker produced by calcining to incipient fusion, an intimate mixture of properly proportioned argilaceous and calcareous substances, with only such additions subsequent to calcining as may be necessary to control certain properties. Such additions shall not exceed 3 per cent. by weight, of the calcined product.

Specific gravity; weight.

41. The cement shall have a specific gravity of not less than 3.10 after being thoroughly dried at 212° F. It shall weigh not less than 380 pounds net, to the barrel, 4 bags of 95 pounds each being considered equivalent to a barrel.

20 Fineness.

42. The cement shall be dry, finely ground, of uniform color and free for lumps. It shall leave a residue of not more than 8 per cent. by weight, when passed through a No. 100 sieve, and not more than 25 per cent. when passed through a No. 200 sieve.

Tensile strength.

43. Standard briquettes shall develop within the periods specified, tensile strength not less than that shown in the following table.

Neat Cement :

| | |
|--|------------------------|
| 24 hours | 175 pounds per-sq. in. |
| 7 days (1 day in moist air, 6 days in water) | 500 pounds per sq. in. |
| 28 days (1 day in moist air, 27 days in water) | 600 pounds per sq. in. |

40 Mortar consisting of 1 part cement and 3 parts of Standard Ottawa Sand, by weight :

| | |
|--|------------------------|
| 7 days (1 day in moist air, 6 days in water) | 180 pounds per sq. in. |
| 28 days (1 day in moist air, 27 days in water) | 225 pounds per sq. in. |

EXHIBIT C-28 (*continued*):

The average of the tensile strengths developed at each age by the briquettes in any set made from one sample will be considered the strength of the sample at that age, excluding any results that are manifestly faulty. The average strength of briquettes at 28 days shall be greater than the average strength at 7 days, and if tests are made after 28 days the strength shall be not less than that at 28 days.

10

Soundness.

44. Pats of neat cement when tested for constancy of volume or soundness shall remain firm and hard and show no sign of checking, cracking, distortion or desintegration.

Setting.

45. Unless otherwise required, the cement shall not develop initial set in less than 30 minutes, and shall develop final set in not less than 1 hour nor more than 10 hours. Quick-setting cement of an approved brand shall, if required, be kept on the work in sufficient quantity to provide for any contingency requiring the use of the same.

20

Testing.

46. The cement will be subjected to such tests as the Engineer may deem necessary, and such tests will be made in accordance with the methods recommended by the Committee on Uniform Tests of Cement of the American Society of Civil Engineers, except that the time of setting will usually be determined by means of the Gilmore needles. In case of dispute as to the time of setting, this test will be made by means of the Vicat needle.

30

Retesting.

47. Any cement which shall have been kept in storage after testing for a sufficient time to warrant it, shall be retested. Any prior acceptance shall be considered void and the acceptance or rejection of the cement shall depend upon the results of the latest tests.

40

Approval of brand may be rescinded.

48. The Engineer may at any time rescind the approval of any brand of cement that develops objectionable qualities.

EXHIBIT C-28 (*continued*):

Samples.

49. The Contractor shall notify the Engineer of the arrival of cement on the work, and furnish such facilities as may be required for obtaining samples for testing. Samples will be taken so as to fairly represent the material. The number of packages sampled and the quantity to be taken from each will depend upon the importance of the work and the number of tests to be made.

Delivery and storing.

50. Cement shall be delivered on the work in barrels or approved bags of uniform size, with the brand and the name of the manufacturer plainly marked thereon; it shall be immediately stored in a dry place and carefully protected from the weather. A sufficient stock of cement shall be kept on the work in advance of the necessity for its use to permit of the making of the required seven day tests. Except by written permission, no cement shall be used before it has been tested and accepted, and any concrete or masonry which may have been made under such permission with cement that is subsequently rejected, shall be removed and replaced by the Contractor, at his own expense, with concrete or masonry made of accepted cement.

Cost to be covered.

51. The cost of furnishing, storing and incorporating cement in the work, and the cost of samples required for testing, shall be covered by the contract prices for the structures or classes of work in connection with which the cement is used.

MORTAR.

52. All mortar used in the work, unless otherwise specified, shall be composed of 1 volume of cement, as in the original package, and $2\frac{1}{2}$ volumes of sand. Where required, mortar of cement and sand in other proportions or mortar of neat cement shall be used as directed.

Sand.

53. Sand shall be composed of grains of clean, sharp quartz, not softer than hard limestone. It shall be moderately coarse and preferably made up of grains of varying size not exceeding one-quarter ($\frac{1}{4}$) inch producing a mass with low per-

EXHIBIT C-28 (*continued*):

centage of voids. It shall not contain, in all, more than five (5) per cent, by volume of clay, loam, mica, scales, silt, or other objectionable inorganic matter, nor more than one (1) per cent. of organic matter.

10 Tests may also be made of the cement and sand used in the proportions of one (1) part cement to three (3) parts sand, and these tests must show at least 70 per cent. of the strength of the mortar made with the cement and standard sand, or the sand may be rejected.

Mixing.

20 54. Mortar shall be mixed in a suitable box or on a tight platform, and never upon the pavement or ground. The cement and sand shall be thoroughly mixed dry, until the mixture has a uniform color. Clean, fresh water shall then be added and the mass worked until a mortar, which is uniform and of the required consistency is produced. The mortar shall be mixed in no greater quantity than is required for the work in hand, and any that has set sufficiently to require retempering shall not be used.

Freezing weather.

55. The mixing and use of mortar in freezing weather shall be subject to the same requirements as hereinafter specified for mixing and placing concrete under similar conditions.

30 Cost covered.

56. The cost of all labor and materials required to furnish and place the mortar in the work, as specified, shall be covered by the contract price for the structure or class of work in connection with which the mortar is used.

CONCRETE.

Class A concrete.

40 57. Class A concrete shall be made of 1 part of cement, 2 parts of sand and 4 parts of broken stone or gravel.

58. Broken stone for Class A concrete shall be approved trap rock, dense fine-grained blue limestone or granite broken into roughly cubical or pyramidal fragments. Broken stone which contains dust, loam, clay, organic matter or other improper substances shall not be used. Broken stone for Class A concrete shall be the run of the crusher that will pass through a

EXHIBIT C-28 (continued) :

screen with circular openings $1\frac{1}{4}$ inches in diameter and shall be retained on a screen with openings $\frac{1}{8}$ -inch in diameter. Gravel shall be equal in quantity to North Shore Long Island gravel, shall be clean and sound, and shall be of the sizes herein specified for broken stone.

Measuring ingredients.

- 10 67. For the purpose of determining the proportions of the materials for concrete, each bag of cement will be considered as containing $\frac{9}{10}$ cubic foot, and the other ingredients shall be measured by an approved method.

Water.

68. Only clean fresh water shall be used for concrete.

Mixing.

- 20 69. Unless permitted to be mixed by hand, concrete shall be mixed in approved mechanical batch mixers, so constructed and operated that the ingredients of the concrete may be accurately measured and thoroughly mixed. Enough water shall be added during the mixing to bring the concrete to the required consistency, which generally shall be such that the concrete may be poured into place without causing the separation of the stones from the mortar. When concrete is mixed by hand the broken stone or gravel shall be spread on a tight platform in a bed about 6 inches deep and shall be thoroughly wetted. The cement and sand shall be mixed dry on a suitable platform, until the mixture has a uniform color. This mixture shall be spread evenly on the bed of wet stone, water added, and the entire mass turned until each piece of stone is entirely coated with mortar and a concrete produced which is uniform and of the consistency herein specified for machine mixed concrete. When a comparatively dry concrete is required it shall be mixed to such consistency as may be directed.
- 30

40 Placing concrete.

70. Concrete shall be mixed only in such quantity as is required for the work in hand, and any that has set sufficiently to require retempering shall not be used. Any concrete in which the water has separated from the solid matter shall be satisfactorily remixed before being placed. The concrete shall be so deposited in the work as to prevent the separation of the stone from the mortar. It shall be deposited in as nearly a continuous

EXHIBIT C-28 (*continued*):

operation as practicable and shall be tamped or spaded with suitable tools to expel air bubbles and produce a dense and compact mass. When the operation of placing concrete is interrupted the concrete in the work, shall, if required, be confined by suitable temporary forms or bulkheads. When concrete is to surround reinforcing metal, structural steel, or wire netting, it shall be so deposited as to work closely around such material. When
10 a comparatively dry concrete is used it shall be deposited in horizontal layers not exceeding 6 inches in depth and solidly tamped.

Joining old and new concrete.

71. When fresh concrete is to be laid on or adjoining concrete already set, the surface of the latter shall be thoroughly cleaned, washed, and roughened, and coated with a grout of neat cement before the fresh concrete is deposited.

20 Forms and centres.

72. The Contractor shall provide all necessary forms and centres for shaping concrete wherever used. They shall be true to the required shapes and sizes, strong enough and so secured in place as to withstand all operations incidental to placing the concrete, and watertight, and the faces against which the concrete is to be placed shall be satisfactorily smooth and clean. Timber used in forms and centres for exposed faces of concrete shall be seasoned stock. Unless otherwise permitted, those sur-
30 faces of forms and centres which will be in contact with concrete shall be coated as directed with an approval lubricant; when no lubricant is required such surfaces shall be thoroughly wetted just before the concrete is placed.

Removal of forms and centres.

73. The forms and centres shall be left in place until the concrete has set sufficiently to permit their removal without danger to the structure, and until so much of the backfilling or
40 embankment as may be directed has been put in place. No forms or centres shall be struck or removed until permission to do so has been given.

Exposed surfaces.

74. Special care shall be used to secure a smooth and uniform finish to the surfaces of concrete which will be exposed in the completed structure. Immediately after the removal of

EXHIBIT C-28 (*continued*) :

the forms such surfaces, if uneven, shall be rubbed smooth to a uniform and satisfactory finish, all exposed edges of concrete shall be neatly rounded as directed, and if any voids, projections or other imperfections be found, such defects shall at once be corrected by tooling, cutting out and filling with mortar, or otherwise, as directed.

10 Expansion joints.

75. Expansion joints shall be provided in such manner and at such places as are shown on the plan or as may be directed. All unavoidable joints shall be made as shown on the plan or as directed.

Freezing weather.

20 77. In freezing weather, until the temperature falls to 24 degrees Fahrenheit the water used for concrete shall, if directed, be heated to an approved temperature, and if directed, one per cent. by weight of salt shall be added to the water for each degree Fahrenheit that the temperature of the air is below 32 degrees Fahrenheit. The other materials for the concrete shall be heated sufficiently to remove all frost and ice. No concrete shall be laid when the temperature of the air is below 24 degrees Fahrenheit.

Protection.

30 78. Concrete shall be allowed to set for such time as may be directed before being worked or walked upon, or before filling, backfilling or other material is placed upon or against it. It shall not be flooded with water until it has sufficiently set. Concrete shall be carefully protected from injury, from freezing and from the drying effects of the sun and wind by covering it with canvas, bagging, hay or other suitable and approved materials. Such protection shall be placed as soon as the concrete is in condition to receive it, and except in freezing weather, the covering as well as the concrete shall be kept wet for such time as may be directed.

Measurement.

40 79. The cost of all concrete and the requirements specified in connection therewith shall be covered by the contract price for the structure in connection with which it is used.

BRICK MASONRY.

Quality of bricks.

81. All bricks used in the work shall be sound and hard burned throughout, and of uniform size and quality. If required

EXHIBIT C-28 (*continued*):

the bricks shall be culled immediately after they are brought on the work and all bricks which are warped, cracked or of improper quality shall be at once removed. The proportion of bats permitted will be determined according to the character and location of the work in which they are to be used. When bricks are used as the lining for inverts of sewers they shall be specially selected, and no bats shall be used except for closers.

10

How laid.

83. Bricks shall be satisfactorily wet when being laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The joints shall be not wider than $\frac{3}{8}$ inch, except when the bricks are laid radially, in which case the narrowest part of the joint shall not exceed $\frac{1}{4}$ inch. The bricks shall be laid in a workmanlike manner, true to line, and wherever practicable the joint shall be carefully struck and pointed on the inside. Brickwork shall be laid with a satisfactory bond, and as it progresses shall be racked back in courses, unless otherwise permitted.

20

Protection.

84. All fresh brickwork shall be carefully protected from freezing and from the drying effects of the sun and wind, and if required, it shall be sprinkled with water at such intervals and for such a time as may be directed. Brickwork shall be protected from injuries of all sorts, and all portions which may become damaged or may be found defective shall be repaired, or if directed, be removed and rebuilt.

30

Freezing weather.

85. In freezing weather bricks shall be heated sufficiently to remove all ice and frost.

Price to cover.

86. The cost of all brick masonry shall be covered by the contract price for the structure in connection with which it is used.

40

STEEL REINFORCEMENT BARS.

Shape.

112. Steel bars for reinforcing concrete shall be of such shape as to afford an approved mechanical bond with the concrete at frequent intervals and to insure intimate contact between

EXHIBIT C-2S (continued):

the steel and concrete. Plain bars may be used only when shown on the plan.

Samples.

113. The Contractor shall indicate the type of bars proposed to be used, and if required shall furnish samples thereof, and he is cautioned not to place the order for the bars until the type has been approved.

Size.

114. Each bar shall have a net cross sectional area equivalent to that designated on the plan or required, or it shall be the commercial size of the approved type of bar having a net cross sectional area next larger than that designated or required.

Variation in weight.

115. Reinforcement bars will be rejected if their actual weight varies more than 5 per cent. from their theoretical weight as shown by the manufacturer's tables.

Quality.

116. All steel for reinforcement bars shall be made by the open hearth process and shall conform to the latest revised Standard Specifications for Steel Reinforcement Bars adopted by the American Society for Testing Materials, and such tests as may be required, shall be made in accordance therewith, and at the places hereinafter specified. The chemical and physical properties of the steel shall be as follows:

| Properties Considered | Structural Steel Grade | | Hard Grade* | | Cold Twisted Bars |
|--|------------------------|----------------------|----------------------|----------------------|----------------------|
| | Plain Bars | Deformed Bars | Plain Bars | Deformed Bars | |
| Phosphorus, max. | | | | | |
| Bessemer | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Open Hearth | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Ultimate Tensile Strength, pounds per sq. in. | 55,000-70,000 | 55,000-70,000 | 80,000 min. | 80,000 min. | Recorded only |
| Yield Point, minimum pounds per sq. in. | 33,000 | 33,000 | 50,000 | 50,000 | 55,000 |
| Elongation, minimum per cent. in 8 inches | <u>1,400,000</u> | <u>1,250,000</u> | <u>1,200,000</u> | <u>1,000,000</u> | 5 per cent. |
| | tens. str. | tens. str. | tens. str. | tens. str. | |
| Cold bend without fracture: | | | | | |
| Bars under ¾ in. in diam. or thickness | 180° to diam. of 1t. | 180° to diam. of 1t. | 180° to diam. of 3t. | 180° to diam. of 4t. | 180° to diam. of 2t. |
| Bars ¾ in. in diam. or thickness and over ... | 180° to diam. of 1t. | 180° to diam. of 2t. | 90° to diam. of 3t. | 90° to diam. of 4t. | 180° to diam. of 3t. |

t: Nominal thickness or diameter of bar. * The hard grade will be used only when specified.

EXHIBIT C-28 (*continued*):

117. Reinforcement bars shall be rolled from billets of new steel; they shall be straight and free from seams, flaws, cracks and imperfections of all kinds.

Tests and inspections.

10 119. Test pieces 18 inches long may be cut from any of the bars delivered on the work, and the failure of any test piece to meet the specified requirements, or the failure of any bar when being bent will be sufficient cause for the rejection of all steel from the melt from which the test piece or bar was made.

Delivery and protection.

20 121. Bars shall be delivered in bundles, to each of which shall be securely wired a metal tag with the number of the melt from which the bars were made stamped thereon. The bars shall be protected at all times from mechanical injury and from the weather and when placed in the work they shall be free from dirt, scale-rust, paint and oil. Bars which are not to be embodied in concrete within a short time after being placed in the work shall, if directed, be immediately coated with a thin grout of equal parts of cement and sand.

Cutting and bending.

30 122. The bars shall be bent to the shapes shown on the plan and in conformity with approved templates. When bars are cut and bent on the work, the Contractor shall employ competent men and shall provide the necessary appliances for the purpose.

Placing.

123. All bars shall be as long as can be conveniently used, accurately bent, placed, spaced and jointed as shown or directed, and they shall be securely held in their required positions by approved devices until the concrete has been placed around them.

Joints.

40 124. Where more than one bar is necessary to complete the required length the joints shall be made by means of approved clamps which will develop the full strength of the bars or by looping the ends of the bars around each other in such a manner as to produce and maintain tension on the joint during construction or by lapping the ends of the bars, as directed, and wiring them together in an approved manner, or by lapping the ends of

EXHIBIT C-28 (*continued*):

the bars for a distance of 30 times their nominal diameters for deformed bars, and 40 times their nominal diameters for plain bars, and with a space not less than 2 inches between them. Laps of longitudinal bars below the standard sewer sections shall be 6 inches in length unless otherwise shown on the plan or directed. Joints in longitudinal bars shall be staggered as directed.

10

Price to cover.

125. The cost of all steel reinforcement bars and the requirements specified in connection therewith shall be covered by the contract price for the structure in connection with which it is used.

WROUGHT IRON.

Quality.

20

132. Wrought iron shall be double rolled, tough, fibrous and uniform in quality. It shall be thoroughly welded in rolling and be free from surface defects. It shall have an ultimate tensile strength of at least 48,000 pounds per square inch, an elongation of at least 20 per cent. in 8 inches, and a fracture wholly fibrous. Specimens shall bend cold, with the fiber, through 180 degrees around a diameter equal to the thickness of the piece tested. When nicked and bent the fracture shall be at least 90 per cent. fibrous.

30

Galvanizing painting.

133. Exposed wrought iron shall be thoroughly and uniformly galvanized.

Price to cover.

134. The cost of all wrought iron and the requirements specified in connection therewith shall be covered by the contract price for the structure in connection with which it is used.

IRON CASTINGS.

40

Quality.

136. Iron castings shall be of the best foundry pig iron, gray, tough and free from cold shuts, blow holes and other imperfections. The weight shall be conspicuously painted by the manufacturer with white oil paint on each casting. The castings shall be sound, clean and neatly finished. Where required, castings shall be thoroughly coated with coal tar pitch varnish.

EXHIBIT C-28 (*continued*):

Side walls.

155. Concrete in the side walls of sewers shall be deposited continuously to the height directed and for such longitudinal distances as may be convenient.

Roof.

- 10 156. Concrete in the roofs of sewers shall be deposited continuously for the full depths and widths of the roofs and for such longitudinal distances as may be convenient. The outer surfaces of roofs shall be finished with an excess of mortar and left true and smooth. They shall be covered and protected as specified in paragraph 78, and such covering shall remain thereon until the backfilling or embankment is placed.

Bulkheads.

- 20 157. While being deposited the concrete for sewers shall be confined by temporary, vertical bulkheads placed at such intervals longitudinally as may be required for convenient working. The bulkheads shall be so designed as to give an approved shape to the end of the section of concrete under construction, shall be satisfactorily secured in place before the concrete is deposited, and shall remain in place until the concrete has set sufficiently to hold its shape.

Reinforcement.

- 30 158. Where shown on the plan concrete sewers shall be reinforced with metal of the dimensions and shapes shown, and of the quality and in the manner hereinbefore specified.

Minimum length of invert.

159. Unless otherwise permitted or ordered, not less than 16 feet of foundation or invert for concrete sewer shall be built at one operation.

Connections.

- 40 160. Connections and branches for lateral sewers and receiving basins shall be built in where shown on the plan or where directed. Such connections and branches shall be closed with bulkheads of brick masonry 8 inches thick unless otherwise shown on the plan. All necessary openings and bulkheads for branch sewers shall be built in concrete sewers where shown on the plan or where directed.

EXHIBIT C-28 (*continued*):

Measurements.

161. The lengths of concrete sewers will be determined by horizontal measurements, along their centre lines. No deductions will be made on account of openings at branches and man-holes. The measurement of a branch concrete sewer will be made from the inner surface of the wall of the main sewer through
10 which it enters. A reducer will be paid for at the contract price for the sewer at the larger end thereof.

Prices to cover.

162. The contract prices for concrete sewers shall cover the cost of all necessary excavation (except rock); of furnishing, maintaining and removing all forms, centres, templets and temporary bulkheads; of all openings and bulkheads; of all back-filling; and of all labor and materials required to construct concrete sewers as shown by the normal sections on the plan and as
20 specified.

VITRIFIED PIPE SEWERS.

Vitrified pipe.

168. Vitrified pipe sewers shall be built of shale or clay hub and spigot pipes with deep and wide sockets. They shall be thoroughly and perfectly burned, without warps, cracks or other imperfections, and shall be fully and smoothly salt-glazed over the entire inner and outer surfaces, except that the inside of the
30 hub and the outside of the spigot may be unglazed for two-thirds the depth of the hub. On all other portions of the pipe the glazing shall completely cover and form an integral part of the pipe body. If not left unglazed the inside of the hub and the outside of the spigot shall be scored in 3 parallel lines extending completely around the circumference. When it is broken, vitrified pipe shall show dense and solid material, without serious cracks or laminations; it shall be of such toughness that it can be worked with a chisel and hammer, and when struck with a hammer, it shall
40 have a metallic ring.

Identification marks.

169. Each pipe shall have clearly impressed on its outer surface the name of the manufacturer and of the factory in which it was made.

EXHIBIT C-28 (continued) :

Shape and dimensions.

170. The sizes of the pipes are designated by their interior diameters. Each pipe shall be a cylinder with a circular section, and shall have a uniform thickness. The minimum lengths, thicknesses, depths of hubs and annular spaces for the respective sizes of pipe shall be as follows :

| 10 | Size | Length | Thickness | Depth of Socket | Annular Space |
|----|---------|---------|-----------|-----------------|---------------|
| | 6..... | 2 feet | 5/8 inch | 2 1/2 inches | 5/8 inch |
| | 8..... | 3 " | 3/4 " | 2 3/4 " | 5/8 " |
| | 10..... | 3 " | 7/8 " | 2 3/4 " | 5/8 " |
| | 12..... | 3 " | 1 " | 3 " | 5/8 " |
| | 15..... | 3 " | 1 1/4 " | 3 " | 5/8 " |
| | 18..... | 3 " | 1 1/2 " | 3 1/4 " | 5/8 " |
| | 20..... | 3 " | 1 2/3 " | 3 1/2 " | 5/8 " |
| 20 | 22..... | 3 " | 1 5/6 " | 3 3/4 " | 5/8 " |
| | 24..... | 3 " | 2 inches | 4 " | 5/8 " |
| | 27..... | 2 1/2 " | 2 1/4 " | 4 " | 3/4 " |
| | 30..... | 2 1/2 " | 2 1/2 " | 4 " | 3/4 " |
| | 33..... | 2 1/2 " | 2 5/8 " | 5 " | 1 1/4 " |
| | 36..... | 2 1/2 " | 2 3/4 " | 5 " | 1 1/4 " |
| | 42..... | 2 1/2 " | 3 1/2 " | 5 " | 1 1/4 " |

Curves, bends, etc.

30 171. Where curved pipes are required they shall be furnished in either one-eighth or one-quarter bends of their respective sizes. Curved pipe, bends, siphons, and special pipe of the sizes and forms shown on the plan shall be furnished and laid, and unless otherwise provided they will be paid for at the contract prices for the corresponding sizes of vitrified pipe sewers.

Samples for testing.

40 172. Any or all of the following tests may be applied to samples selected from the pipe delivered on the work. For the purposes of making such tests as may be required the Contractor shall furnish and deliver when and where directed one length of pipe for each 200 feet of pipe sewer to be laid.

Crushing tests.

173. When supported at the bottom upon a knife edge one inch in width in such manner that an even bearing is provided

EXHIBIT C-28 (continued) :

throughout the whole length, exclusive of the bell, and pressure is applied at the crown uniformly through a similar knife edge, the various sizes of pipe shall withstand the following pressures :

| | | Diameter | Pressure | | | |
|----|--|----------------|----------|------|-----|----------|
| | | 6 inches | 900 | lbs. | per | lin. ft. |
| 10 | | 8 " | 900 | " | " | " " |
| | | 10 " | 1,000 | " | " | " " |
| | | 12 " | 1,050 | " | " | " " |
| | | 15 " | 1,250 | " | " | " " |
| | | 18 " | 1,400 | " | " | " " |
| | | 20 " | 1,550 | " | " | " " |
| | | 22 " | 1,750 | " | " | " " |
| | | 24 " | 1,950 | " | " | " " |
| | | 27 " | 2,150 | " | " | " " |
| | | 30 " | 2,350 | " | " | " " |
| 20 | | 33 " | 2,500 | " | " | " " |
| | | 36 " | 2,800 | " | " | " " |
| | | 42 " | 3,200 | " | " | " " |

Drop weight test.

174. When supported on a dry sand bed 2 inches deep, all pipe shall withstand without cracking the impact from 2 blows of a cast iron ball weighing 8 pounds falling 18 inches. Spurs shall resist without fracture the impact from 2 blows of such a ball falling 6 inches and striking on the extreme end of the hub of the spur.

Hydrostatic test.

175. When subjected to an internal hydrostatic pressure of 8 pounds per square inch, vitrified pipe shall show no percolation.

Absorption test.

176. After having been thoroughly dried and then immersed in water for 24 hours, sample pieces of pipe with all broken edges shall not absorb more than 4 per cent. of their weight of water.

Factory rejection.

177. 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 where the

EXHIBIT C-28 (*continued*) :

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

Cradles.

178. In earth trenches pipe sewers shall be laid in concrete cradles when required by the plan.

10 Without cradle.

179. When the sewer is to be laid without a cradle the trench shall be excavated as specified in paragraph 18 and the earth forming the bed carefully freed of stones. The pipe shall then be evenly bedded therein and the backfilling placed and firmly tamped in such a manner as to avoid disturbing the sewer.

Concrete cradle.

20 180. When the sewer is to be laid in a concrete cradle, the concrete for the full width of the cradle shall be deposited continuously to the height of the outside bottom of the pipe. Before the concrete has set the pipe shall be evenly bedded therein and the remainder of the concrete immediately deposited and carefully tamped in such a manner as to avoid disturbing the sewer.

How laid.

30 182. All pipes shall be laid with ends abutting and true to line and grade. The pipes shall be fitted together and matched so that when laid in the work they will form a sewer with a smooth and uniform invert. Unless otherwise permitted or directed, not less than 12 feet of pipe sewer shall be laid in one operation.

183. Unless otherwise shown on the plan, the joints of vitrified pipe sewers shall be made as hereinafter specified in paragraph 185.

Gasket and mortar joints.

40 185. Gasket and mortar joints shall be made in the following manner: A closely twisted hemp or oakum gasket of suitable diameter, in no case less than $\frac{3}{4}$ -inch, and in one piece of sufficient length to pass around the pipe and lap at the top, shall be solidly rammed into the annular space between the pipes with a suitable calking tool. Before being placed, the gasket shall, if desired, be saturated with neat cement grout. The remainder of

EXHIBIT C-28 (*continued*):

the space shall then be completely filled with plastic mortar mixed 1 to 1½, and the joint wiped inside and finished to a smooth level outside.

Inspection of joints.

- 10 186. Unless otherwise permitted, at least 4 finished joints shall be left exposed for inspection throughout the working day, and the necessary staging for the protection of the exposed sewers and for the handling of excavated material shall be provided. A suitable ladder affording easy access for such inspection shall be furnished at every trench open for the proposed sewer.

Subgrade to be tested.

187. No pipe shall be laid or placed until the subgrade of the trench shall have been tested and found correct.

- 20 Sewer to be kept clean.

188. The interior of the sewer shall, as the work progresses, be cleared of all dirt, cement and superfluous materials of every description.

Backfilling.

- 30 189. Immediately after the sewer is laid the trench shall be backfilled as provided in paragraphs 30 to 38 inclusive and 186. No walking on or working upon the completed sewer (except as may be necessary in tamping the backfilling) will be permitted until the trench has been backfilled to a height of at least 2 feet over the top of the sewer.

Temporary covers.

190. The exposed ends of pipe sewers shall be provided with approved temporary covers fitted to the pipe so as to exclude earth and other materials.

Branch pipes.

- 40 191. Branch pipes and connection pipes shall be of the same quality and dimensions, and laid in the same manner as specified for vitrified pipe sewers. Dead ends of pipes shall be closed with bulkheads of brick masonry 8 inches in thickness.

Connection with existing work.

192. Wherever the proposed sewer is to connect with an existing manhole or sewer in which there is a branch pipe which

EXHIBIT C-28 (*continued*):

is damaged or of unsuitable size or in improper position, such pipe shall be removed and be replaced with a pipe of suitable size or be reset in the proper position. The pipe so substituted or reset will be paid for at the contract price, for the corresponding size of pipe sewer.

Pipes cut to fit masonry.

- 10 193. The ends of pipes which enter masonry shall be neatly cut to fit the face of the masonry. When directed, such cutting shall be done before the pipes are built in.

Measurement.

194. The length of pipe sewers to be paid for will be determined by horizontal measurements along their center lines, and no deductions will be made on account of openings at manholes.

- 20 194a. Where a pipe sewer is laid in concrete cradle, the length to be paid for shall include the distance through the manhole at the upper end thereof.

Prices to cover.

- 30 195. The contract prices for vitrified pipe sewers shall cover the cost of all necessary excavation (except rock); of all cradles required; of all necessary trimmings, fitting and building into masonry; of all bulkheads; of all backfilling; of all samples furnished; and of all labor and materials required to furnish and lay the sewers complete in place, as shown on the plan and as specified.

BASIN CONNECTIONS.

- 40 206. The connections between inlets and basin manholes and between basin manholes and sewers or sewer manholes shall be of vitrified pipe of the size shown on the standard details on file in the Engineer's Office, Bureau of Engineering Construction, Division of Sewers. The pipes shall be of the same quality and dimensions, and laid in the same manner as hereinbefore specified for vitrified pipe sewers.

Measurement.

207. The lengths of basin connections to be paid for will be determined by measurements along their axes.

EXHIBIT C-28 (*continued*):

Prices to cover.

208. The contract price for basin connections shall cover the cost of all necessary excavation (except rock); of all necessary trimming, fitting and building into concrete, or masonry; of all backfilling; and of all labor and materials required to furnish and lay the basin connections complete in place as specified.

SPURS FOR HOUSE CONNECTIONS.

213. Spurs for house connections shall be of vitrified pipe 6 inches in diameter, equal in quality and dimensions to that specified for vitrified pipe sewers.

In concrete sewers.

214. In concrete sewers spurs shall be built in as shown on the plan or as directed. They shall be hub and spigot pipes with the spigot end molded or cut to fit flush with the inner surface of the sewer, and of sufficient length to reach the exterior of the sewer.

In pipe sewers.

215. Pipes having 6-inch spurs with hubs molded thereon shall be furnished and laid in pipe sewers where shown on the plan or directed. Such pipes will be paid for at the contract prices for vitrified pipe sewers, and the spurs will be paid for in addition at the contract price for spurs.

Covers.

216. The ends of all spurs not connected with drains shall be closed with approved covers. If required such covers shall be cemented in place, and when directed the covers shall be so cemented before the pipes are lowered into the trench.

Price to cover.

217. The contract price for spurs shall cover the cost of all labor and materials required to furnish and place the same as specified, and the cost of furnishing and cementing the covers for the same.

EXHIBIT C-28 (*continued*):

DRAINS FOR HOUSE CONNECTIONS.

218. Where shown on the plan or where directed, drains for house connections shall be built from the spurs in such a manner and for such distance as may be shown or directed.

Depth at curb.

- 10 219. House connections drains shall be laid with a minimum gradient of $\frac{1}{4}$ inch to a foot, and wherever possible the depth from curb grade to the inner bottom of the drain at curb line shall be at least 8 feet.

Material.

- 20 220. Unless otherwise shown on the plan, drains for house connections shall be of vitrified pipe of the quality and dimensions specified for vitrified pipe sewers. The ends of the drains shall be closed with approved covers.

How laid.

221. All the requirements, as hereinbefore specified, relating to excavation, laying and backfilling of vitrified pipe sewers shall apply, as far as they are applicable, to drains for house connections.

Measurement.

- 30 222. The lengths of pipe drains for house connections to be paid for will be determined by measurement along their axes.

Price to cover.

- 40 223. The contract price for drains for house connections shall cover the cost of all necessary excavation (except rock); the cost of all backfilling; the cost of all covers, bends and specials required; and the cost of all labor and materials required to furnish and lay the drains for house connections complete in place, as specified.

MANHOLES.

227. The masonry or concrete for manholes shall be built to within such distances of the existing surface of the ground as directed. The masonry or concrete shall, if directed, be covered with an approved reinforced concrete slab to support the head.

EXHIBIT C-28 (*continued*):

Brick manholes.

228. Brick manholes shall be formed by means of templets placed at top and bottom with not less than 8 lines drawn between them, and they shall be smoothly and evenly plastered on the outside with a layer of mortar $\frac{1}{2}$ -inch thick. When manholes extend above the existing surface of the ground, the entire exposed surface shall be coated with 2 coats of whitewash.
- 10

Concrete manholes.

229. Concrete manholes shall be built of the materials, sizes and dimensions shown on the plan.

Steps.

230. Galvanized wrought iron steps of the size and shape shown on the plan shall be firmly built into the manholes at vertical intervals of about 16 inches.
- 20

Head and cover.

231. The manhole head and cover shall be of cast iron, and unless otherwise shown on the plan, each head, exclusive of cover, shall weigh not less than 475 pounds and each cover shall weigh not less than 135 pounds. The weight of each head and cover shall be conspicuously painted thereon by the manufacturer with white oil paint. The head shall be set on the masonry or concrete in a full bed of stiff mortar.
- 30

Price to cover.

233. The contract price for manholes shall cover the cost of all necessary excavation (except rock); of all backfilling; of all plastering; of all whitewashing; of all concrete slabs; of all steps; and of all labor and materials required to construct the same complete, in place, as shown on the plan and specified.

BASIN MANHOLES.

40 Brick basin manhole.

234. Brick basin manholes shall be formed by means of templets placed at top and bottom with not less than 10 vertical lines drawn between them.

235. Where the walls of brick basin manholes are not built of two rings of brickwork with a mortar layer between, the

EXHIBIT C-28 (*continued*) :

inside of the brickwork shall be smoothly and evenly plastered with a layer of 1 : 2 Portland cement mortar $\frac{1}{2}$ -inch thick.

236. Where the wall of the basin manhole consists of two rings of brickwork, with a mortar layer between, the outer ring shall be carried up not less than 1 foot in advance of the inner ring, and the inner surface of the former shall be plastered with
10 two coats of mortar. The second coat of mortar shall be applied before the first is set, and the total thickness of the mortar layer shall be 1 inch.

Concrete basin manholes.

237. Concrete basin manholes shall, if required, be built in such a manner that the bottom and sidewalks shall be formed in one continuous operation. Concrete basins shall be coated with a grout of neat cement on the inside.

- 20 Concrete cover slabs.

238. Concrete cover slabs of basin manholes shall be built of Class "A" concrete, reinforced as shown on plan.

Head, cover and trap.

239. The basin manhole head and cover shall be of cast iron, as shown on plan, and known as a Standard Sidewalk Manhole Head and Cover. Each head exclusive of cover shall weigh not less than 260 pounds and each cover shall weigh not less
30 than 100 pounds. An iron hood or trap, of the size and dimensions shown on the plan, must be burnished by the Contractor for each basin manhole, and is to be built into the basin manhole, as shown on plan.

Restoration of side-walks, curbs, etc.

240. All sidewalk pavements and curbs, disturbed by the construction of basin manholes, shall be restored by the Contractor in accordance with the specifications for similar work
40 of the Bureau of Highways.

Price to cover.

241. The contract price for basin manholes shall cover the cost of all necessary excavation (except rock); of all back-filling; of all sidewalk and curb restorations; and of all labor and materials required to construct the basin manholes complete in place, as shown on the plan and specified.

EXHIBIT C-28 (*continued*):

INLETS.

242. Inlets and the heads therefor shall be of the materials, forms and dimensions shown on the plan. The specifications for brickwork and concrete shall be those hereinbefore specified for basin manholes.

10 Heads.

243. The head shall be of cast iron and shall conform in all respects to the specifications for iron castings. If required, the inlets shall be closed with bulkheads of brick masonry and such bulkheads shall be removed when directed.

Restoration of roadway, pavements, etc.

20 244. All roadway pavements, sidewalk pavements and curbs, disturbed by the construction of inlets, except those under guarantee for maintenance shall be restored by the Contractor in accordance with the specifications of the Bureau of Highways for similar work or specifications hereafter attached. In unpaved streets and macadamized streets where the inlets are approximately at the surface of the street a space of two and one-half ($2\frac{1}{2}$) feet adjoining such inlets shall, if required, be paved with approved paving blocks.

Price to cover.

30 245. The contract price for inlets shall cover the cost of all necessary excavation (except rock); of all backfilling; of the temporary brick bulkheads in the mouths of the inlets, when required; of all roadway, sidewalk and curb restorations; of all labor and materials required to construct the inlets, complete in place, as shown on the plan and specified.

RESTORATION OF SURFACE AND CLEANING UP.

Restoration of unpaved roadways, sidewalks, etc.

40 254. At such time as may be directed, all unpaved roadways, gutters and sidewalks affected by the work done under this contract shall be restored by the Contractor to the same condition in which they were at the time of the opening of bids for this contract.

EXHIBIT C-28 (*continued*) :

Pavements, etc., restored by Contractor.

256. If required by the plan, roadway and sidewalk pavements, cross-walks, curbs, etc., shall be satisfactorily constructed and adjusted by the Contractor at such times as may be directed. Sidewalk pavements shall be restored in whole flags, squares or sections which shall correspond in quality and appearance with
10 the original or adjoining flags, squares or sections. All work and materials used in such restoration and adjustment shall conform in all respects to the standard specifications now in use by the President for similar work and materials.

RESTORING SHEET ASPHALT PAVEMENTS AND FOUNDATIONS WHERE INJURED OR DISTURBED.

Wherever a sheet asphalt pavement or foundation is taken
20 up or injured in connection with the operation of this sewer contract, the trench and foundation shall be prepared as described herein, and the sheet asphalt pavement shall be restored as described in Specification No. 895, on file in Bureau of Engineering Construction, Division of Highways, and the contractor shall be responsible for its maintenance for a period of six months as per Paragraph 42 of contract.

The trench shall be excavated to nine (9) inches below
30 the grade of the street, and if any unsuitable, soft or spongy material is exposed it shall also be removed and replaced with enough good acceptable material to bring the trench to the proper grade after compacting. The earth in the trench shall then be compacted by tamping or flushing, or both, as directed by the Engineer, until a firm surface is obtained parallel with the surface of the finished pavement.

Any loose or depressed parts of the old concrete foundation adjacent to the trench shall be removed and the face of the old foundation shall be cut back so that the upper edge slants
back about two (2) inches.

40 After the faces of the old concrete have been thoroughly washed and cleaned, a new concrete foundation, consisting of a 1-3-6 mix, shall be deposited in the trench to a thickness of six (6) inches except around manholes, where it shall be increased to eight (8) inches.

EXHIBIT C-28 (*continued*):

The concrete foundation must remain undisturbed until sufficiently set and be protected from traffic for at least forty-eight (48) hours.

If the sheet asphalt adjacent to the trench has become settled or depressed on account of the trench it shall be cut back far enough so that a good joint is obtained.

10

RELAYING OLD STONE BLOCK OR VITRIFIED BRICK PAVEMENTS.

The trench shall be excavated to subgrade and should any spongy, soft or other unfit material be disclosed, it shall be removed and replaced by good acceptable material.

The trench shall then be thoroughly flushed until no more settlement in the fill occurs.

20

Any depressions that have developed, during flushing shall be refilled with good material and rammed, rolled, or flushed as directed.

The entire surface of the trench shall then be rolled or tamped until it is parallel to the contour of the pavement and at the proper subgrade.

30

When the pavement adjacent to the trench has settled, the contractor shall remove it and compact the earth in the same manner as in the trench proper.

On the bed thus prepared, a bed of clean coarse dry sand shall be spread to a depth of not less than one (1) inch or more than two (2) inches for stone blocks and not less than one-half ($\frac{1}{2}$) inch or more than one (1) inch for vitrified blocks, as may be necessary to bring the surface of the pavement, when thoroughly rammed, to the proper grade.

40 On this sand bed the blocks shall be laid at right angles to the line of the street or at such other angles as may be directed by the Engineer. Each course of blocks shall be laid straight and regularly with the end joints broken by a lap of at least three (3) inches, and in no case shall blocks of different widths be laid in the same course. The blocks shall be laid with the best face on top and the joints shall be as close as possible and those between course shall not exceed for stone blocks three-quarters ($\frac{3}{4}$) of an inch and for vitrified blocks one-quarter ($\frac{1}{4}$) of an inch in width and shall be practically uniform. As the blocks

EXHIBIT C-28 (*continued*):

are laid, they shall be covered with clean sharp sand, free from gravel or other impurities. The blocks shall then be thoroughly rammed to a firm unyielding bed, to a uniform surface to conform to the given crown and grade.

Sand covering shall then be spread on the pavement to a depth of one-half ($\frac{1}{2}$) of an inch.

10 In case the blocks after being taken up and relaid do not cover the original area, the contractor shall furnish additional blocks, similar and equal in quality to the blocks or bricks of the original pavement, to complete the paving.

If it is deemed necessary, the contractor shall take up enough blocks on either side of the trench, so that in repaving, the general contour of the street can be followed.

20 SPECIFICATIONS FOR PAVING WITH OLD GRANITE
BLOCK OF A CONCRETE FOUNDATION.

The trench shall be excavated to a depth of 16" or more, where spongy, soft or unfit material is disclosed. The unfit material shall be replaced with good suitable material, and the trench thoroughly compacted by rolling, tamping or flushing. All loose or depressed parts of the adjacent old concrete foundation shall be removed and the face of the old foundation trimmed off so that it will slope backward from the trench. Any paving blocks that are either below or above grade adjacent to the trench shall be removed so that when the repaving is completed, the contour of the repaved portion will conform to the contour of the street.

30 On this prepared subgrade, shall be laid a concrete foundation ten (10) inches in thickness, except around manholes, where the foundation shall be twelve (12) inches thick. The concrete shall consist of a mix of one part of cement, three of sand, and six of broken stone. No traffic shall be allowed on the newly laid concrete foundation until the same has thoroughly set.

40 When the concrete is thoroughly set, a layer of clean, course, dry sand to a depth of not more than one and one-half ($1\frac{1}{2}$) of an inch shall be spread; and on this sand bed shall be laid the stone blocks at right angles to the line of the street, or at such angles as may be directed. The blocks shall be bonded thoroughly to the old pavement adjacent to the trench, making with the end joints a lap of at least three (3) inches. The blocks

EXHIBIT C-28 (*continued*):

used in each course shall be as nearly as possible of the same width and the joints between the courses shall not exceed three-quarters ($\frac{3}{4}$) of an inch in width and shall be practically uniform.

When it is necessary for the contractor to furnish new blocks, they shall conform to the following specifications:

- 10 The blocks shall be of medium grained granite, showing an even distribution of constituent minerals, shall be of uniform quality and texture without seams, scales or discolorations showing disintegration, free from an excess of mica or feldspar, and equal in every respect to the blocks on the remainder of the street.

20 If old granite block are used, they shall be split and re-dressed with new heads so they can be laid with close end joints and side joints not exceeding three-quarters ($\frac{3}{4}$) of an inch; besides, this, the blocks shall be as follows: — Not less than five (5) inches, nor more than ten (10) inches in length; not less than three and one-half ($3\frac{1}{2}$) inches nor more than four and one-half ($4\frac{1}{2}$) inches in width; and not less than four and one-half ($4\frac{1}{2}$) inches nor more than five and one-half ($5\frac{1}{2}$) inches in depth. The blocks are to be rectangular, with tops and sides uniform in thickness, to lay closely, and with a fair and true surface.

The cement used in the foundation shall conform to the following specifications:

Portland Cement.

- 30 Portland cement shall be defined as the pulverized product resulting from the calcination to incipient fusion of an intimate mixture of properly proportioned argillaceous and calcareous materials, and to which no addition greater than three per cent. has been made subsequent calcination.

Specific Gravity.

The specific gravity of the cement, thoroughly dried or after ignition at a low red heat, shall not be less than 3.10.

- 40 Fineness.

The cement shall be ground to such fineness that at least 92 per cent. by weight shall pass through a standard number 100 mesh sieve, and 75 per cent. shall pass a number 200 sieve.

EXHIBIT C-28 (*continued*) :

Time of Setting.

At the temperature of about seventy (70) degrees F. mortar mad of neat cement shall develop an initial set in not less than thirty (30) minutes, and must develop a hard set in not less than one (1) hour nor more than ten (10) hours.

10 Strength.

Briquettes of one square inch sections shall develop or exceed the following tensile strength, and shall show no retrogression in strength within the periods specified.

NEAT CEMENT.

Constancy of volume.

20 Pats of neat cement when tested for constancy of volume or soundness shall remain firm and hard and show no sign of checking, cracking, distortion or disintegration.

Pounds.

Twenty-four hours in moist air 175
One day in moist air, 6 days in water 500

One part of cement to 3 parts of
standard sand, by weight,

30 One day in moist air, and 6 days in water 175
One day in moist air, 27 days in water 225

Tests.

Cement tests shall be conducted in accordance with the methods recommended by the "Committee on Uniform Tests of Cement" of the American Society of Civil Engineers.

Conditions.

40 All cement shall be of a uniform quality, color and weight, dry, free from lumps, properly seasoned, and shall be supplied in original unbroken packages, with the brand of the manufacturer plainly marked on each package. It shall be properly protected at all times from rain and moisture. The required samples of the cement must be submitted to the Engineer at least ten (10) days (exclusive of Sundays and holidays) before it is to be used, in order to allow of proper inspection, and the contractor shall furnish all necessary facilities for such inspection. Brands

EXHIBIT C-28 (*continued*):

of cement without established good reputation or not heretofore used in The City of New York, may be rejected; or they will be accepted only after they satisfactorily pass the 28-day test. Rejected cement must be at once removed from the street.

A bag of cement shall weigh at least 94 pounds net, and shall be considered as one (1) cubic feet in measurement.

10 Sand.

Sand shall be composed of grains not softer than hard limestone. It shall be moderately coarse and preferably made up of grains of varying size not exceeding one-quarter ($\frac{1}{4}$) inch including amass with low percentage of voids. It shall not contain in all, more than five (5) per cent. by volume of clay, loam, mica, scales, silt, or other objectionable inorganic matter, nor more than one (1) per cent. of organic matter.

20 Tests may also be made of the cement and sand used on the street in the proportions of 1 part cement to 3 parts sand, and these tests must show at least 70 per cent. of the strength of the mortar made with the cement and standard sand, or the sand may be rejected.

The blocks shall be stiffened, before ramming by sprinkling screened pea gravel over the surface, and sweeping it into the joints.

30 No more pea gravel shall be used than is just sufficient to hold the stones firmly in position during the ramming and until finally grouted.

The blocks shall be thoroughly rammed and the ramming repeated until they are brought to an unyielding bearing with a uniform surface, true to the given grade and crown.

40 The paving blocks shall be thoroughly sprinkled with water before grouting. The grout shall be composed of one part of cement, one part of clean, dry, sharp, fine sand, a natural quick setting cement being preferred. The grout shall be mixed in water-tight boxes in amounts not to exceed two (2) cubic feet of cement and two (2) cubic feet of sand; the sand and cement shall be thoroughly mixed dry until the mass is one color. An amount of clean water will then be added to form a liquid of the consistency of thin cream. From the time the water is added until the liquid is swept into the joints of the pavement, the grout

EXHIBIT C-28 (*continued*):

must be kept in constant motion. The sand must not be allowed to settle to the bottom; and no settlings or residue shall be used.

10 This mixture is to be spread on the pavement with scoop shovels or similar receptacles, and thoroughly swept into the joints until they are filled. Before this first layer of grout has time to set, a second coat shall be applied in the same way, except the mixture shall be a little thicker than the first. Should the grout become thick on the pavement, a man provided with a large sprinkling can, the head perforated with small holes, shall lightly sprinkle the surface with water ahead of the sweepers. In no case shall the mortar box be dumped on the pavement.

20 Within about half an hour after this last coat has been applied, and the grout between the joints has fully subsided and the initial set is taking place, the whole surface shall be slightly sprinkled and all surface mixture left on the top of the blocks swept into the joints, bringing them up flush and full. The pavement shall be broomed to a smooth surface, sufficient grout being applied to bring said surface even with the highest part of any of the blocks.

30 After the grouting is done and sufficient time for evaporation has elapsed, so that the coating of sand will not absorb any moisture from the cement mixture, one-half ($\frac{1}{2}$) inch of damp sand shall be spread over the whole surface and in case the work is subjected to a hot summer sun, the sand shall be occasionally sprinkled with water for two or three days, as directed by the Engineer.

Adequate barricades shall be erected to keep all traffic off the newly laid pavement for at least seven (7) days.

Temporary restoration.

40 258. At such times as may be directed roadway and sidewalk pavements, crosswalks, curbs, etc., which have been removed, whether under guarantee or not, shall be temporarily restored by the Contractor to the satisfaction of the Engineer.

When new pavement is laid.

260. If pavement, sidewalks, crosswalks, curbs, etc., are laid where none existed at the time the bids for this contract were opened, the Contractor shall excavate and remove such portions of the pavements, sidewalks, crosswalks, curbs, etc., and their

EXHIBIT C-28 (*continued*):

foundations as may be necessary for the prosecution of the work, but he will not be required to make a permanent restoration of them.

Trenches flooded.

10 261. Before laying any pavements, sidewalks, crosswalks, curbs, etc., the trenches shall, if required, be flooded with water, as directed, and all resulting holes or depressions shall be filled and tamped solid.

Unnecessary cross gutters.

262. All cross gutters rendered unnecessary by the work under this contract shall be removed and the entire street intersection or so much thereof as may be necessary shall be regraded and repaved as herein specified.

20 Cleaning up.

263. At such times as may be directed the Contractor shall remove from the streets, all materials which were placed thereon by him as a consequence of performing this work and which are not required by the contract to be left as part of the finished work. The entire work and portions of the streets affected thereby shall be left in a satisfactory condition. The sidewalks and crosswalks shall be swept clean of all material which may have come thereon by reason of the work under this contract, and if required, they shall be sprinkled with water during the
30 sweeping.

Cost to be covered.

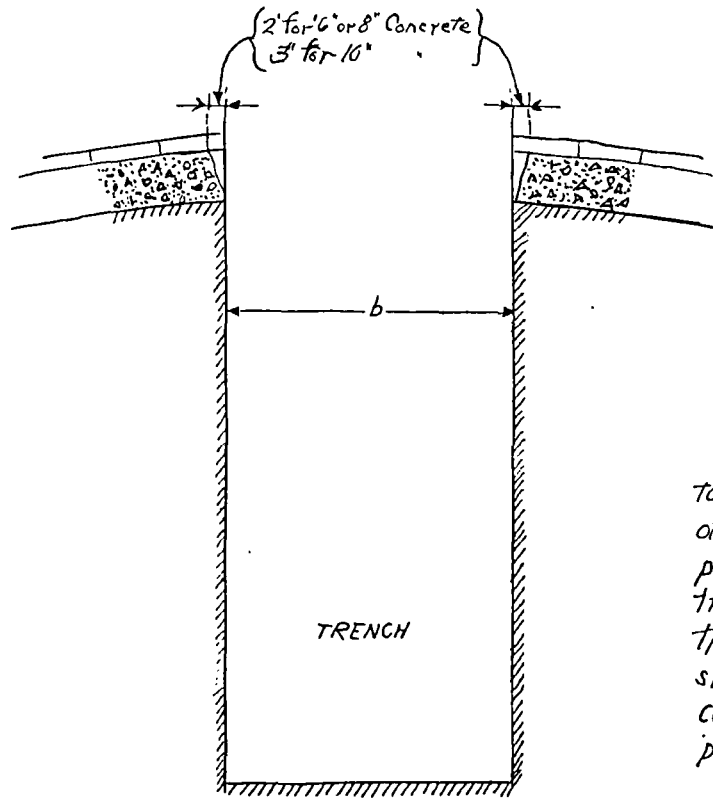
264. The cost of all the labor required to be done and all the materials required to be furnished in the performance of all the work specified in paragraphs 254 to 263 inclusive, shall be covered by all the contract prices for all the items for which there are contract prices.

40

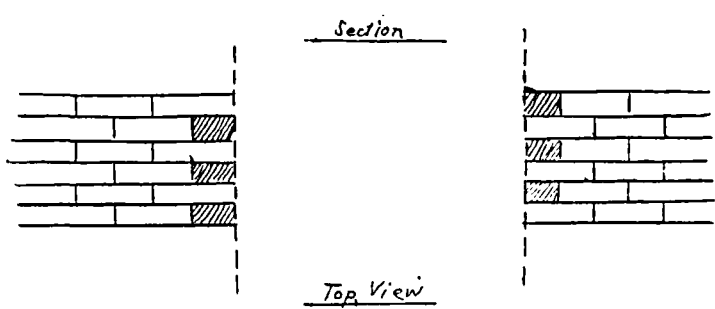
CITY OF NEW YORK
 OFFICE OF THE PRESIDENT, BOROUGH OF QUEENS
 BUREAU OF HIGHWAYS

SKETCH SHOWING
 YARDAGE TO BE COMPUTED FOR RESTORING DIFFERENT
 CLASSES OF PAVEMENT OVER SEWER TRENCHES

JAN. 18TH 1916.



The figures below are the minimum dimensions to be added to the width "b" of the sewer trench when computing the amount of deposit required from the sewer contractor to pay for the re-paving of the area disturbed by him, except when the sides of the trench have settled during construction, or where the foundation has been injured, which amount of settlement or injury shall be added thereto, or where creeping of pavement has occurred, when an adequate amount shall be added to obtain proper bond with adjacent pavement



Not Drawn to Scale

| | |
|---------------------|-------------------------------------|
| Brick - | 8 1/2 inches each side = 17 inches. |
| Wood Block | 8 " " " = 16 " |
| Asph " | 12 " " " = 24 " |
| Gran " | 9 " " " = 18 " |
| Sheet Asphalt | 6 " " " = 12 " |
| Bituthic Concrete | 6 " " " = 12 " |
| Water Bound Macadam | 6 " " " = 12 " |

J. J. Rice ENGINEER OF HIGHWAYS
 ENGINEER IN CHARGE - ENGINEERING CONSTRUCTION.

EXHIBIT C-29:

EXHIBIT C-29.

10 (Contract between Joseph L. Sigretto and The City of New York for construction of sewers and appurtenances in Atlantic Avenue, north side, from Willard (Vanderveer) Avenue to Freedom Avenue, and in Hatch Avenue from Atlantic Avenue, north side, to Fulton Street, Fourth Ward of the Borough of Queens.)

THE CITY OF NEW YORK—DEPARTMENT OF FINANCE

Office of the Comptroller

CONTRACT SUMMARY

Contractor: JOSEPH L. SIGRETTO & CO.

No. 47342

Names of Sureties: National Surety Co.

20

Amount of bond: \$3500.00

Date of award: Apr. 10, 1917 Department: President, Borough of Queens; Date of contract: Apr. 23, 1917; Borough: Queens; Date of expiration: 60 days; Date of filing: Apr. 13, 1917; Damages: \$10.00 per day; Date paid in full: 5/8/18.

DESCRIPTION OF WORK

30 For constructing sewer and appurtenances in Atlantic Avenue (north side) from Willard (Vanderveer) Avenue to Freedom Avenue, and in Hatch Ave. from Atlantic Ave. (north side) to Fulton St., Fourth Ward.

Original Estimate, \$9,092.10

R. E. 76.27

—————
\$9,015.83

ACCOUNTS TO BE CHARGED

40 CFM 25

TO BE KEPT IN REPAIR FOR 6 MONTHS.

The obligation on this surety bond ceases as to anything occurring after April 1, 1918.

If the conditions of the contract have been complied with, the retained percentage (if any) is due on or after April 1, 1918.

F. B. RYAN.

EXHIBIT C-29 (continued) :

PAYMENTS, AMOUNTS RETAINED AND EARNED

| | Date | ...% Payments | Amount paid to date | Amount retained to date | Amount earned to date |
|----|---------|---------------|---------------------|-------------------------|-----------------------|
| | | 2,944.44 | 2,944.44 | 519.61 | 3,464.05 |
| | | 3,827.59 | 6,772.03 | 1,195.07 | 7,967.10 |
| 10 | 8/17/17 | 2,047.20 | 8,819.23 | 196.60 | 9,015.83 |
| | 4/22/18 | 196.60 | 9,015.83 | | 9.015.83 |
| | | <hr/> | | | |
| | | 9,015.83 | | | |

IN FULL

20

THE CITY OF NEW YORK

Department of Finance

Bureau of Audit—Division of Disbursements

Municipal Building Room 631

\$196.60

New York, May 8, 1918.

30 Received from CHARLES L. CRAIG, Comptroller, Warrant No. 61753, for the sum of ONE HUNDRED NINETY SIX 60/100 Dollars, on account of the within Contract numbered 47342, for and in full of repairing security on contract.

Mailer May 8, 1918.

R. O'CONNOR.

40

EXHIBIT C-29 (*continued*):

THE CITY OF NEW YORK

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

Maurice E. Connolly
President

10

Borough Secretary

Hugh Hall
Secretary to President

Long Island City, May 5, 1917.

Hon. William A. Prendergast, Comptroller,
Department of Finance, City of New York,
Municipal Building, Borough of Manhattan.

20

Sir:—

Referring to contract No. 47342;—

“For the construction of a sewer and appurtenances
in ATLANTIC AVENUE (north side) from Willard (Van-
derveer) Avenue to Freedom Avenue, and in HATCH
AVENUE from Atlantic Avenue (north side) to Fulton
Street, Fourth Ward, Borough of Queens.”

30

I beg to inform you that the contractor, Joseph L. Sigretto
& Co., 1455 Woodhaven Avenue, Woodhaven, N. Y., have been
ordered to commence the work embraced in said contract on May
14, 1917, or before five days from the receipt of their notice.

Yours very truly,

WPB-PJH

.....
Acting President of the Borough of Queens.

40

EXHIBIT C-29 (continued):

CORPORATION

General Release.

To all to whom these Presents shall come or may concern,
Greeting:

10 KNOW DE, That JOS. L. SIGRETTO & CO., for and in
consideration of the sum of TWO THOUSAND, FORTY SEVEN
20/100 Dollars, lawful money of the United States of America,
to it paid by The City of New York, the receipt of which
is hereby acknowledged, have remised, released and forever dis-
charged, and by these presents does for itself, its successors and
assigns, remise, release and forever discharge the said The City
of New York, their successors and assigns, of and from all and
all manner of action and actions, cause and causes of action, suits,
debts, dues, sums of money, accounts, reckonings, bonds, bills,
20 specialties, covenants, controversies, agreements, promises, var-
iances, trespasses, damages, judgments, extents, executions,
claims and demands whatsoever in law or in equity, which
against them it ever had, now has or which it or its successors
or assigns hereafter can, shall or may have, for, upon or by
reason of a certain contract or agreement made the 23rd day of
April A. D., 1917, by and between JOS. L. SIGRETTO & CO.,
and the said The City of New York, for Contract No. 47342,
Sewer, Atlantic Ave., etc., or by reason of any matter, cause or
thing whatsoever resulting or arising therefrom from the begin-
30 ning of the world to the day of the date of these presents, except-
ing the sum of \$196.60 retained as repairing security.

IN WITNESS WHEREOF, JOS. L. SIGRETTO & CO.,
has caused its corporate seal to be affixed hereto and its cor-
porate name to be signed to these presents by its President this
21st day of September in the year one thousand, nine hundred
and Seventeen.

Sealed and delivered in the presence of

40 WM. F. HEFFERNAN.

JOSEPH L. SIGRETTO & CO.,

(Signed) Joseph L. Sigretto.

Seal—1909

President.

Original delivered to Chief Auditor.

J. C.

EXHIBIT C-29 (*continued*):

State of New York,
County of New York, ss.:
City of New York,

10 On this 21st day of September 1917, before me personally came JOSEPH L. SIGRETTO, to me known, who being by me duly sworn did depose and say that he resided in Boro of Queens, that he is the President of the Joseph L. Sigretto & Co., the Corporation described in and which executed the above instrument, that he knew the seal of said Corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

(Signed) WM. F. HEFFERNAN.
Com. of Deeds, N. Y. City
N. Y. Co. Clerks No. 22, Expires Jan. 25, 1918.

20

Contract No. 47342
(To be filled in by the Dept. of Finance)
The City of New York

ADVICE OF AWARD OF CONTRACT

(This copy to be retained by Bookkeeping Division,
Department of Finance)

30 Dep't of President, Borough of Queens

*Date April 10, 1917.

Comptroller of The City of New York:

Please take notice that the following described contract has this day * been awarded to Contractor Joseph L. Sigretto & Company, Address 1455 Woodhaven Avenue, Woodhaven, L. I.

| | SURETIES | AMT. OF BONDS |
|--|----------|---------------|
| 40 National Surety Company, 115 Broadway | | \$3500.00 |
| 15854 | | |

DETAILS OF PURPOSE OF CONTRACT

For constructing sewer and appurtenances in Atlantic Avenue (north side) from Willard (Vanderveer) Avenue to Freedom Avenue, and in Hatch Avenue from Atlantic Avenue (north side) to Fulton Street, Fourth Ward.

EXHIBIT C-29 (continued) :

| Contract Chargeable to Code No. | Estimated Amount | Contracts Previously Awarded (Including Adjustments) | Open Market Orders Issued To Date (Including Adjustments) | Misc. Vouchers, Payrolls, and Other Charges |
|---------------------------------|------------------|--|---|---|
| CFM 25 | 9,092.10 | 1,545,789.87 | 28,091.52 | 69,685.23 |

Enter full titles of accounts below and refer to code numbers by means of line numbers in margins.

10

Street Improvement Fund.

The within expense is properly payable from the fund or funds shown hereon.

JAS. P. McINERNEY,

4/12/17

Auditor of Accounts.

Yours respectfully,

MAURICE E. CONNOLLY,

President, Borough of Queens.

Head of Dept.

20

* This will be the date of the entry by which the fund is charged with the estimated amount of the contract both in the department making the award and by the Department of Finance. There must therefore be no delay in forwarding this advice.

NOTICE.—Bidders are particularly requested to carefully examine the Proposal for Bids, Form of Agreement, Specifications, Plan and the location of the work and the surroundings thereof before bidding.

30

No.....

THE CITY OF NEW YORK

Office of

THE PRESIDENT OF THE BOROUGH OF QUEENS

BUREAU OF SEWERS

1917

ASSESSMENT WORK

40

Proposal for Bids, Bid, Bond, Agreement and Specifications for Constructing Sewers and Appurtenances in ATLANTIC AVENUE, north side, from Willard (Vanderveer) Avenue to Freedom Avenue, and in HATCH AVENUE, from Atlantic Avenue, north side, to Fulton Street, Fourth Ward of the Borough of Queens, together with all the work incidental thereto.

EXHIBIT C-29 (*continued*):

“The Largest Surety Company in the World”

We bond more people than any other company in the world.

WM. B. JOYCE,
President.

Mr. Burns

10 NATIONAL SURETY COMPANY
Capital and Surplus over \$6,000,000.00
LWF-mr

115 Broadway

Address reply to
CONTRACT DEPARTMENT

Howard Abrahams, vice president
Joseph R. Wells, vice president
Robert C. Carson, assistant secretary
Frank T. Gilson, supt. of western division

20 New York, April 13th, 1917.

Hon. William A. Prendergast,
Comptroller.

SIR:

30 Joseph L. Sigretto, has been awarded a contract by the
Department of President of the Borough of Queens, for the
construction of a sewer and appurtenances in Atlantic Ave., from
Willard Ave., to Freedom Ave., et al, Borough of Queens, and he
has requested this company to prepare the surety bond in the
sum of \$3500.00

We desire to furnish the bond as requested subject to your
approval as to its adequacy and sufficiency.

Respectfully yours,

FRANK T. GILSON,
Resident Vice-President.

Department of Queens

40 The adequacy and sufficiency of the above bond is herein
approved and the NATIONAL SURETY COMPANY, may now
be notified to execute the surety bond and attach it to the con-
tract.

This letter of approval should be affixed to part of the
original contract to be hereafter filed in the Department of
Finance.

ETC-JM Apr. 16 1917

.....
Deputy and Acting Comptroller.

EXHIBIT C-29 (*continued*):

Time for presenting bids.

1. *Scaled bids* for the above-entitled work will be received at the office of the President of the Borough of Queens, Long Island City, in The City of New York, until 11 o'clock A. M., on WEDNESDAY APRIL 4th, 1917.

10 Time allowed for completion.

2. The time allowed for the full completion of the work herein described will be SIXTY (60) CONSECUTIVE WORKING DAYS.

Security required.

3. The amount of security required will be THREE THOUSAND FIVE HUNDRED DOLLARS (\$3500 00/100).

20 Bidders referred to form of agreement, etc.

4. Bidders are referred to the form of agreement, to the specifications and to the plan and drawings of Standard Details on file at the office of the President, and to the following Engineer's estimate of the quantity and kind of work required, the items whereof in all cases include all materials and labor necessary to fully complete said work. Prices for each item shall be named, upon the sum total of which the comparison and tests of bids will be made.

30 Engineer's Estimates.

342 lineal feet 2'-9" Plain Concrete Sewer.

260 lineal feet 18" Vitrified Pipe Sewer.

126 lineal feet 12" Vitrified Pipe Sewer, including Concrete Cradle

1,034 lineal feet 12" Vitrified Pipe Sewer.

14 Manholes, complete.

4 Basin Manholes (new type), complete.

7 Inlets (new type), complete.

40 120 lineal feet 12" Vitrified Pipe for Basin Connections.

105 lineal feet 10" Vitrified Pipe for Basin Connections.

11 Six-inch Spurs, 24" long, on Concrete Sewer.

8 Six-inch Spurs on 18" Vitrified Pipe Sewer.

67 Six-inch Spurs on 12" Vitrified Pipe Sewer.

546 lineal feet 6" Vitrified Pipe for House Connection Drains.

EXHIBIT C-29 (*continued*):

Personal examination of work.

5. The foregoing Engineer's Estimate is *approximate only* and is not to be considered as a binding feature of the contract. Bidders are required to submit their bids upon the following express conditions which apply to and become a part of every bid received. Bidders must satisfy themselves by personal examination of the location of the proposed work and surroundings thereof, and by such other means as they may prefer as to the accuracy of the foregoing estimate, and shall not at any time after submission of their bids, dispute or complain of such estimate of the engineer, nor assert that there was any misunderstanding in regard to the quantity or kind of materials to be furnished or work to be done.

Prices to be stated in writing and in figures.

6. Any bid which fails to name a price, written both in words and in figures, per unit of measurement for each of the items for which quantities are given, will be held to be informal and will be rejected. In case of any discrepancy between the price in words and that in figures, the price in words will be considered as the bid.

Prices bid to cover.

7. The prices bid must cover the cost of furnishing *all necessary materials and labor for and the complete performance of all the work* set forth in this proposal, described in the form of agreement and specification annexed hereto, and indicated by the plan of the work on file in the office of the President, to all of which information the bidders are referred.

Rock excavation.

8. The attention of the bidders is particularly directed to the specifications relating to rock excavation.

Bids may be rejected.

9. Permission will not be given for the withdrawal of any bid and the right is expressly reserved by the President to reject all bids if he shall deem it to the public interest so to do. No bid will be accepted from, or contract awarded to, any person who is in arrears to The City of New York upon debt or contract or who is a defaulter, as surety or otherwise, upon any obligation to The City of New York.

EXHIBIT C-29 (*continued*):

Times and places for commencing and prosecuting work to be determined by the President.

10 10. Bidders are especially notified that the President reserves the right to determine the times and places for commencing and prosecuting the work, and that postponement or delay on the whole, or any part thereof, occasioned by the precedence of other contracts, which may be either let or executed before the opening of the bids for this work, can constitute no claim for damages nor for a reduction of the damages fixed for delay in completing the work beyond the time allowed.

No extra compensation.

20 11. The Contractor will be required to complete the entire work to the satisfaction of the President and in accordance with the agreement, the specifications and the plan of the work. No extra compensation beyond the amount payable for the several classes of work hereinbefore enumerated, which shall be actually furnished and performed at the prices bid therefor by the bidder to whom the contract is awarded, shall be due or payable for the entire materials and work.

Deposit to accompany bid.

30 12. No bid will be received or considered unless accompanied by either a certified check upon one of the National or State Banks of The City of New York, drawn to the order of the Comptroller, or money or corporate stock or certificate of indebtedness of any nature issued by The City of New York, which the Comptroller shall approve as of equal value with the security required, to an amount of five per centum of the amount of the bond required for the faithful performance of the contract (as provided by section 420 of The Greater New York Charter, as amended). Such check or money or other form of security must not be inclosed in the sealed envelope containing the bid, but must be handed to the officer or clerk who has charge of the bidding, and no bid can be deposited in the box provided for that purpose until such check or money or other form of security has been examined by said officer or clerk and found to be correct. All such deposits, except those of the lowest three bidders, will be returned to the persons making the same within ten days after the opening of the bids; within three days after the awarding of the contract, the remaining deposits, except that made by the bidder whose bid has been accepted, will be returned to the persons making the same. If the successful bidder shall refuse or

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EXHIBIT C-29 (*continued*):

neglect to execute the contract within five days after notice that it has been awarded to him, and that the adequacy and sufficiency of the security offered has been approved by the Comptroller, the amount of the deposit made by him shall be forfeited to and retained by The City of New York, but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

10

Names of persons interested.

13. Bidders are required to state in their bids, under oath, their names and places of residence or business, the names of all persons interested with them therein, and if no other person be so interested, they shall distinctly state that fact; also, that it is made without any connection with any other person making any bid for the same purpose, and that it is in all respects fair and without collusion or fraud; and that no member of the Board
20 of Aldermen, head of a department, chief of a bureau, deputy thereof or clerk therein or officer or employee of The City of New York, is, shall be or become interested, directly or indirectly, as contracting party, partner, stockholder, surety or otherwise, in or in the performance of the contract or in the material, work or business to which it relates, or in any portion of the profits thereof. Bidders must verify by oath, in writing, the several matters stated in their bids.

Sealed bids to be submitted.

30

14. Each bid must be delivered in a sealed envelope, endorsed with the *title* given above of the work for which the bid is made, with the name of the bidder, and the date of presentation to the President at his office, on or before the date and hour hereinbefore named, at which time and place the bids received will be publicly opened by the President and read and the award of the contract made according to law as soon thereafter as practicable. The person or persons to whom the contract may be awarded will be required to attend at said office with the sureties offered by him or them and execute the contract within five
40 days from the date of the service of a notice to the effect that the contract has been so awarded and the surety accepted; and in case of failure or neglect so to do he or they will be considered as having abandoned the contract and as being in default to the City.

EXHIBIT C-29 (*continued*):

Bidders shall use blank forms to be furnished by the President.

15. Bidders shall make their bids upon the forms prepared by the President, a copy of which with the proper envelope in which to enclose the same can be obtained upon application therefor at the office of the President, Long Island City, where the plan can be seen, as also the form of contract, including the specifications in the form approved by the Corporation Counsel.

MAURICE E. CONNOLLY,
President of the Borough of Queens.

The City of New York,....., 191

20 THE CITY OF NEW YORK
OFFICE OF THE PRESIDENT OF THE BOROUGH
OF QUEENS
BUREAU OF SEWERS
CONTRACT FOR
the construction of a sewer and appurtenances in
ATLANTIC AVENUE, north side, from Willard (Vanderveer)
Avenue to Freedom Avenue, and in
30 HATCH AVENUE, from Atlantic Avenue, north side, to Fulton
Street, Fourth Ward of the Borough of Queens,
together with all the work incidental thereto.
Parties.

40 THIS AGREEMENT, made and entered into this 23rd day of April, in the year one thousand nine hundred and seventeen by and between The City of New York, party of the first part, by the President of the Borough of Queens, and Joseph L. Sigretto & Co., 1455 Woodhaven Avenue, Woodhaven, L. I., Contractor, party of the second part, pursuant to the provisions of The Greater New York Charter, and the resolution of The Board of Estimate and Apportionment adopted on the 27th day of October 1916, of which resolution the following is a copy:

EXHIBIT C-29 (*continued*):

BOARD OF ESTIMATE and APPORTIONMENT

CITY OF NEW YORK

(Cal. No. 79)

10 A copy of a resolution of the Local Board of the Jamaica District, duly adopted by said Board on the 22nd day of January, 1915, and approved by the President of the Borough of Queens on the 9th day of February, 1915, having been transmitted to the Board of Estimate and Apportionment, as follows, to wit:

“RESOLVED, That this Board does hereby initiate proceedings for the said local improvement, to wit:

20 For constructing sewer and appurtenances in Atlantic Avenue, north side, from Willard (Vanderveer) Avenue to Freedom Avenue; and in Hatch Avenue, from Atlantic Avenue, north side, to Fulton street, Fourth Ward of the Borough of Queens;”
and thereupon, on the 27th day of October, 1916, resolutions having been adopted by the Board of Estimate and Apportionment authorizing the President of the Borough of Queens to prepare the necessary plans, specifications and an estimate of the cost of the proposed improvement based on actual survey and further resolving that the Board of Estimate and Apportionment will consider the authorization of the construction of the proposed improvement after the President of the Borough of Queens has submitted certain statements as provided in the said resolution, and the said resolution having
30 been duly complied with by the President of the Borough of Queens, as appears by papers and documents on the files of the Board of Estimate and Apportionment, and there having been presented to the Board of Estimate and Apportionment an estimate in writing in such details as the Board has directed, that the cost of the proposed work or improvement, together with the preliminary expenses will be the sum of \$8,500.; and a statement of the assessed value according to the last preceding tax roll of the real estate included within the probable area of assessment,
40 to wit, the sum of \$119,050. having also been presented, it is

RESOLVED, That the said resolution of the Local Board be and the same is hereby approved and the construction of the local improvement therein provided for is hereby authorized. This Board does hereby determine that no portion of the cost and expense thereof shall be borne and paid by The City of New York, but that the whole of such cost and expense, including the

EXHIBIT C-29 (*continued*):

aforesaid preliminary expenses, shall be assessed upon the property deemed to be benefited by the said local improvement.

I hereby certify that the foregoing is a true copy of a resolution adopted by the Board of Estimate and Apportionment at a meeting of said Board held on January 19, 1917.

10 Dated, New York, January 22, 1917.

(Signed) JAMES MATTHEWS,
Assistant Secretary,
JCD. Board of Estimate and Apportionment.

RESOLUTION

BOARD OF ESTIMATE AND APPORTIONMENT

20

City of New York

(Cal. No. 83)

WHEREAS, The President of the Borough of Queens has transmitted to the Board of Estimate and Apportionment a copy of a resolution of the Local Board of the Jamaica District, duly adopted by said Board on the 22nd day of January, 1915, and approved by the President of the Borough of Queens on the 9th day of February, 1915, as follows, to wit:

30

“RESOLVED, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For constructing sewer and appurtenances in Atlantic Avenue, north side, from Willard (Vanderveer) Avenue to Freedom Avenue; and in Hatch Avenue, from Atlantic Avenue, north side, to Fulton street, Fourth Ward of the Borough of Queens;” and which resolution is accompanied with an approximate estimate of the cost of work and the assessed value of the property benefited.

40

RESOLVED, That the Board of Estimate and Apportionment hereby authorizes the President of the Borough of Queens to prepare plans, specifications and an estimate of cost based on actual survey, and also to secure a determination of the boundary of the district of assessment; the entire expense of the work done subsequent to the date of this authorization to be charged against

EXHIBIT C-29 (*continued*):

the Street Improvement Fund and later included in the assessment.

10 RESOLVED, That the Board of Estimate and Apportionment will consider the authorization of the construction of the said proposed improvement after the President of the Borough of Queens has submitted a statement showing that all of the above described work has been done, that he has secured the approval
20 of the form of contract by the Corporation Counsel, that he is prepared to place the improvement under contract as soon as he receives the consent of the Board, and that the assessment map will be completed on or before the date of payment on acceptance; this report being accompanied by a further statement showing the quantity of work to be performed under each item and the unit price thereof, the expense incurred for preliminary work, the allowance to be made for additional engineering and contingencies, the total probable cost, and the number of working days to be allowed the contractor for carrying out the work.

I hereby certify that the foregoing is a true copy of a resolution adopted by the Board of Estimate and Apportionment at a meeting of said Board held on October 27, 1916.

Dated, New York, October 30, 1918.

(Signed) JAMES MATTHEWS,

Assistant Secretary,

JCD.

Board of Estimate and Apportionment.

30

Covenant.

40 WITNESSETH, That the parties to these presents, each in consideration of the agreements on the part of the other herein contained, have mutually agreed, and hereby mutually agree, the party of the first part for itself and its successors, and the party of the second part for itself, himself, or themselves, and its, his or their executors, administrators, successors, and assigns, as follows:

Contract.

I. The contract for the hereinbefore entitled work shall include the following, which are hereby agreed upon as forming part and parcel thereof: the Proposal for Bids, the Bid, the Bond, this Agreement and the Specifications hereto annexed; also the Plan of the Work dated Jan. 5th, 1917, filed in the office of the

EXHIBIT C-29 (*continued*):

President of the Borough, entitled: Plan, Profile and Details for the construction of a sewer in

ATLANTIC AVENUE, north side, from Willard (Vanderveer) Avenue to Freedom Avenue, and in HATCH AVENUE, from Atlantic Avenue, north side, to Fulton Street, Fourth Ward of the Borough of Queens,

10 and also the Drawings of Standard Details pertinent thereto on file in the office of the Engineer.

Party of the first part.

II. Whenever the term "The City" or a word "President," or a pronoun in place of either, is used, it refers to and means The City of New York, the party of the first part hereto, or the President of the Borough of Queens, or his authorized representative.

20 Party of the second part.

Whenever the word "Contractor," or a pronoun in place thereof, is used, it refers to and means the party of the second part hereto.

Engineer described.

30 III. Whenever the word "Engineer," or a pronoun in place thereof, is used, it refers to and means the Engineer in Charge of Sewers, Borough of Queens, acting either directly or through assistants designated by him to act in the premises, limited to the particular duties entrusted to them. In case said Engineer may not be able to act, then such Engineer as may be designated by the President shall act in his place.

Terms defined.

40 IV. Whenever the word "plan" is used it refers to and means the plan of this work and the standard drawings pertinent thereto. Whenever it is provided that anything is "to be" or "to be done," "if" or "as," or "when" or "where approved," "required," "directed," "permitted," "ordered," "designated" or "deemed necessary" it shall be taken to mean approved, required, permitted, ordered, designated or deemed necessary as the case may be by the Engineer. Whenever the words "desirable," "suitable," "sufficient," "satisfactory" or others of a similar purport are used it is hereby agreed that the desirability, suitability, suffi-

EXHIBIT C-29 (continued) :

ciency, satisfactoriness or other denominated condition shall be as determined by the Engineer.

Contractor to furnish tools, proper appliances, etc.

10 V. The Contractor hereby agrees to furnish and provide all materials, labor, and appliances necessary and proper for the purpose, to excavate for, build, complete and connect in a good substantial manner, to the satisfaction of the President, and in conformity with the contract, the hereinbefore entitled work and all the work incidental thereto, and the Contractor hereby agrees to receive and accept as and for his full compensation the following prices, which are the amounts or rates at which this contract was awarded to the Contractor at the public letting thereof:

Prices.

- 20 342 lineal feet 2'-9" Plain Concrete Sewer, per lineal foot, Eight and 60/100 Dollars (\$8.60).
260 lineal feet 18" Vitrified Pipe Sewer, per lineal foot, Three and 40/100 Dollars (\$3.40).
126 lineal feet 12" Vitrified Pipe Sewer, including Concrete Cradle, per lineal foot, Five and 00/100 Dollars (\$5.00).
1,034 lineal feet 12" Vitrified Pipe Sewer, per lineal foot, Two and 15/100 Dollars (\$2.15).
14 Manholes, complete, each, Sixty five and 00/100 Dollars (\$65.00).
30 4 Basin Manholes (new type), complete, each, Eighty and 00/100 Dollars (\$80.00).
7 Inlets (new type), complete, each, Forty and 00/100 Dollars (\$40.00).
120 lineal feet 12" Vitrified Pipe for Basin Connections, per lineal foot, One and 35/100 Dollars (\$1.35).
105 lineal feet 10" Vitrified Pipe for Basin Connections, per lineal foot, One and 25/100 Dollars (\$1.25).
11 Six-inch Spurs, 24" long, on Concrete Sewer, each, Fifty cents (\$0.50).
40 8 Six-inch Spurs on 18" Vitrified Pipe Sewer, each, Two and 90/100 Dollars (\$2.90).
67 Six-inch Spurs on 12" Vitrified Pipe Sewer, each, One and 35/100 Dollars (\$1.35).
546 lineal feet 6" Vitrified Pipe for House Connection Drains, per lineal foot, Ninety cents (\$0.90).

EXHIBIT C-29 (*continued*):

Quantities are approximate only.

No extra compensation.

10 VI. The Contractor admits that the quantities of materials to be furnished and the amount of work to be done, as stated in the proposal for bids for the work, are approximate only. The Contractor agrees that The City is not to be held responsible that any of said quantities and amounts shall obtain in the construction of the work, as he has judged for himself as to such quantities and amounts and each of them, and as to the other circumstances affecting the cost of the performance of this contract; and that he will not at any time dispute or complain of such statement nor assert that there was any misunderstanding in regard to the character, size or depth of the excavations to be made or the kind or amount of the materials to be furnished or work to be done. The Contractor hereby agrees that he will 20 not ask, demand, sue for, nor seek to recover for the entire work any extra compensation beyond the amount payable for the several classes of work and kinds of materials in this contract enumerated, which shall be actually performed and furnished, at the prices therefor herein agreed upon and fixed.

Sewers, etc., to be built as shown on the plan.

30 VII. The sewer and appurtenances will be built on the lines, at the depths and at the grades and in the manner shown on the plan of the work as the same will be designated on the ground by the Engineer.

Line may be changed.

40 The President may change the line of the sewer or the location of the receiving basins, or other sewer appurtenances provided such changes do not materially affect either the character or the amount of the work to be done, or the conditions under which it is to be performed, and the Contractor hereby agrees to make no claim for damages or extra compensation on account thereof.

Preservation of points, stakes, etc.

The Contractor will safeguard all points, stakes, grade marks, monuments and bench marks made or established on or near the line of work, and he agrees to accept responsibility for and to remedy at his cost any mistakes that may be caused by

EXHIBIT C-29 (*continued*):

the unauthorized disturbance or removal of such points, stakes, grade marks, monuments and bench marks.

Written order for extra work.

10 VIII. No claim for additional work or materials shall be made by or allowed to the Contractor, unless before the performance of such additional work the President shall have first authorized the same, in writing, and the same shall have been done or furnished under a written order from the President, given before the performance of such additional work or the furnishing of such additional materials. The aggregate price to be paid for additional work or materials so authorized or ordered shall not exceed five per cent. (5%) of the contract price or the total cost of the work and materials.

Contract may be modified.

20 This contract may be modified and changed from time to time as may previously be agreed to, in writing, between the parties hereto, in a manner not materially affecting the substance thereof or increasing the contract price thereunder, in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed.

Limit to extras.

30 All claims for additional work or materials in any month shall be made to the Engineer, in writing, before the 15th day of the following month, and failing to make such claim within the time required, the rights of the Contractor to additional pay for such additional work or materials shall be deemed to have been waived and forfeited.

Inspection.

Work or materials may be condemned at any time.

40 IX. The Engineer shall inspect the materials furnished and the work done and see that the same correspond with the specifications. The Engineer is hereby authorized and empowered to reject and refuse all labor and material or method of application, or any part thereof, offered under or in fulfillment of this contract, that do not comply in kind, quality or quantity with the terms thereof. Any material delivered or offered to be delivered under this contract, which shall be rejected by the Engineer as not conforming to the terms thereof, will be forthwith removed!

EXHIBIT C-29 (*continued*):

10 by the Contractor, and material which does so conform will be forthwith furnished and delivered by him in place thereof. The Contractor hereby agrees not to use any material which has not been inspected and accepted, nor to perform any work except under inspection, to which end he further agrees to notify the Engineer when lines, grades or inspection are required so that the Engineer may have time to provide for the same. No inspection, approval or acceptance of any part of the work herein contracted for or of the materials used therein, or any payment on account thereof, shall prevent the President from refusing to accept the work or materials at any time thereafter.

Engineer to be final arbiter.

20 X. To prevent all disputes and litigation, it is hereby agreed that the Chief Engineer in Charge of Sewers shall, in all cases determine the amount and the quality of the several kinds of work and materials which are to be paid for under this contract, and he shall determine all questions in relation to the work and materials and the construction thereof, and he shall in all cases decide every question which may arise relative to the execution of this contract on the part of the Contractor, and his decision will be final and conclusive; and such decision, in case any question shall arise, shall be a condition precedent to the right of the Contractor to receive any money under this contract.

30 Any doubt as to the meaning of this contract and the specifications thereof, or any obscurity as to the wording of them, or any discrepancy between them and the plan will be explained by the Engineer, and his explanation will be accepted by the Contractor, who hereby agrees to execute the work in accordance with such explanation, and to make no charge or claim for any extra work or damage on account thereof.

Work and materials must agree with specifications.

40 XI. The work will be performed in the best manner, and all materials of which the work is composed will be of the best kind, and a sufficient number of persons will be at all times employed to execute the work with due dispatch, the whole to be done to the satisfaction of the Engineer, and any materials furnished or work done not satisfactory to the Engineer will be immediately removed and satisfactorily replaced by the Contractor at his own expense; or if he shall neglect or refuse to remove and replace the same when notified so to do by a written notice to be served upon him, then the President may remove, or cause

EXHIBIT C-29 (*continued*):

the same to be removed and satisfactorily replaced, by contract or otherwise, as he may deem expedient, and charge the expense thereof to the Contractor; and the expense so charged shall be deducted and paid by The City out of such moneys as are or may become due under this contract.

Examinations.

- 10 During the progress or after the completion of the work, should the Engineer require it, for the purpose of examining the same, the Contractor will make such openings, and to such extent through such part or parts of the work as the Engineer may direct, and the Contractor will satisfactorily restore the work so disturbed. Should the openings disclose defects in the work such defects shall be remedied in accordance with the provisions of the first paragraph of this section.

20 Use of patented articles.

- XII. Wherever an article or any kind of material is specified by a trade name or by the name of a patentee, manufacturer or dealer, or by reference to the catalogue of a manufacturer or dealer, it shall be taken as intending to mean and specify the article or kind of material designated, or any other equal thereto in quality, finish and durability, and equally serviceable for the purposes for which it is or they are intended. Nothing on the plan or in the specifications shall be interpreted or taken to violate the provisions of section 1554 of the Greater New York
30 Charter, which provides that "except for repairs, no patented pavement shall be laid and no patented article shall be advertised for, contracted for or purchased, except under such circumstances that there can be a fair and reasonable opportunity for competition, the conditions to secure which shall be prescribed by the Board of Estimate and Apportionment."

Claims for infringement.

- 40 The Contractor will be responsible for any claims made against The City for any infringement of patents, by the use of patented articles or processes in the construction and completion of the work, and he will have harmless and indemnify The City against all costs, expenses and damages caused by reason of any infringement of patents used in the construction and completion of the work.

EXHIBIT C-29 (continued) :

Commencement and completion.

10 XIII. The Contractor will begin the work herein agreed to be performed on such date as the President shall notify him to begin on and from which date the time hereinafter fixed for the completion of the work shall begin to run. The place where the work is to be begun will be either stated in said notice or designated on the ground by the Engineer. The commencement of work by the Contractor shall be deemed and taken to be a waiver on his part of notice to begin work, in which case the time for the completion of the work will begin to run on and from the date the work was commenced.

Time of performance.

20 XIV. The Contractor will carry on the work with such force and in such manner and order and at such places, times and seasons, including freezing weather, as may be directed by the Engineer, and will execute all the work in every respect in a thorough and workmanlike manner; and he will fully and entirely perform this contract on his part before the expiration of SIXTY (60) CONSECUTIVE WORKING DAYS.

Time important.

30 It is hereby agreed that the time designated for the performance of all the work under this Contract is of the essence of this agreement, in view whereof it is hereby further agreed that a rate of progress will be maintained so that the work performed up to any time will be at least the same percentage of the total work to be performed under this contract as the net elapsed time at such time is of the total time allowed for the performance of all the work under this contract.

40 In the computation of the number of consecutive working days, the time during which the completion of the work has been delayed in consequence of the condition of the weather, or tides, or by any act or omission of the party of the first part or during such period as the work has been suspended by written order of the President, or delays for which the Contractor is not responsible (all of which will be determined by the President, who shall certify to the same in writing, and whose determination and certificate thereof shall be binding and conclusive upon the Contractor), will be allowed to the Contractor and will be deducted in computation. Sundays and also holidays on which no work is done, will also be excluded from said computation. If

EXHIBIT C-29 (*continued*):

the completion of the work to be done under this contract shall require work or materials or both in greater amounts than those set forth in the Engineer's Estimate of Quantities, or if unforeseen obstacles are encountered in the prosecution of said work, then the time which the Contractor is delayed on account thereof will be determined and allowed by
10 the President at the completion of the work, upon the receipt by him of a written application from the Contractor for such determination and allowance. No demand by the Contractor that the President determine and certify the matters aforesaid shall be of any effect whatsoever unless the same be made in writing and duly served upon the President prior to the filing in the office of the Comptroller of The City of the final certificate of the completion and acceptance of the work.

End of time period.

20 The time shall run against this contract until all work called for in this contract is completed to the satisfaction of the Engineer.

Liquidated damages.

30 XV. In case the Contractor shall fail to complete the work hereunder in accordance with the contract within the time aforesaid, he agrees to pay to The City the sum of Ten Dollars (\$10.00) for each and every day the time consumed in said performance and completion exceeds the time hereinbefore allowed for that purpose; which said sum, in view of the difficulty of ascertaining the loss which The City will suffer by reason of delay in the performance of the work hereunder, is hereby agreed upon, fixed and determined by the parties hereto as the liquidated damages that The City will suffer by reason of said delay and default, and not as a penalty; and The City shall and may deduct and retain the amount of such liquidated damages out of the moneys which may be due or become due to the Contractor under this contract.

40 Work no provided for in contract.

XVI. If, before the completion of the work contemplated herein, it shall become necessary to do any other or further work on or near the line thereof than is provided for in this contract, the Contractor will not in any way interfere with or molest such person or persons as the President may employ to do such work, and will carry on the work under this contract in such manner

EXHIBIT C-29 (*continued*):

as may be ordered so as to afford all reasonable facilities for doing such other or further work; and no damage or claim by the Contractor shall be allowed therefor, except such allowance of time for delay as the President may deem reasonable.

President's right to suspend work.

10 XVII. The President is hereby authorized to suspend the whole or any part of the work herein contracted to be done, if he shall deem it for the interest of The City so to do. During such suspension the trenches shall be backfilled, if required, and the roadways and pavements over the same satisfactorily restored, and all materials upon the work shall be neatly piled so as not to obstruct public travel, or shall be removed from the line of the work, if directed.

No damages to be claimed for delay
due to other contracts.

20 XVIII. Should postponement or delay be occasioned by the precedence of paving or other contracts, which may have been either let or executed before the opening of the bids for this contract, the Contractor will make no claim for damages therefor nor for any damages in consequence of the street or the adjoining sewers not being in the condition contemplated by the parties at the time of making the contract; if, however, the Contractor shall be delayed in performance of his work by reason of the street or the adjoining sewers not being in such condition, or by reason
0 of the work or any work or any part thereof being suspended as herein before provided, such allowance of time on account thereof as the President shall deem reasonable will be made.

40 If the work be suspended or delayed by any act or omission of The City, or for the reason that The City does not own or has not obtained possession of, or the right to enter upon the land upon which the work is to be performed, or because of any act or omission of any employee or agent of The City or any other Contractor performing work for The City, the President, or whoever is directed by this contract, to make the certificate in reference to time, shall make such allowance of time for the completion of the work as the Engineer shall certify that the work has been delayed. No allowance whatever as damages will be made to the Contractor because of any such suspension or delays, and no claim shall be made by the Contractor on account thereof.

EXHIBIT C-29 (*continued*):

Allowance of time for delays.

10 XIX. No allowances of time for delays under the provisions of this contract nor the delivery and acceptance of any articles or materials called for by this contract, shall be deemed to be a waiver by the President of the right to abrogate this contract for abandonment or delay in the manner hereinafter provided.

Right to construct sewers, etc.

Permits for connections.

20 XX. Prior to the commencement of and during the progress of the work under this contract the President shall have the right to undertake, and to grant permits for, any construction, reconstruction, and repairing of any pipes, sewers, basins, subway ducts and railway tracks, and any appurtenances thereof located on and adjoining the line of the work, and for any connections with and additions to such pipes, etc., and for such purposes the President is hereby authorized to suspend work on any part of this contract, in accordance with Section XVII., and the Contractor will not interfere with nor place any obstructions in the way of any person or persons who may be engaged upon such work. The President is hereby authorized to connect, by contract or otherwise, any sewers and drains with the work built under this contract and to grant permits to any person or persons to make connections therewith at any time before it is completed; and the Contractor will not interfere with nor place obstructions in the way of such persons as may be employed in building such sewers and drains, or in making such connections, and the flow from such sewers, drains and connections will be permitted by the Contractor to discharge into the work built under this contract and the Contractor agrees to make no claim for compensation, damages or delay on account thereof. The issuance of such permits shall not be considered as an acceptance by The City of that part of the sewer into which such connections empty or flow, nor shall the Contractor on account thereof be relieved from the cleaning of the sewer prior to the final examination of the work. No new connections or drains will be allowed to be made or joined to the work built under this contract unless a permit therefor has been duly issued by the President, which permit shall be shown in all cases to the Inspector of the work.

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EXHIBIT C-29 (*continued*) :

Flow of sewer and drains, etc.

Drains, etc., interrupted.

Sewers, etc., to be kept clean.

XXI. The Contractor will provide at his own cost for the flow of the sewers, drains and water courses interrupted during the progress of the work, and will immediately cart away and remove all offensive matter. The flow throughout the entire length of such sewers and appurtenances as are to be replaced by the work to be done under this contract will be maintained by the Contractor. The Contractor will remove at his own cost and expense all such bulkheads, as may be directed, from the sewers with which the work under this contract will be connected. When the permanent removal of any existing pipe sewers and appurtenances and pipe drains is necessitated by the work to be done under this contract, such of the materials of such structures as may be directed shall be carefully taken up, piled and left at the disposal of The City, and shall not be used in the work, and the remainder shall be removed from the work and disposed of by the Contractor. Wherever the work to be built under this contract, or the trenches in which it is to be constructed, follow the line, and occupy the place of or intercept the Fire Alarm Telegraph System of The City, or any existing sewers, drains, culverts, basin connections or house connections for which permits may have been granted prior to the opening of the bids for this contract, the Contractor will make the same good, and will rebuild the Fire Alarm Telegraph System of The City and also said sewers, drains, culverts and connections, or connect the same with the sewer built under this contract, whichever he may be directed to do, at his own cost and expense. All sewers, drains, culverts, basins and basin connections rendered unnecessary by the construction of the work herein contemplated, shall be thoroughly broken up, except as otherwise hereinbefore provided, and satisfactorily filled in by the Contractor at his own cost and expense, as shall also all portions of water courses in, through or across any street that may be rendered unnecessary by the construction of this work. During the progress of the work, and until the completion and acceptance thereof, the sewers, drains, basins, culverts and connections built under this contract shall be kept thoroughly cleaned throughout, and shall be left clean.

EXHIBIT C-29 (continued) :

Sale of sand or earth.

10 XXII. The Contractor will not sell, nor permit to be removed from the line of the work, before the trench shall have been backfilled, any building sand or earth thrown up, except upon written permission, and then only so much as shall remain after reserving a sufficient quantity to backfill the trench and complete the paving; and the Contractor will, in all cases, backfill the trench with the same material thrown out, provided it be suitable, then the same shall be removed from the line of work, and suitable material procured and used for backfilling the trench, and when required sand of proper quality and depth shall be spread on the surface to receive the pavement.

20 The Contractor hereby agrees that all excavated material and materials of construction placed by him or for him upon private property, unless by written permission of the owners or lessees thereof, will be removed by him and all damage to said property remedied by him at his own cost and expense. Unless such materials are removed and such damage remedied by the Contractor within 48 hours after the receipt by him of a written notice so to do, he agrees that the President shall be and is hereby authorized to dispose of such materials, and to remedy such damage and to deduct the expense thereof from the moneys due or to become due under this contract.

Contractor to give personal attention to work.

30 Not to assign or sublet.

40 XXIII. The Contractor will give his personal attention constantly to the faithful prosecution of the work; he will not assign, transfer, convey, sublet or otherwise dispose of this contract, or his right, title or interest in or to the same, or any part thereof, without the previous consent, in writing, of the President, indorsed hereon or hereto attached; and he will not assign, by power of attorney or otherwise, any of the moneys to become due and payable under this contract, unless by and with the like consent, signified in like manner. If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys due or to become due under this contract, to any other person, company or other corporation, this contract may, at the option of the President, be revoked and annulled, and The City shall thereupon be relieved and dis-

EXHIBIT C-29 (continued) :

charged from any and all liability and obligations growing out of the same to the Contractor, and to his assignee or transferee; provided that nothing herein contained shall be construed to hinder, prevent or affect an assignment by the Contractor for the benefit of his creditors, made pursuant to the statutes of the State of New York; and no right under this contract, or to any money to become due hereunder, shall be asserted against The
10 City, in law or in equity, by reason of any so-called assignment of this contract, or any part thereof, or of any moneys due or to become due hereunder, unless authorized as aforesaid by the written consent of the President.

When Contractor is absent.

Disorderly workmen.

Contractor to provide assistance.

20 XXIV. Whenever the Contractor is not present on any part of the work where it may be necessary to give directions, orders will be given by the Engineer to and shall be received and obeyed by the superintendents and foremen who may have immediate charge of the men employed on the particular work in relation to which the order may be given; and at any time, if a foreman or workman employed by the Contractor shall be declared by the Engineer to be disobedient, incompetent or disrespectful, the Contractor, on receiving written notice to that effect, will forthwith dismiss such person, and will not again employ
30 him on any part of the work. The Contractor will provide all necessary assistance for the Engineer when required, without charge or expense to The City or Engineer.

Contractor to plank and bridge for traffic.

40 XXV. The Contractor will observe the law and all ordinances of The City in relation to obstructing the streets, keeping open passageways and protecting the same where they are exposed and would be dangerous to the public travel, and such passageways shall, as may be required, be planked or bridged by the Contractor, at his own expense.

Guards and lights.

Indemnification of City.

XXVI. During the performance of the work herein set forth the Contractor will place proper guards upon and around

EXHIBIT C-29 (*continued*):

10 the same for the prevention of accidents, and at night will put up and keep suitable and sufficient lights, and he will indemnify and save harmless The City against and from all claims, suits and actions, of every name and description, brought against it, and all costs and damages to which it may be put on account or by reason of any injury or alleged injury to the person or property of another, resulting from the prosecution of the work or
20 from negligence or carelessness in the performance of the work, or in guarding the same, or from any improper materials used in its prosecution, or by or on account of any act or omission of the Contractor or his agents; and the Contractor agrees that the whole or so much of the moneys due to the Contractor under and by virtue of this contract, as shall or may be considered necessary by the Comptroller of The City, may, as its option, be retained by The City until all such suits and claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the Comptroller.

Contractor to make repairs.

30 XXVII. In case any injury is done to property along the line of the work, or to any sidewalk, in consequence of any act or omission on the part of the Contractor or his employees or agents in carrying out any of the provisions or requirements of this contract, the Contractor will make such repairs as are necessary in consequence thereof, at his own expense and to the satisfaction of the President, and in case of failure on the part of the Contractor to promptly make such repairs, they may be made by the President, and the expense thereof will be deducted out of the moneys due or to become due to the Contractor under this contract.

Loss or damage to be assumed by Contractor.

40 XXVIII. The Contractor agrees to assume, and to make no claim on account of, any and all loss or damages arising out of the nature of the work to be done under this contract, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the action of the elements, or from incumbrances on or near the line of the work, or from the breaking of water mains, sewer and gas mains on or near the line of the work.

Claims for labor, etc.

XXIX. The Contractor will pay promptly, and in cash, for all labor employed upon and all materials furnished and used

EXHIBIT C-29 (continued) :

10 in the work, and if at any time before or within thirty days after the whole work herein agreed to be performed has been completed and accepted by The City, any person or persons claiming to have performed any labor or furnished any materials toward the performance and completion of the contract, shall file with the President and with the Comptroller of The City any such notice as is described in the Lien Law or any act of the Legislature of the State of New York, then, and in every such case, The City shall retain—anything herein contained to the contrary thereto notwithstanding—from the moneys under its control, and due or to become due under this contract, so much of the moneys as shall be sufficient to pay off, satisfy and discharge the amount in such notice alleged or claimed to be due to the person or persons filing such notice, together with the reasonable cost of any action or actions brought to enforce such claim or the lien created by the filing of such notice. The money so retained shall be retained by 20 The City until the lien thereon created by the said act and the filing of the said notice shall be discharged, pursuant to the provisions of the said act.

Contractor will prevent filing of liens, etc.

XXX. The Contractor will not, at any time, suffer or permit any lien, attachment, or other incumbrances, under the law of this State or otherwise, by any person or persons whomsoever, to remain on file in the Finance Department or at the office of the City Department having supervision of the work 30 against any money due or to become due for any work done or materials furnished under this contract, or by reason of any other claim or demand against the Contractor; and that any such lien, attachment, or other incumbrance, until it is removed, shall preclude any and all claim or demand for any payment whatsoever under or by virtue of this contract.

Evidence of satisfaction of liens, etc.

40 The Contractor further agrees that he will present to the party of the first part satisfactory evidence that all just liens, claims and demands of his employees, or of parties from whom materials used in the construction of the work may have been purchased or procured are fully satisfied and that the materials furnished and work done under this contract are fully released from all such liens, claims and demands before said party of the second part will demand or shall receive the sums due one final payment under this contract.