

# STANDARD SPECIFICATIONS



1910

... OF ...

## THE City of Seattle

FOR .....

GRADING  
SIDEWALKS  
WATERMAINS  
PLANKING  
SEWERS  
PAVING



R. H. THOMSON

CITY ENGINEER

D. W. Mc MORRIS

Principal Assistant Engineer

Approved by the Board of Public Works, May 24, 1910  
SEATTLE, WASH.

1910

## **STANDARD SPECIFICATIONS**

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### ORIGINAL GRADING

#### CLEARING AND GRUBBING

The district to be cleared and grubbed will be as follows:

First. The entire area included within the margins of the streets.

Second. The area covered by all slopes, whether in excavation or embankment, which extend beyond the margins of the streets.

Third. The area of all approaches to all streets and alleys, whether in excavation or embankment.

Fourth. All streets or alleys where waste material is to be deposited.

All brush, trees, stumps, logs, old sidewalks, planking, crosswalks, curbs, gutters, box drains, bulkheads, rubbish or any material subject to shrinkage or decay, and all roots and grubs and other debris encountered during the progress of the work shall be piled and burned, or otherwise disposed of, as the City Engineer may direct. All stumps which stand on the line of the street, or on the line of slope of any excavation or embankment, shall be entirely removed. All fences adjoining any excavation or embankment, which will be liable to fall, or be buried, shall be carefully removed and placed upon the adjoining property, unless otherwise directed by the City Engineer. After the excavation or embankment has been completed, these fences shall be rebuilt by the contractor on the property lines. All solid or loose rock or boulders encountered in the progress of the work shall be removed and disposed of to the satisfaction of the City Engineer. The cost of all work, as specified above, shall be included in the price paid for Clearing and Grubbing.

**Payment.**—Clearing and Grubbing will be paid for at the rate bid per acre therefor as listed on the proposal for this improvement, and shall be in full for all work as above specified.

### Grading

#### EARTH- WORK

Under this head is included all excavations and embankments required for the formation of the subgrade, making approaches to abutting streets and alleys, and all other excavation or embankment connected with or incident to the completion of the work. The preparation, surfacing and seeding of all slopes and parks is included as grading.

**Excavation.**—All material taken from excavations (except when otherwise ordered by the City Engineer) shall be deposited in the embankments, and the cost of such removal and deposit of material shall be included in the

## ORIGINAL GRADING—Continued

### EARTH- WORK

price paid for excavation. It will be understood, therefore, that the contract price per cubic yard is intended to pay for excavating, loading, hauling and dumping in embankment all material procured from or for the district under contract, and such other work as is hereinafter specified under the head of embankment. Side slopes shall be made as directed by the City Engineer, it being understood that all slopes shall be dressed to a true line and surface, and in case any material shall slide into excavations during the progress of the work, the same must be removed at contract price, and no extra payment will be allowed therefor beyond such contract prices. There is attached to these specifications all applications filed to date by property owners within the district asking for excess excavation to be deposited on private property; but the contractor is hereby especially notified that inasmuch as this work is being done at the cost of and for the improvement of the district, the contractor must deliver the excess of excavation as directed, upon adjoining streets or alleys, or upon low-lying properties within the limits of the assessment district, where requests of owners are made for same, whether the application is made or direction given prior to the award of the contract or during the period of construction prior to the removal of such excess earth. The contractor must not remove earth from within the district until he has ascertained from the property owners within the district that no further earth is required in said district within 600 feet of excess excavation. All solid or loose rock encountered in the progress of the work shall be removed and disposed of to the satisfaction of the City Engineer. The cost of removing all rock must be included in the price bid for "Earthwork" per cubic yard.

**Embankment.**—The contractor shall furnish all material required for embankment not found in this improvement. No payment whatever will be made for clearing and grubbing of borrow pits nor for any loose or solid rock found in said pits. The clearing and grubbing and disposing of the same, as hereinabove specified, shall be kept at least two hundred (200) feet in advance of the embankment, and no embankment shall be commenced until the clearing and grubbing has been inspected and approved by the City Engineer or his assistant. All embankments shall be made of such width and the sides thereof at such slopes as, in the judgment of the City Engineer, shall be necessary to maintain solid and permanent sidewalks and roadways. All fills under concrete sidewalks shall be made of suitable material, spread in layers not exceeding one foot in thickness, thoroughly flushed with water and well tamped or rolled until a hard, unyielding surface is obtained. Where fills are to be made the contractor must exercise his own judgment as to the amount of shrinkage or settlement to be provided for. In case the earth placed in any embankment shall not shape itself naturally to such slopes or surface as, in the judg-

## ORIGINAL GRADING—Continued

### EARTH- WORK

ment of the City Engineer, may be sufficient to sustain such embankment, the contractor shall dress such slope smoothly and uniformly to such inclination as shall be designated by the City Engineer, and the cost of such dressing of such slope shall be included and paid for only in the price to be paid for the material so placed in such embankment. Whenever, in the judgment of the City Engineer, any material is too soft or otherwise unsuitable to remain in the street, the contractor shall excavate the same to such a depth as the City Engineer may direct, and remove such material outside of the limits of any public streets or alleys, and all material so removed will be classified and paid for the same as material excavated elsewhere.

**Measurement.**—All excavation and embankment required for this improvement will be carefully and accurately measured and computed. If the net measurement of excavation exceeds the net measurement of embankment, payment will be made for excavation only. If the net measurement of embankment exceeds the net measurement of excavation, payment will be made for embankment only; no allowance whatever being made for shrinkage or settlement. Computations will be made by End Area method.

**Surfacing.**—The street when completed shall be dressed to a smooth and uniform surface, rounding by a uniform curved line from gutter to gutter, and all rock or stones of two inches diameter or over shall be removed from the street. Whenever the material found in cuttings is unsuitable to form a good roadbed, or where deemed necessary by the City Engineer, the same shall be excavated to such a depth as the City Engineer may direct, and the same shall be refilled with such material as the City Engineer may designate, to a true grade and surface, and all material removed from such excavations shall be classified and paid for as that in other cuttings for this improvement. All parking strips shall be carefully raked smooth; all slopes shall be sowed with white clover seed of good quality, using one pound to 300 square feet.

**Maintenance.**—The contractor will be required to maintain the improvement in good condition for the period of thirty (30) days from the date of acceptance, and will receive no compensation therefor beyond the amount of the final estimate.

**Payment.**—Grading will be paid for at the respective rates bid for "Earthwork" as listed on the proposal, and such payment shall be in full for all work as above specified.

### TEMPORARY WOOD WALKS

As directed by the City Engineer, temporary wood walks shall be constructed of 2"x12" fir planks laid lengthwise and firmly nailed with 20-d wire nails to 2"x12" blocks laid crosswise every eight (8) feet and properly bedded in the ground. On steep grades, as required by the City Engineer, cross pieces of 1"x2" shall be nailed to the planks every fifteen (15) inches apart with four 10-d wire nails to each slat.



## ORIGINAL GRADING—Continued

### TEMPORARY WOOD WALKS

**Payment.**—Temporary wood walks will be paid for at the rate bid therefor per M. feet B.M. as listed on the proposal, and shall include the furnishing, laying and maintaining, and shall be in full for all labor and materials in the completed work.

### CURBS AND GUTTERS

Curbs, gutters and lips shall be of lengths 16, 24 and 32 feet, and they shall rest on sound fir blocks of the dimensions shown, placed not more than eight feet center to center, and under every joint, and solidly bedded in the ground. They shall be sized one side and both edges. The gutters shall be spiked to each block with two 60-penny wire nails. Curbs and lips shall be spiked to the gutters with 60-penny wire nails, every two feet, driven horizontally. Curbs, gutters and lips shall be laid breaking joints. Angle blocks shall be nailed with two 16-penny wire nails at each end. All breaks in grades shall be carefully rounded by vertical curves. The lumber shall correspond to that specified under "Lumber" in Miscellaneous Items.

**Measurement.**—All curbs and gutters will be measured on the face of the curb.

**Payment.**—Curbs and gutters will be paid for at the respective rates bid for the same per M. feet B.M. as listed on the proposal, for lumber in the completed work, and such payments shall be in full for furnishing and laying all material required, including nails, bedding of blocks, and all other materials and labor necessary for the finished result.

### CURBS AND GUTTERS ADJUSTED

Where it is necessary to tear up existing curbs and gutters in order to make proper adjustments, the old curbs and gutters shall be torn up and relaid, as shown on the plan or as directed by the City Engineer, using only such old lumber as is suitable for the work. Construction to be made in the same manner and with like material as new curbs and gutters.

**Payment.**—Curbs and gutters adjusted will be paid for at the rate bid per M. feet B.M. as listed on the proposal. Such payment will be in full for furnishing and laying all material required, including nails, bedding of blocks and all other materials and labor necessary for the completed work.

### SEWER PIPE DRAINS

Sewer pipe drains shall be constructed of the dimensions and in the locations shown on the plans, or where directed by the City Engineer. The pipe shall be laid to a straight line and grade solidly bedded in the ground. All joints shall be filled with cement mortar, mixed one part cement to three parts sand. They shall be provided with such inlets as may be directed.

**Payment.**—Sewer pipe drains will be paid for at the rate bid therefor per linear foot, as listed on the proposal, and such payments will include the cost of furnishing and laying pipe, the excavation and refilling of the trench, and all other material and labor necessary for the completed work.

## ORIGINAL GRADING—Continued

### BOX DRAINS

Box drains shall be constructed of the dimensions and in the locations as shown on the plans, or as directed by the City Engineer. A three-cornered strip, cut from 2"x2" lumber, and dressed on all sides, shall be nailed in the two lower corners of the box. All other lumber shall be dressed on one side.

**Payment.**—Box drains will be paid for at the rate bid per M. feet B.M. for lumber, as listed on the proposal, in the completed work, and such payments shall be in full for furnishing and laying all materials required, including all excavation, back-filling, nails, bedding of blocks, and all other material and labor necessary for the finished work.

### REBUILDING MANHOLES

Where shown on the plan or as directed by the City Engineer the existing manholes shall be built in the positions shown. The contractor shall use such of the old materials as directed by the City Engineer, and shall furnish all new material required.

**Payment** will be at the rate bid therefor, as listed on the proposal, and will be in full for all labor and material in the completed work.

### TEMPORARY INLETS

Where shown on the plan or as directed by the City Engineer, temporary inlets shall be constructed in accordance with the details on the standard plan.

**Payment** for temporary inlets will be at the rate bid for each as listed on the proposal and shall be in full for all material and labor furnished in the completed work.

### SAND BOXES

Sand boxes shall be constructed where shown on the plan, or where directed by the City Engineer. They shall be well and strongly built, as shown on the detail plans. The outlet pipe shall consist of a quarter bend special of the same inside diameter required for connection to main sewer, neatly fitted into the box with the spigot end inside, proper connection between hubs outside being made by a short section of pipe. Inlet boxes and ditches leading thereto shall be constructed for each box as shown in the detail plan. Connection to the main sewer shall be made with eight (8) inch sewer pipe, unless otherwise shown.

**Payment.**—Sand boxes will be paid for at the price bid for the same, as listed on the proposal, which shall include all labor and materials for the box, inlets, and connection to the main sewer, provided, said connection be not over forty (40) feet in length; 50 cents per foot will be allowed for all extra pipe used beyond the 40-foot connection.

### SAND CATCHER

Where shown on the plan or as directed by the City Engineer, sand catchers shall be constructed according to the standard plans therefor.

**Payment** for sand catchers will be at the rate bid as listed on the proposal, and will be in full for all labor and material necessary to build and fit the same to the gutters.

## ORIGINAL GRADING—Continued

### SHEAR BOARDS

When shown on the plan, or as directed by the City Engineer, shear boards shall be constructed as shown on the standard plans.

**Payment** will be at the rate bid therefor per M. feet B.M. as listed on the proposal, and will be in full for all labor and material in the completed work.

### WOODEN BULKHEADS LUMBER

Wooden bulkheads shall be constructed along the sides of the streets where shown on the plans, or where directed by the City Engineer.

All lumber used shall be sound, live, merchantable, yellow fir, free from shakes, dead knots, pitch seams, or other imperfections which might impair its strength, or durability, and shall be of such dimensions as may be shown on the plans. All portions of bulkheads shall be well fitted, bedded and spiked. All posts shall be set on blocks, laid in holes excavated to the depth as shown on the plans, or as directed by the City Engineer. In refilling such holes, the earth shall be thoroughly tamped. "Deadmen" shall be bedded to the depth shown. All excavations, such as trenches for "deadmen," and holes for posts and other unexposed work in bulkheads, shall not be filled or covered until the same have been fully inspected. All lumber used for bulkheads not exposed, except ends of timbers (unless otherwise specified) shall be painted with two (2) coats of hot coal tar or some other preparation approved by the City Engineer.

**Payment.**—All lumber in bulkheads will be paid for at the rate bid per M. feet B.M., as listed on the proposal, in the finished structure, and such payment shall be in full for furnishing and placing in position all lumber required, including the digging and refilling of post holes, the painting of the lumber, and all other labor and material necessary for the completed work.

Rods used in bulkheads shall be of good quality of wrought iron and shall be of the dimensions shown on the plans. Threads at each end shall be eight inches in length. All rods shall have upset ends two feet long, three-eighths ( $\frac{3}{8}$ ) inch larger than main rod. Each rod shall be provided with the standard size nuts and 6-inch cast-iron washers. All rods shall be thoroughly painted with two coats of "P. & B." or other preparation approved by the City Engineer. Blocks of the dimensions shown on the plans shall be used under each washer. Blocks will be included in the measurement of lumber used.

**Payment.**—All iron for bulkheads will be paid for at the rate bid for same per pound, and such payment shall be in full for furnishing, painting and placing in position.

### CONCRETE RETAINING WALLS

Where shown on the plans or as directed by the City Engineer, concrete retaining walls shall be constructed in accordance with the details given. The foundation for all retaining walls shall be excavated to solid ground and thoroughly tamped and prepared. The concrete used in the main body of the wall shall be composed of one (1) part Portland cement, three (3) parts sand, and six (6) parts gravel.

## ORIGINAL GRADING—Continued

### CONCRETE RETAINING WALLS

The materials used shall be of the same quality and mixed in the same manner as hereinafter provided for "Concrete Sidewalks." The concrete shall be deposited in layers, not exceeding one (1) foot in thickness, and each layer shall be rammed until free mortar flushes to the surface. Each section of the wall shall be laid continuously in order to form a monolithic mass, vertical joints being provided where directed. The contractor shall provide all forms necessary to construct the wall of the shape and dimensions given. These forms shall be of sufficient strength to insure the wall having perfectly straight and even lines. No filling in of earth behind any retaining wall will be allowed until the concrete has thoroughly set.

All concrete retaining walls shall be faced with a coating of cement mortar, three-quarters ( $\frac{3}{4}$ ) of an inch in thickness, mixed with one (1) part Portland cement to one (1) part of sand. The cement mortar facing and the concrete wall shall be brought up together, special care being taken to secure a thorough bond between the two. The facing shall be marked off into "V"-shaped grooves of the shape and dimensions given. Mold boards shall be perfectly smooth, and shall have strips or cleats nailed to them, making the grooves required. These boards shall be thoroughly greased each time before being used.

There shall be placed at the back and bottom of the wall a tile drain which shall be connected to the gutter through the wall at intervals of not more than thirty (30) feet. There shall be placed at the back of the wall for its entire height gravel not less than four (4) inches in thickness.

All filling of earth behind bulkheads or retaining walls shall be carefully made in layers not exceeding one foot in thickness, and each layer thoroughly tamped. No filling in of loose earth and puddling the same with water will be permitted, except by express permission of the City Engineer.

**Computations** will be made by the prismoidal formulae.

**Payment.**—Concrete retaining walls will be paid for at the rate bid for the same per cubic yard as listed on the proposal, and such payment shall be in full for furnishing and placing all material required, including all excavating, concrete, tile drain, gravel, back-filling, cement mortar facing, coping, and the furnishing, placing and removing of all forms necessary.

### STEEL

The steel used for reinforcing shall be plain or one of the types of deformed bars of sizes as shown on the plans. It shall have an ultimate tensile strength of 60,000 pounds per square inch, and shall have an elastic limit of not less than one-half the ultimate strength. The ends of all upright bars shall be bent into hooks.

**Payment** for steel will be at the rate bid therefor per pound as listed on the proposal, and will be in full for furnishing and placing the same.

## ORIGINAL GRADING—Continued

**GALVANIZED IRON RAILING** Where shown on the plans, or where directed by the City Engineer, galvanized iron railing shall be constructed in accordance with the dimensions and the details given on the plan. Special care shall be taken to secure the railing strongly and firmly to the concrete base. All fittings used shall be malleable iron.

**Payment.**—Galvanized iron railing will be paid for at the rate bid for the same per linear foot, measured on the slope, and such payment shall be in full for furnishing and placing in position all material required, including the painting.

## RESURFACING STREETS AND SIDEWALKS

### CLEARING AND GRUBBING

All brush, trees, stumps, logs, old sidewalks, fences, cross-walks, curbs and gutters, box drains, bulkheads, planking, rubbish, sawdust, etc., or any material in the way of this improvement, or any other material, subject to shrinkage or decay, and all roots and grubs and other debris encountered during the progress of the work shall be piled and burned or otherwise disposed of as the City Engineer may direct. Also the tearing away of any existing concrete walks which may be necessary to connect properly with the new walk. Where wood sidewalks have been reconstructed under the direction of the Board of Public Works, within one year prior to the date of the resolution declaring the intention of the City Council to order this improvement, such walks shall be carefully taken up and neatly piled by the contractor, and the lumber therein shall become the property of the owner of the abutting property. Payment for taking up such walks shall be included in the price bid for "Clearing and Grubbing."

**Payment** for clearing and grubbing shall be at the lump sum bid therefor as listed on the proposal, and shall cover the cost of all work as specified above.

### EARTH-WORK

All grading for concrete walks shall be done according to the Standard Specifications for Grading. Before street or streets are accepted as completed they must be left as designated in surfacing streets under grading.

**Payment** for all classes of earthwork, whether in parks or in roadways, shall be made on the same basis as specified under grading specifications, except when earthwork is taken as bid per lump sum, when payment shall include all classes of earthwork, whether in parks or in roadways.

### WOODEN SIDEWALKS

Shall be constructed where shown on the plans or as directed by the City Engineer. The covering planks of sidewalks shall be of fir, surfaced on one side, two (2) inches thick and uniformly eight (8) inches wide. They shall be sawed square at both ends and placed to a true line, both on inner and outer edges of walk. They shall be spiked to the stringers by two (2) 20-penny wire nails to each plank at each stringer. Stringers shall be in lengths of 16, 24 or 32 feet, and shall rest on solid fir blocks, placed not more than eight feet center to center, and under every joint and solidly bedded in the ground. The stringers shall be toenailed to each block with two 30-penny wire nails. The lumber shall correspond to that specified for Lumber under Miscellaneous Items.

## RESURFACING STREETS AND SIDEWALKS—Continued

### WOODEN SIDEWALKS

Payment for wooden sidewalks will be at the rate bid for the same per M. feet, B.M., for lumber in the completed work, and such payments shall be in full for furnishing and laying all material required, including nails, bedding, blocks and all other materials and labor necessary for the completed work.

### CROSS- WALKS

Shall be constructed when shown on the plans or as directed by the City Engineer. Covering planks of cross-walks shall be uniformly three inches thick and twelve inches wide, and shall be spiked to the stringers with two 60-penny wire nails in each plank at each stringer. The stringers shall be shaped accurately to the dimensions shown on the plans, and shall be solidly bedded in the ground. Aprons shall be made from planks two inches by eight inches wide, unless otherwise shown on the plan, sized on upper side and placed as shown on the plans. The lumber shall correspond to that specified for Lumber under Miscellaneous Items.

Payment for cross-walks will be at the rate bid for the same per M. feet B.M. for lumber in the completed work, and such payment shall be in full for furnishing and laying all material required, including nails, bedding cross ties and all other materials and labor necessary for the completed work. No extra payment will be made for excavating for cross-walks.

### CROSS- WALKS REBUILT

Cross-walks shall be rebuilt as shown on the plan or as directed by the City Engineer, using such of the old lumber as in the opinion of the City Engineer is suitable. The method of construction shall be the same as for new cross-walks.

Payment for cross-walks rebuilt will be at the rate bide therefor per M. feet B.M. as listed on the proposal, and will be in full for all labor and material in the completed work.

### TILE DRAINS

At such points as are shown on the plan, or as the City Engineer shall deem necessary, tile drains shall be constructed in such directions and for such lengths as may be required, and in accordance with details shown on the plans. The trench shall be carefully filled to the top with screened gravel, small stones, or other material approved by the City Engineer.

Payment.—Tile drains will be paid for at the rate bid therefor per linear foot as listed on the proposal. Payments so made will be in full for all labor and materials necessary for the completed work.

### 3" SEWER PIPE

Where directed by the City Engineer, three (3) inch sewer pipe shall be laid under the concrete sidewalks and extended across the parking strip and through the curb. Holes shall be bored through the curb. No cutting of the curb will be allowed. The pipe shall be salt glazed, vitrified sewer pipe, of quality conforming to the standard specifications of the City of Seattle. It shall be laid with cement mortar joints, the mortar to be composed of one part Portland cement to two parts clean sand. It shall be laid close to the concrete

## RESURFACING STREETS AND SIDEWALKS—Continued

### 3" SEWER PIPE

and shall be solidly bedded in the ground. Connection will be made with the gutter as shown on the plan. When necessary to extend the existing 3" sewer pipe out through the concrete curb, the same shall be done in the manner as shown on the standard plan.

Payment will be made for 3" sewer pipe at the rate bid therefor as listed on the proposal, and will be in full for all labor and materials necessary for the completed work.

### ROCK POCKETS

Rock pockets shall be constructed at the upper end of the three (3) inch sewer pipe in the manner shown on the standard plan. The gravel shall not exceed six (6) inches in diameter.

Payment for rock pocket will be included in the price bid for three (3) inch sewer pipe.

### CONCRETE SIDEWALKS

Concrete sidewalks of such width as may be shown on the plan or as directed by the City Engineer shall be constructed on this improvement, as shown on the plan. Provided, however, that no concrete sidewalk shall be constructed upon any embankment unless the City Engineer shall consider the same sufficiently settled to afford a stable foundation. They shall conform accurately to the lines and grades given, and shall be constructed as follows:

The sub-soil shall be excavated to a depth of about four (4) inches below the finished grade and thoroughly settled and compressed by wetting and tamping. If any filling in is necessary, it shall be done in the manner hereinafter specified for embankment under grading.

The contractor shall provide forms of such shape and dimensions as may be required. They shall be made of surfaced lumber, and shall be thoroughly wetted before placing the mortar. The cost of furnishing and setting the forms must be included in the price bid for concrete sidewalks. After the forms are set accurately to the grades and slopes given, the foundation shall be brought to the exact sub-grade required and well wetted and smoothed down just before placing the concrete.

Concrete sidewalks shall consist of two courses: First, a bottom course of concrete three and one-half (3½) inches thick, composed of one part Portland cement, three parts sand and six parts gravel or broken stone; second, a finishing or wearing course of cement mortar one-half (½) inch thick, composed of one part cement to one and one-half parts sand.

### Cement Specifications

The cement shall be a true Portland cement, of the best quality, dry and free from lumps and all foreign material. It shall be a cement which usage has proven to possess the proper qualifications and uniformity for the work intended. It shall be delivered on the work in the original packages, in good condition, properly labeled, and must be well protected from rain and dampness. It shall be delivered on the work in advance, in such quantity as to



## RESURFACING STREETS AND SIDEWALKS—Continued

**CONCRETE** afford the Engineer an opportunity of making  
**SIDEWALKS** tests before the cement shall be used. Each package shall be subject to the following tests:

At least eighty (80) per cent. shall pass a No. 200 sieve (40,000 meshes to the square inch) and not less than ninety-two (92) per cent. shall pass a No. 100 sieve (10,000 meshes to the square inch). Cement shall develop initial set in not less than forty (40) minutes, and must develop hard set in not less than two (2) hours, nor in more than ten (10) hours.

As a mortar, mixed one (1) part cement and three (3) parts sand, by weight, after one (1) day in moist air and six (6) days immersion in clear water, briquettes of the same shall not break under a tensile strength of one hundred and eighty (180) pounds per square inch; and after one (1) day in moist air and twenty-seven (27) days immersion, they shall not break under two hundred and seventy-five (275) pounds per square inch.

Cement which shall be found to fall below this standard shall be considered rejected cement. The sand used in testing shall be a local sand, passing a No. 20 screen and retained on a No. 30 screen.

In addition to the tests above specified, all cement used on this work shall be subject to such other tests as may be necessary to determine whether or not the cement possesses the proper qualities for the particular work for which it is intended. Should there be discovered, at any time, any characteristics in any cement being used, that are objectionable in this work, or should the cement fail to make good concrete or mortar, its further use on this work will be prohibited, regardless of the fact that it has satisfactorily withstood the tests hereinbefore specified.

All cement used in this improvement is subject to these specifications.

The sand used shall be clean, coarse and sharp. It shall be thoroughly washed until free from loam, clay or earthy particles. Sand will be rejected if more than five per cent. fails to pass a one-fourth inch sand screen standing at a pitch of one-half to one. All sand shall range uniformly from fine to coarse. Special care shall be taken in the selection of sand to be used in the wearing surface.

The gravel used shall be thoroughly washed until free from loam, clay or earthy particles. It shall range in size from one-quarter inch to one and one-half inches in diameter. Care should be taken that the gravel shall range uniformly between these sizes. All gravel will be rejected which shows an undue proportion of fine gravel on the one hand, or large stones on the other, and of which more than five per cent. shall pass a screen having a mesh of one-quarter inch.

Concrete shall be mixed by a batch mixer of a type approved by the City Engineer or as follows: Upon a tight platform containing 324 square feet, unless otherwise directed by the City Engineer, of evenly laid plank, a correct proportion of gravel shall be evenly spread, and in no case more than eight inches deep. All

## RESURFACING STREETS AND SIDEWALKS—Continued

**CONCRETE** materials for concrete shall be accurately measured  
**SIDEWALKS** in suitable sized boxes. No counting by shovels or other approximation will be allowed. To determine the proper proportions, a barrel of cement weighing not less than 376 pounds net shall be taken as measuring three and one-half cubic feet. In a separate box the correct proportion of sand and cement shall be mixed dry until the whole mass is one even color. The gravel shall then be wetted and the mixture of dry sand and cement shall be evenly spread over it. The mass shall be turned with shovels not less than three (3) times, and more if necessary, in the judgment of the City Engineer, to secure a perfect mixture of mortar and gravel. In addition to the thorough wetting of the stones, if, in the judgment of the City Engineer it will be necessary, sufficient water shall be added to the mass to enable the material to become thoroughly incorporated, and the process of mixing shall be continued until the surface of each stone is well covered with mortar. The concrete shall be spread upon the foundation as soon as mixed in a layer of such depth that after having been thoroughly compacted with iron-shod rammers, seven inches square, and weighing not less than twenty pounds, it shall not be in any place less than three and one-half (3½) inches thick, and the upper surface shall be parallel with and not less than one-half (½) inch below the proposed surface of the completed pavement. To insure this the concrete shall be struck with a gauge which shall be shod with a steel plate not less than one-eighth (⅛) inch in thickness. The concrete shall be thoroughly tamped or rammed until water appears on the surface. A batch of concrete made with two barrels of cement shall not make more than 200 square feet of sidewalks, and not less than one barrel of cement shall be used for every 50 square feet of finished sidewalk.

When the bottom course is completed, and before the concrete has begun to set, the finishing or wearing course shall be laid down. The correct proportion of sand and cement shall be thoroughly mixed dry until of one uniform color, and sufficient water added to make a mortar of proper consistency. The mortar shall be colored by mixing lampblack therewith, at the rate of about three-quarters (¾) of a pound of lampblack to one barrel of cement. This quantity may be varied to produce the shade desired. The lampblack shall be thoroughly mixed with the cement mortar in such a manner as to produce a uniform and even shade satisfactory to the City Engineer. Special care must be taken to thoroughly trowel down the mortar in order to secure a perfect bond with the concrete base. It shall then be carefully smoothed to a uniform surface, which must not be disturbed after the first setting takes place.

"V"-shaped grooves one-quarter of an inch in depth shall then be made with a suitable tool, dividing the pavement into blocks two feet square. The thickness of the completed wearing surface must not be less than one-half inch at any point. On grades steeper than



## RESURFACING STREETS AND SIDEWALKS—Continued

**CONCRETE SIDEWALKS** four per cent. the cement coating shall be roughened by finishing with brush, or in such manner as the City Engineer may direct.

At such points as may be directed by the City Engineer, and which shall be approximately sixty (60) feet apart, all concrete sidewalks shall have a joint, extending entirely through the concrete base and wearing surface. This joint is to be made with an iron bar three-eighths inch in thickness at bottom edge and five-eighths inch in thickness at top edge. After removing joint bar, the open joint shall be covered by a strip of wood 1 in. x 4 in. firmly nailed to the forms. When forms are removed, this joint shall be carefully cleaned and immediately poured to within one-half inch of the surface with hot Grade "D" Asphalt, or with Pavers' Pitch No. 6.

When the sidewalk is completed it shall be covered with such material as may be directed and kept moist by sprinkling for at least one week. The sprinkling shall be done as often as may be necessary to keep the sidewalk constantly moist.

The contractor will be required to stamp his name in letters one and one-half inches high and one-quarter of an inch deep, twice in each block on each side of street.

All concrete shall be laid in short sections and immediately covered with the wearing surface. Retempering of concrete or mortar will not be permitted. All mortar or concrete that has begun to set before ramming is completed shall be removed from the work. Any concrete or mortar that fails to show proper bond, or that fails to set after, in the opinion of the City Engineer, it has been allowed sufficient time, shall be taken up and replaced by the contractor at his own expense with new concrete or mortar of proper quality.

Concrete shall not be mixed nor deposited when the temperature is below forty (40) degrees Fahrenheit, unless special precautions are taken to avoid the use of materials containing frost and the work protected in a manner satisfactory to the City Engineer until the concrete has thoroughly hardened.

All walks or driveways connecting with private entrances, or any extra work connected with or incidental to the complete performance of this contract shall be executed by the contractor in a neat and workmanlike manner, in accordance with these specifications or the special directions of the City Engineer in each case.

After the walks have been completed and the forms removed, the slopes and parks shall be neatly and evenly surfaced and smoothed to conform to the lines indicated on the plan.

All parks shall be sowed with white clover seed of good quality, using one pound of seed for each three hundred (300) square feet.

Before the final release of the work all concrete sidewalks will be carefully inspected and sounded for defects, and any hollow or otherwise defective blocks shall be cut out and replaced by the contractor at his own expense. Relaying of top course only will not be permitted.

## RESURFACING STREETS AND SIDEWALKS—Continued

**CONCRETE SIDEWALKS** Measurement of concrete sidewalks shall be on the slope.

Payment of concrete sidewalks shall be at the rate bid per square yard for same as listed on the proposal, and shall be in full for all material and labor furnished for the finished product.

### CONCRETE ALLEY CROSSINGS

Alley crossings shall be constructed where shown on plan or where directed by the City Engineer. The concrete base shall not be less than four (4) inches thick, and the wearing surface shall not be less than one (1) inch thick. Both concrete and cement shall be composed and laid down as specified for concrete walks. The surface shall be roughened as directed by the City Engineer. The lumber placed back of concrete alley crossings shall be classified and paid for as crosswalk lumber.

Measurement for concrete alley crossings shall be on the slope.

Payment for concrete alley crossings shall be at the rate bid per square yard for same as listed on the proposal, and shall be in full for all materials and labor furnished for the finished product.

### CORRUGATED WALKS

Corrugated walks shall be constructed as shown on the plan or as directed by the City Engineer in accordance with the standard plans. Materials and methods of construction shall be the same as specified for concrete sidewalks, except that corrugations in base and top shall be formed with a templet.

Payment for corrugated walks will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### CONCRETE STAIRWAYS

Where shown on the plan or as directed by the City Engineer, concrete stairways shall be built in accordance with details shown on plans. The concrete and cement mortar shall be composed of materials of the same quality, mixed in the same proportions and in the same manner as specified for "Concrete Sidewalks." A cement mortar facing, one inch thick, for the stair risers, shall be composed of one part cement and two parts sand. Special care shall be taken to secure a thorough bond between the cement mortar facing and the concrete base. The contractor will be required to replace, to the satisfaction of the City Engineer, all hollow or otherwise defective steps. The treads of all steps shall have a slope of three-sixteenths (3-16) of an inch in order to secure drainage.

On each side of the steps and along the sides of landings, where so indicated on the plans, or where directed by the City Engineer, there shall be constructed a coping or parapet wall and concrete gutter of the dimensions and designs shown on the detail plans. They shall be built in the same manner as specified for concrete steps. The copings, steps and concrete gutter shall be tied together with five-eighths ( $\frac{5}{8}$ ) inch iron rods, as shown on the plans. The iron rods extending through the steps shall be hooked or bent around those in the coping.

## RESURFACING STREETS AND SIDEWALKS—Continued

**CONCRETE STAIRWAYS** The contractor will be required to provide all necessary forms for the construction of the concrete stairways, copings or parapet walls and concrete gutters. These forms shall be of sized lumber.

**Payment.**—Concrete stairways will be paid for at the rate bid therefor per linear foot of step, as listed on the proposal, measurement to be from the inside to inside of coping or parapet wall, and such payment shall be in full for furnishing and placing in position of all materials required, including the cost of all forms and labor necessary and including the furnishing and placing of iron rods in steps as are shown in detail on the plans.

**CONCRETE LANDINGS** Concrete landings will be classed as concrete sidewalks, and will be paid for at the rate bid for concrete sidewalks.

**CONCRETE COPING OR PARAPET** Concrete coping or parapet shall be constructed where shown on the plan or as directed by the City Engineer, according to the standard plan therefor.

**Measurement** shall be on the slope.

**Payment** shall be at the rate bid per linear foot for same as listed on the proposal, and shall be in full for all materials and labor furnished in the completed work.

**CONCRETE GUTTERS** Concrete gutters shall be constructed where shown on the plan or as directed by the City Engineer according to the standard plans therefor.

**Measurement** will be on the slope.

**Payment** shall be at the rate bid per linear foot for same as listed on the proposal, and shall be in full for all materials and labor furnished on the completed work.

**INLETS** Shall be constructed where shown on the plans or as directed by the City Engineer according to details on plan therefor. Inlets shall be set in a neat and workmanlike manner, conforming to the existing curb and gutter, unless otherwise directed by the City Engineer. They shall be well bedded in concrete, as shown in detail on the plans. Care should be taken that they are set approximately on grade and contour of the street on which they are to be placed. They should be set about three-quarters ( $\frac{3}{4}$ ) of an inch below the surface of the pavement, and care should be taken that the pavement is brought down so as to lead all water quickly into the inlet. The connection from the inlet to the catch basins, whether the inlet is new or existing, shall be made in a straight line, and no bends whatever will be allowed.

**Payment** will be at the rate bid for each as listed on the proposal, and shall be in full for all labor and materials used in the finished work.

## SEWERS

Pipe sewer shall be constructed where shown on the plans or where directed by the City Engineer.

### PIPE SEWERS

**Quality of Pipe.**—All pipe and specials used in constructing this sewer shall be of the best quality, salt-glazed, vitrified clay sewer pipe to be had in the Seattle market. Both body and bell of pipe fifteen (15) inches or less inside diameter shall be of standard thickness; pipe over fifteen (15) inches inside diameter shall have a thickness not less than one-twelfth (1-12) the inside diameter. All pipe and specials shall be sound and well-burned throughout their thickness, impervious to moisture, with a clear ring, smooth and well-glazed on interior and exterior surfaces, free from cracks, flaws, blisters, fire-checks or other imperfections, and warranted to stand a compressive stress between flat faces, of three thousand (3000) pounds. Any pipe or special which varies between any two diameters more than three (3) per cent. shall be rejected. Any pipe or special which betrays in any manner a want of thorough vitrification, or the use of improper or insufficient materials or methods in its manufacture, shall be rejected. The Board of Public Works and the City Engineer shall constitute the only judges as to quality of pipe. The name of the maker of the pipe proposed to be used must be given by each bidder.

**Alignment and Grades.**—The alignment and grade of the sewer will be indicated upon cross sills or timbers, four (4) inches by eight (8) inches by ten (10) feet long, except where sewers are 18 inches in diameter or less, sills or timbers may be three inches by eight inches by eight feet in length, bedded at intervals from twenty-five (25) feet to thirty (30) feet, at right angles to the line of the sewer. These timbers shall be furnished and solidly bedded by the contractor. The line will be given, and the cut to the invert of the sewer will be marked on these timbers. A marker board must be nailed to each timber by the contractor, so that a line drawn from the top of one marker to the other will indicate true line and true grade, the invert being known depth below and parallel with said line. The contractor shall provide a suitable plumb bob and rod to project this line accurately to the bottom of the trench, the rod used for measuring depths to have an iron shoe projecting accurately at right angles to the rod a distance of about five (5) inches.

**Trenching.**—The ground shall be excavated to the required depth and width, principally in open trench. The completed trench shall be

## SEWERS—Continued

### PIPE SEWERS

kept not less than thirty (30) feet ahead of the pipe layers. The trenches shall be at least six (6) inches wider on both sides, or a total width of twelve (12) inches more, than the exterior diameter of the pipe. If rock is excavated it must be removed to a depth of four (4) inches below the bottom of the bell and the trench refilled with sand well tamped.

The contractor shall furnish all necessary machinery for the work, shall pump, bail or otherwise remove any water which may be found or which may accumulate in the trenches, and shall perform all work necessary to keep them clear of water while the foundations and the masonry are being constructed or the pipe laid.

When necessary the sides of the trench shall be braced and rendered secure, and either open or close sheathing used, to the satisfaction of the City Engineer. The cost of all such sheathing must be included in the price bid per linear foot for the completed sewer, and no extra payment beyond such price will be allowed.

**Tunneling.**—Where the trench is ten (10) feet or more in depth, tunneling may be resorted to. Open trenches between tunnels shall not be less than eight (8) feet in length, and the tunnels shall not be more than two (2) feet longer than the depth of the trench. Tunnels shall be at least two (2) feet higher than the diameter of the sewer, but in no case less than four (4) feet high and two (2) feet wide.

**Pipe Laying.**—Before being laid the pipe and specials must be carefully inspected for defects, and those not meeting the foregoing specifications shall be rejected. The accepted pipe shall then be fitted together, matched and marked, before being lowered into the trench, and must be laid as marked. The pipe must be so laid in the trench that after the sewer is completed the interior surface thereof shall conform accurately to the grades and alignment given by the City Engineer. All adjustment to line and grade must be done by scraping away or filling in the earth under the body of the pipe and not by blocking or wedging up. Great care must be exercised that the pipe has a full, solid bearing along its entire length. Before laying the interior of the bell shall be carefully wiped clean and the lower part well covered with cement mortar before the insertion of the spigot end. Special care must be taken that the annular space at the sides and bottom, as well as the top of the joint, is well filled with mortar, which must be thoroughly worked in.

The cement mortar for filling the joints shall be composed of one (1) part cement and two (2) parts sand.

**Cement Specifications.**—See page 11.

All sand shall be clean, sharp, washed sand, not too fine, and free from loam, clay or vegetable matter.

All mortars used shall be mixed as follows: The contractor shall furnish tight platforms of suitable size on which the mortar shall be mixed, as follows: One measure of sand shall

## SEWERS—Continued

### PIPE SEWERS

be evenly distributed on the platform; and one measure of cement shall be distributed on the sand and a second measure of sand shall be distributed on the cement. The sand and cement shall then be thoroughly mixed in a dry state, being turned over with shovels until the whole mass is of a uniform color. Water shall then be added in sufficient quantity to convert the sand and cement into a mortar which will stand in a pile and not be fluid enough to flow. During the application of the water the mass must be constantly turned with shovels, so that the mortar will be of uniform consistency. Mortar shall be mixed in small quantities and used immediately thereafter. Mortar once set must be thrown away.

As soon as each joint of pipe has been properly placed and jointed, the spaces between the pipe and sides of the trench shall be carefully filled with sand or fine earth and well rammed under and around the pipe. Sufficient filling and tamping must be done to hold the pipe firmly in position. The joint must be checked for line and grade before the next succeeding joint is placed.

Running water shall at all times be kept from the joints for at least twelve (12) hours after completion, and if at any time it be the judgment of the City Engineer that it is necessary to do so, he may require the joint to be caulked with tarred oakum before being cemented.

Where quicksand is encountered, the pipe shall be bedded in concrete, mixed one (1) part cement, four (4) parts sand, and seven (7) parts gravel, as shown in detail on the plans. All concrete used will be paid for at the rate bid for the same per cubic yard; such payment to be in full for furnishing and placing in position all material required.

Wyes will be placed at the positions shown upon the plan or as directed by the City Engineer. An earthenware stopper must be used to close the open end of each wye. The inclination given each wye, unless otherwise directed by the City Engineer, will be about thirty (30) degrees above the horizon.

The interior of the pipes shall be carefully cleaned from dirt, cement and superfluous material of every description. Each joint shall be carefully scraped as the work progresses, or, when directed by the City Engineer, a wad made of a sack filled with hay, large enough to fill the pipe and attached to a rod or cord, shall be kept in pipes eighteen (18) inches or less inside diameter, and drawn forward as the work proceeds, care being taken not to loosen the joints.

**Back Filling.**—Back filling shall follow close after the pipe laying, and in no case more than 200 feet in the rear, unless special permission is obtained from the City Engineer. The earth shall be filled in and well rammed in layers, not exceeding one foot in thickness, up to the surface of the street, and in no case shall the number of men filling exceed the number of men ramming. Special care must be taken, in filling and ramming the first layer, not to disturb the pipe. No walking on the pipe will be

## SEWERS—Continued

### PIPE SEWERS

allowed until at least nine (9) inches of earth has been placed upon it. In lieu of ramming, the earth may be thoroughly flushed or water-settled.

In all cases the contractor shall maintain the roadway over the sewer constructed for a period of thirty (30) days after the acceptance of the sewer by the Board of Public Works, and in no case shall the thirty (30) per cent. of the total amount of the contract reserved for thirty (30) days under the provisions of the City Charter be paid to the contractor until the roadway shall have been leveled or surfaced to the satisfaction of the City Engineer.

Where necessary to cut through the existing planking or pavement the same shall be removed in such a manner as to permit the back-fill being thoroughly compacted by tamping with sufficient water to make the earth pack before any planking or pavement is relaid.

The payment for replacing planking or paving so removed shall be included in the prices bid for sewer work.

**Measurements** of each size of pipe sewer constructed will be made on the slope from center to center of manholes.

**Payment.**—Pipe sewers will be paid for at the respective rates bid per linear foot for the different sizes, as listed on the proposal, the price so paid to be in full payment for furnishing and laying the pipe and specials, the removal of existing sewers, appurtenances and all connections to existing sewers and adjustment of inverts to existing manholes, as shown on the plan or as directed by the City Engineer, including earth excavation, sheathing, pumping, back-filling, restoring the street surface, hauling away surplus earth and material, and all other work and material required by these specifications or necessary to give a finished result.

**Quality of Brick.**—Where shown on the plans or as directed by the City Engineer, oviform or circular brick sewers shall be constructed in accordance with the details shown on the plans. The brick used for the inverts shall be selected, perfectly-shaped, straight-edged brick, burned hard entirely through in all respects equal to first-class paving brick. They shall not absorb more than three (3) per cent. by weight of water after being thoroughly dried and immersed in water for forty-eight (48) hours. When broken the fracture shall be uniform throughout, not granular, and free from pebbles. No brick will be accepted which contain lime or other substances which may cause spalling, or pitting of the surface when the brick have been soaked in water from three (3) consecutive days and then exposed to the air for the same length of time. Where shown on the plans, the inverts and arches shall be constructed of wedge-shaped brick. The brick for the remaining portions of the sewers shall be a good quality of sound, hard-burned, perfectly-shaped, hard-ringing brick, presenting a smooth and regular surface. They shall be made from well-ground clay, free from lumps or pebbles, and when thoroughly dried and immersed in water

## SEWERS—Continued

### BRICK SEWERS

for twenty-four (24) hours they shall not absorb more than six (6) per cent. by weight of water.

**Brick Laying.**—None but sound, whole brick shall be used in the construction of sewers, except as may be specially directed. All brick shall be thoroughly wetted immediately before being laid. They shall be laid in straight courses, parallel with the axis of the sewer, with "push" joints, so as to thoroughly fill every joint with mortar. The mortar shall be composed of one (1) part Portland cement to two (2) parts of sand. The cement and sand and mortar shall conform to the foregoing specifications for pipe laying. All joints shall be as nearly as possible of a uniform thickness and not exceeding three-eighths ( $\frac{3}{8}$ ) of one (1) inch. On the inside of the invert the joints shall not exceed one-eighth ( $\frac{1}{8}$ ) of one (1) inch in thickness. All joints on the sides and on the invert shall be struck when laid. The upper arch shall be built upon strongly made centers. The crown of the arch shall be thoroughly keyed with stretchers and all joints shall be well filled with mortar. The centers shall not be withdrawn until the mortar is well set. The exterior surface of the upper arch shall be covered with a coat of mortar, not less than three-eighths ( $\frac{3}{8}$ ) of one (1) inch in thickness. All brick work shall be thoroughly bonded. The unfinished ends of all sewers shall be racked back in courses. No "toothing" will be allowed. The finished sewer shall conform accurately to the dimensions and shape shown in detail on the plan. Slants, of the diameter shown on the plans, shall be furnished by the contractor and set where directed, in a neat and workmanlike manner, and to the satisfaction of the City Engineer. Each slant shall be provided with an earthenware stopper.

**Back Filling.**—After the masonry shall have become thoroughly set and hardened, the trenches shall be refilled. Special care shall be taken in filling around the sides of the sewer and to the depth of one (1) foot over the top of the pipe. The earth for this portion of the sewer shall be deposited in layers not exceeding six (6) inches in thickness, and thoroughly rammed. In no case shall the number of men filling exceed the number of men ramming. After the fill has been brought to a depth of not less than one (1) foot over the top of the outside arch, the remainder of the trench may be filled in the ordinary way and thoroughly water settled.

**Measurements** of each size of brick sewers constructed will be made on the slope from center to center of manholes.

**Payment.**—Brick sewers will be paid for at the respective rates bid for the same per linear foot as listed on the proposals, prices so paid to include the slants, excavating, sheathing, pumping, back-filling, and all other labor and material necessary for the finished work.



## SEWERS—Continued

### BRICK MANHOLES

Manholes shall be built where shown on the plan, or where directed by the City Engineer, in size, form, thickness of walls, and all other respects in accordance with the plans which may be furnished from time to time. The excavations for all manholes and flush tanks shall be sufficient to leave six (6) inches in the clear between their outer surfaces and the bank or timber used to support it. Brick shall be of good quality, sound, hard and evenly burned, made of clay and free from large lumps or large pebbles that will pass between rollers set three-eighths of an inch apart, unduly warped, clinkered or badly fire checked brick will be rejected. When thoroughly dried and immersed in water for twenty-four hours, brick used in the construction of manholes shall not absorb more than ten (10) per cent. by weight of water, and brick used in the construction of flush tanks shall not absorb more than six (6) per cent. by weight of water. Brick shall be wetted just before being used and shall be laid with shove joints. Mortar used shall be composed of one (1) part Portland cement and two (2) parts sand. The cement and sand to conform to the foregoing specifications. Special care shall be taken to see that all joints are well filled with mortar. The covers of manholes shall be brought accurately to the grade given. The channels in manholes shall conform accurately to the sewer grade. In the case of pipe sewers, split pipe shall be used for the inverts to these channels where possible. Where a curve in the channel or some other condition prevents this, the channel shall be formed of bricks on edge, set in mortar. Brick channels shall be lined with cement mortar, one-quarter ( $\frac{1}{4}$ ) inch thick, mixed one part cement to one part sand, and shall be exactly semi-circular of the diameters of the pipes which they connect. If these be of different diameter the channel shall taper uniformly from one to the other.

Manholes shall be provided with a cast iron frame and cover, in accordance with the details shown. All iron castings shall be made from a superior quality of gray iron, remelted in the cupola or air furnace, tough and of even grain, and shall possess a tensile strength of not less than 18,000 pounds per square inch. Test bars of the metal three (3) inches by one-half ( $\frac{1}{2}$ ) inch, when broken transversely eighteen (18) inches between supports and loaded in the center, shall have a breaking load of not less than 1,000 pounds and a total deflection of not less than three-tenths ( $\frac{3}{10}$ ) of an inch before breaking. Specimen bars shall be prepared when required. All castings shall conform to the shape and dimensions required by the detail drawings furnished by the City Engineer and shall be clean and perfect, without blow or sand holes, or defects of any kind. No plugging or stopping of holes will be allowed. All castings that fall short more than five (5) per cent. in weight, from those required by the plans, will be rejected. All castings, after being approved by the City Engineer, are to be coated with asphaltum by dipping the same

## SEWERS—Continued

### BRICK MANHOLES

into a bath having a temperature of at least 300 degrees F., and allowing the castings to remain long enough to obtain a thorough coating, and never less than twenty (20) minutes. When permitted by the City Engineer, castings may be painted with three coats of Smith's Durable Metal Coating, or some other approved composition.

Where the foundation is in hardpan, the City Engineer may order the modified form of manholes, as indicated by dotted lines on the plan, involving a less amount of excavation and of brick work. A deduction of five dollars (\$5.00) from the price bid will be made for each manhole so modified.

All manholes shall be built to the street grade shown on the plan, but shall be extended to the surface of the ground as hereinafter provided. (See "Wooden Box Sewers and Manhole Extensions.")

Where shown on the plan, existing manholes shall be readjusted in such manner as to permit a proper connection for the new sewer, in accordance with the details given. The cost of such work, including all labor and material required, shall be included in the price bid per linear foot for the completed sewer, and no extra payment will be allowed therefor.

Payment for manholes will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### BRICK FLUSH TANKS

Flush tanks shall be constructed where shown on the plan or as directed by the City Engineer in accordance with the detail on standard plans therefor. The specifications above for manholes shall apply to the flush tanks in regard to brick work and general requirements for castings.

Flush tanks shall be plastered on the inside with a coat of cement mortar one-quarter ( $\frac{1}{4}$ ) inch in thickness, mixed one part cement to one part sand. Flushing apparatus shall conform to the detail plans. Other designs of flush tanks may be used, provided that detail plans thereof shall have been submitted to the City Engineer and approved by him.

Flush tanks shall be connected to the nearest water main by a one-half ( $\frac{1}{2}$ ) inch galvanized iron pipe. The tap shall be furnished by the City Water Department, and the contractor shall deposit with said department the sum of \$8.00 in payment therefor. The contractor shall also furnish and place in position a first-class one-half ( $\frac{1}{2}$ ) inch faucet. Where there is no existing water main, the contractor shall furnish and place in position the faucet, together with a sufficient length of one-half ( $\frac{1}{2}$ ) inch galvanized iron pipe to project not less than two (2) feet beyond the tank. He will also be required to deposit with the City Water Department the sum of \$8.00 to cover the cost of making the connection when the water main is laid.



## SEWERS—Continued

### BRICK FLUSH TANKS

The price bid for flush tanks shall include the cost of making this connection, together with the amount paid to the City Water Department for making the tap, and no extra payment beyond the price bid will be allowed therefor.

Payment for flush tanks will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### CONCRETE MANHOLES

Concrete manholes shall be constructed where shown on the plan or as directed by the City Engineer according to details given. The concrete shall be composed of one (1) part cement, three (3) parts sand and five (5) parts gravel. The materials used shall be of the same quality and mixed in the same manner as specified under Concrete Sidewalks. The concrete shall be mixed wet, poured or shoveled into the forms in such a manner as to prevent separation of the materials. It shall be sufficiently spaded to produce dense concrete, free from air bubbles and having a smooth surface next to the inner form. Each section shall be laid continuously in order to form a monolithic mass. All forms shall be water-tight. The contractor shall provide all forms necessary to construct the manhole the shape and dimensions given. No filling in of earth around the manhole will be allowed until the concrete has thoroughly set. The walls shall be six (6) inches thick. The additional work to make a full and complete manhole shall correspond in all respects to the standard brick manhole as above specified.

Payment for concrete manhole will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### CONCRETE FLUSH TANKS

Concrete flush tanks shall be constructed as shown on the plan or as directed by the City Engineer according to details on the plan. They shall correspond in all respects to that specified above for brick flush tanks, except in regard to methods and materials of construction for concrete, which shall correspond to that specified above for concrete manholes. They must be made water-tight.

Payment for concrete flush tanks will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and materials in the completed work.

### CONCRETE CATCH BASINS

Concrete catch basins shall be constructed as shown on the plan or as directed by the City Engineer according to details on the plan. They shall correspond in all respects to that specified herein for brick catch basins except in regard to method and materials of construction for concrete, which shall correspond to that specified above for concrete manholes. They must be made water-tight.

Payment for concrete catch basins will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

## SEWERS—Continued

### BRICK CATCH BASINS AND INLETS

Catch basins shall be built where shown on the plan, or where directed by the City Engineer, in accordance with the detail plans. Brick shall be of good quality, sound, hard and evenly burned, made from clay and free from large lumps or large pebbles, that will pass between rollers of three-eighths of an inch apart. Unduly warped, clinkered or badly fire checked brick will be rejected. When thoroughly dried and immersed in water for twenty-four (24) hours, they shall not absorb more than six per cent, by weight of water. When directed by the City Engineer, all brick shall be thoroughly wetted before being used. Special care shall be taken that all joints are well filled with mortar. The mortar used shall be composed of one part Portland cement to two (2) parts sand. It shall be mixed in small quantities and used immediately thereafter. Mortar once set must be thrown away. The sand shall be clean, sharp, and free from deleterious matter. If necessary, in the judgment of the City Engineer, it shall be thoroughly washed before being used. The cement used shall conform to the foregoing specifications for that used in "Concrete Sidewalks."

Catch basins shall be plastered on the inside with a coating of cement mortar one-quarter ( $\frac{1}{4}$ ) of an inch in thickness, mixed one (1) part Portland cement to one (1) part sand. All concrete used for catch basins shall be composed of one (1) part Portland cement, three (3) parts sand and five (5) parts gravel. The sand and cement shall conform to the foregoing specifications for cement mortar. The gravel shall be screened and clean, the smallest stones of which shall not be less than one-quarter ( $\frac{1}{4}$ ) of an inch in diameter, and the largest stones must not exceed two (2) inches. The connection made from the catch basin to the sewer shall be located to meet the requirements of the Public Utilities Department of Seattle, as shown by the plans on file at the City Engineer's office and adopted by the Board of Public Works, or as directed by the City Engineer.

All catch basins shall be provided with cast-iron frames and covers, inlet gratings and outlet traps, as shown on the detail plans. All iron castings shall be made from a superior quality of gray iron, remelted in the cupola or air furnace, tough and of even grain, and shall possess a tensile strength of not less than 18,000 pounds per square inch. Test bars of metal three (3) inches by one-half ( $\frac{1}{2}$ ) inch when broken transversely, eighteen (18) inches between supports and loaded in the center, shall have a breaking load of not less than 1,000 pounds and a total deflection of not less than three-tenths ( $\frac{3}{10}$ ) of an inch before breaking. Specimen bars shall be prepared when required. All castings shall conform to the shape and dimensions required by the detail drawings furnished by the City Engineer, and shall be clean and perfect, without blow or sand holes or defects of any kind. No plugging or stopping of holes will be allowed. All castings that fall short more than five (5) per

## SEWERS—Continued

### BRICK CATCH BASINS AND INLETS

cent. in dimensions or weight from those required by the plans will be rejected.

All castings, after being approved by the City Engineer, are to be coated with asphaltum by dipping the same into a bath having a temperature of at least 300 degrees Fahrenheit, and allowing the castings to remain long enough to obtain a thorough coating, and never less than twenty (20) minutes. When permitted by the City Engineer, castings may be painted with two coats of Smith's Durable Metal Coating, or some other approved composition.

**Payment.**—Catch basins will be paid for as listed on the proposal at the respective prices bid for "Catch Basins, Single Inlet," and "Catch Basins, Double Inlet," etc. The respective prices so paid shall be in full payment for all pipe, brick, mortar, concrete, castings, and all other material and the labor required by these specifications or necessary to give finished result, including all necessary excavation.

The price bid for catch basins shall include the removal of the existing box drains, filling the space caused by such removal with earth and furnishing and fitting whatever material is necessary to finish the gutter in a workman-like manner; all to be done to the satisfaction of the City Engineer.

If five (5) per cent. of the brick delivered upon the work for this improvement fail to pass inspection of the City Engineer, the entire delivery may be condemned and removed from the street. Sorting and culling on the street will not be permitted.

### ADJUST- MENT OF INVERTS

Inverts to existing manholes shall be adjusted as directed by the City Engineer.

**Payment** for "Adjustment of Inverts" will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### WOODEN BOX SEWERS

Where shown on the plan or as directed by the City Engineer, wooden box sewers for temporary outlets or other purposes shall be constructed in accordance with the detail plans. All lumber for sides and bottom shall be sized on one side and both edges. The box shall be thoroughly nailed together.

**Payment** for wooden box sewers shall be at the rate bid per M. feet, B.M., as listed on the proposal. Such payment will be in full for all materials and labor furnished on the finished product.

### WOODEN MANHOLES

Wooden manholes shall be constructed where shown on the plans or as directed by the City Engineer according to details on the plans. All edges to be square.

**Payment** for same will be at the rate bid therefor per M. feet, B.M., as listed on the proposal, and will be in full for all labor and material furnished in the completed work.

### WOODEN MANHOLE EXTENSIONS

In ungraded streets all manholes shall be extended from the proposed street grade to the surface of the ground, as shown on the plan or

## SEWERS—Continued

### WOODEN MANHOLE EXTENSION

as directed by the City Engineer, by constructing an extension of wood, which shall be built in all respects in accordance with the detail plans therefor. All edges to be square.

**Payment.**—All manhole extensions will be paid for per M. feet, B.M., as listed on the proposal for this improvement, such payment to be in full for all labor and material necessary for the finished work.

# **CAST IRON PIPE**

## **WATER MAINS**

The pipe shall be of the kind usually known as "Hub and Spigot," and in general each straight pipe shall be twelve (12) feet long, exclusive of socket. The form and dimensions of all hub and spigot ends of all pipes and castings shall be subject to the approval of the City Engineer, and shall conform accurately in shape and dimensions to any drawings which may be furnished by him from time to time. Each pipe shall have cast upon it the initials of the maker's name and year of manufacture.

**Weight and Dimensions.**—The weight and dimensions of pipe shall be as follows:

Size, Inch	Class	Maximum Head in Feet	Thick- ness of Pipe	Caulking Space	Weight of Pipe Laying 12 Feet	Depth of Lead Joint in Inches	Weight of Lead per Joint in Pounds
4	.....	516	1 1/4 inch	0.35 inch	286 lbs.	2.25	6 lbs.
6	A	286	1 1/2 "	0.35 "	414 "	2.25	8 3/4 "
	B	458	1 5/8 "	0.35 "	470 "	2.25	8 3/4 "
8	A	300	1 3/4 "	0.35 "	613 "	2.25	11 1/4 "
	B	429	1 7/8 "	0.35 "	686 "	2.25	11 1/4 "
10	A	304	1 5/8 "	0.35 "	845 "	2.25	13 1/2 "
	B	408	1 3/4 "	0.35 "	935 "	2.25	13 1/2 "
12	A	228	1 1/2 "	0.40 "	1003 "	2.25	18 1/4 "
	B	401	1 3/4 "	0.40 "	1216 "	2.25	18 1/4 "
16	A	258	1 1/4 "	0.40 "	1598 "	2.75	28 1/2 "
	B	387	1 1/2 "	0.40 "	1879 "	2.75	28 1/2 "
20	A	274	1 1/8 "	0.40 "	2324 "	2.75	35 "
	B	378	1 1/4 "	0.40 "	2672 "	2.75	35 "
24	A	242	1 1/8 "	0.40 "	2975 "	2.75	42 "
	B	371	1 1/4 "	0.40 "	3598 "	2.75	42 "
30	A	263	1 1/8 "	0.40 "	4456 "	2.75	52 "
	B	401	1 3/8 "	0.40 "	5491 "	2.75	52 "

No pipe shall vary more than four per cent. either way from the above specified weight. The weights of all pipes shall be conspicuously painted in white on either outside or inside before delivery on the work.

The weight of lead per joint in the above table is given for convenience in estimating amount of lead only. The actual amount necessary will depend upon the size of the bells, which vary with different makes of pipe.

**Quality of Metal.**—All pipes and special castings shall be made of cast iron, of good quality, remelted in a cupola or air furnace, and of such character as to make the metal of the castings strong, tough and of sound, even grain, and such as will satisfactorily bear drilling, chipping and cuttings. It shall possess a tensile strength of not less than 18,000 pounds per square inch. Test bars of the metal, poured from the ladle at any time, two (2) inches by one (1) inch by twenty-six (26) inches long, when broken transversely twenty-four (24)

# **CAST IRON PIPE**

## **WATER MAINS—Continued**

inches between supports, shall have a breaking load of not less than 2,000 pounds, and shall have a total deflection of not less than thirty-two hundredths (0.32) of an inch before breaking. All pipes shall be entirely free from sand holes, scabs and defects of every kind. No plugging or filling will be allowed.

**Coating.**—Before being coated, all pipes and special castings shall be thoroughly cleaned from all scale, rust or other deleterious matter, both inside and outside. They shall then be immediately coated with a preparation of hot coal tar pitch varnish. The coating must be durable, smooth, glossy, hard, tough, perfectly waterproof, not affected by any salts or acids found in the soil, free from bubbles or blisters, strongly adhesive to the iron under all circumstances, and with no tendency to flow when exposed to the sun in summer, or to become so brittle as to scale off in winter. This coating shall be applied at the foundry where the pipes are cast. Care shall be exercised in handling the pipe and fittings up to the time they are laid in the trench so as not to injure the coating. If any rust spots appear on the pipe when delivered on the work they shall be removed, and the pipe coated with P. & B. or some other approved coating. If the workmen, in laying or caulking the joints, remove the coating, it shall be replaced as specified for rust spots.

**Standard Specials.**—All standard specials, such as crosses, tees, bends, reducers, plugs, yokes, offsets and sleeves, shall be made of the same quality of iron as specified for pipe, and shall be coated with a similar preparation of coal tar pitch varnish, or such other coating as may be approved by the City Engineer. They shall conform to such dimensions as may be required, and shall not vary more than five (5) per cent. either way from the computed weights on file in the office of the City Engineer. Plugs shall be furnished and set where directed; where directed, they shall be furnished with yokes, put on in a manner satisfactory to the City Engineer. They shall be tapped for four (4) inch screw pipe. The weights of all standard specials used shall be conspicuously painted in white on either inside or outside before delivery on the work. Before inserting the four-inch plug, the threads shall be covered with one coat of steamfitters' cement.

**Special Castings.**—Any special casting required shall be made in accordance with the details shown, from the same quality of iron as specified for pipe, and shall be subject to the same requirements as to cleaning, coating and marking weight. Especial care must be taken to have the socket of the required size. Any special casting which is defective in joint room, from any cause, will be rejected. They shall conform closely to the dimensions and weights given. Special castings will be paid for at the rate bid therefor per pound, and such payment shall be in full for furnishing and

**CAST  
IRON  
PIPE**

**WATER MAINS—Continued**

setting in place, including all labor and materials. No excess of weight above the estimated weight for the respective patterns of more than five (5) per cent. will be paid for.

**Alignments and Grades.**—Alignments and grades will be given from hubs driven into the ground parallel with the line of pipe. In graded streets grades may be taken, when directed, from the existing curbs. The top of the pipe shall be at the following depths below the curb elevations, measured to the barrel of the pipe:

For six (6) inch and eight (8) inch pipe, thirty-five (35) inches; for ten (10) inch pipe, forty (40) inches; for twelve (12) inch pipe, forty-three (43) inches; and for all larger sizes up to thirty (30) inch pipe, inclusive, thirty-six (36) inches. Where one side of street is higher than the other, due allowance shall be made to secure proper cover.

In ungraded streets the pipe shall be laid in conformity with the grades shown on the profile, and no allowance will be made for extra excavation beyond the price bid per linear foot of pipe in place. The pipe shall conform accurately to the alignment and grades given.

Gate valves, hydrants, standard specials and special castings shall be set as shown on the plan, or as directed by the City Engineer.

**Trenching.**—Trenches for the pipe shall be opened in accordance with the lines and grades given, and in such order as may be directed. They shall be of sufficient width to give convenient access to the pipes for caulking the joints and packing the earth under and about the pipes. Wherever water occurs in the bottom of the trench it shall be sufficiently drawn off, at contractor's expense, to obtain a firm basis for the pipes, and to admit of the caulking being properly performed.

Wherever the pipe is to be laid on a fill, such fills shall be made of proper material and of such dimensions as to be not less than eighteen inches in depth over the top of the pipe, and four feet in width on top of the fill, with proper side slopes. The fills shall be properly compacted by tamping or otherwise, as may be directed by the City Engineer, before laying the pipe. The cost of such filling shall be included in the price bid per linear foot for the pipe complete. Any culverts or box drains which may be necessary through fills shall be constructed in accordance with the details shown on the plans, or the direction of the City Engineer. Such work will be paid for at the prices bid therefor as stated on the bid blanks for this improvement.

All parts of stumps that are within four (4) feet of the pipe must be totally removed. Boulders or rocks must be removed to the width of the trench before the water main is laid, and the cost of such removal must be included in the price per linear foot of water main laid.

Wherever paving, macadam, planking, etc., have to be disturbed to permit the contractor to lay the pipe, he will remove it and replace

**CAST  
IRON  
PIPE**

**WATER MAINS—Continued**

it in as good condition as when disturbed. The relaying of all paving shall be subject to the provisions of Ordinance No. 17313. The cost of relaying all paving, macadam, planking, etc., shall be included in the price bid per foot of pipe laid in place.

**Laying Pipe.**—After the trenches are completed to the required depth, the spigots of the pipe shall be so adjusted as to give uniform space all round, and if any pipe does not allow sufficient space it shall be replaced by one of the proper dimensions. The joint shall at all times be not less in thickness and depth than shown in the foregoing table of weights and dimensions. Gaskets of clean, sound hemp yarn or oakum braided or twisted and tightly drawn, shall be used to pack these joints. When required, a space one-quarter ( $\frac{1}{4}$ ) of an inch shall be left between contiguous pipes.

**Jointing.**—The lead used shall be of the best quality of pure, soft lead, suitable for caulking and securing a tight and permanent joint. Before running the lead, the joints shall be carefully wiped out to make them clean and dry. The joint shall be run full at one pouring, and the melting pot shall be kept within fifty (50) feet of the joint about to be poured. The joint shall be caulked by competent mechanics; the caulking to be faithfully executed and in such manner as to secure a tight joint without overstraining the iron of the hub. The lead, after being caulked, shall be flush with the face of the socket. The bell hole shall be perfectly free from water while joint is being prepared.

The pipes and all other castings shall be carefully swept out and cleaned, as they are laid, of any earth or rubbish which may have found place inside during or before the operation of laying. Every open end of a pipe shall be plugged before leaving the work for the night.

Whenever it shall be discovered that a lead joint is less in depth than required by these specifications, the contractor will be required, at his own expense, to drill, cut out, or otherwise remove the lead from any or all joints desired, until the City Engineer is satisfied that all shallow joints have been discovered. All joints deficient in lead depth must then be cleared of lead and yarning, re-yarned the depth required by these specifications, leaded and caulked as required; all at the contractor's expense.

**Back Filling.**—In refilling the trenches, the earth filled into the bottom of the trench, under and to the top of the pipes and other castings, shall be free from stones and carefully packed and well rammed with proper tools for the purpose. Special care shall be taken in ramming not to injure the coating of the pipe.

Care shall be taken to give the pipe a solid bearing throughout its entire length. The earth filling above the pipes shall be sufficiently packed and rammed to prevent after settlement, and the material used shall be free from large stones. The trenches shall, in all cases,



## WATER MAINS—Continued

### CAST IRON PIPE

be refilled with the material furnished by their excavation, provided that it be of proper quality. In lieu of ramming, the trenches may be thoroughly water settled.

The City Water Department will charge the contractor for city water used in settling earth at the rate of \$1.40 for every 100 cubic yards of material water settled. The contractor will be required to furnish all hose and other implements necessary for said water settling. The City Inspector in charge of the work will be authorized to open and close the hydrants without cost to the contractor, provided that any damages resulting to the city hydrants while in use for the purpose of water settling will be repaired by the City Water Department, and the cost of said repairs will be deducted in the contractor's final estimate. Any hose, pipe or other utilities belonging to the City Water Department, and any labor furnished by the City Water Department in connection with the water settlings, will be charged to the contractor in the final estimate.

**Tests.**—All pipes shall be able to stand a thorough hammer testing while under the following hydraulic pressures: For six (6) inch and eight (8) inch pipes, five hundred (500) pounds per square inch; for ten (10) inch and twelve (12) inch pipes, four hundred (400) pounds per square inch, and for larger sizes, three hundred (300) pounds per square inch.

As soon as any section of pipe between any two gate valves is laid, or when directed by the City Engineer, the same shall be tested by hydraulic pressure. The pressure shall be brought up to three hundred (300) pounds per square inch for four (4) inch, six (6) inch and eight (8) inch pipes; two hundred seventy-five (275) pounds per square inch for ten (10) inch pipe; two hundred fifty (250) pounds per square inch for twelve (12) inch pipe; two hundred twenty-five (225) pounds per square inch for sixteen (16) inch pipe; and two hundred (200) pounds per square inch for all larger sizes, and while under this pressure each pipe shall be thoroughly hammer tested from end to end. Any pipe which exhibits any defects shall be taken out and replaced by a sound pipe. All pumps, gauges and other appliances used in making this test shall be furnished by the contractor, but the City reserves the right to test and approve all gauges used. If, after any portion of the trench is refilled and before the final release of contract, any defects appear, the contractor shall, at his own expense, re-excavate such portion in order to make good said defects.

**Measurements.**—Measurements for the estimate of pipe will be taken along the top of the pipe in a vertical plane passing through its axis; including all gate valves and standard specials, but omitting all special castings.

**Payments.**—Cast iron pipe and standard specials will be paid for at the rate bid therefor per linear foot of completed pipe, and such payment will be in full for furnishing and laying the pipe, and all standard specials shown on

## WATER MAINS—Continued

### CAST IRON PIPE

the plans, and shall also include all trenching, jointing, back-filling, restoring the street surface, relaying of paving or planking, and all other material and labor necessary for the completed work. Any standard specials not shown on the plans, and which may be ordered by the City Engineer, will be paid for at the rate of six cents (\$0.06) per pound, in place. In case any such standard specials as shown on the plan are omitted in the work, a corresponding reduction will be made from the estimate. Any excavation above that shown on the profiles, or specified above, under "Alignment and Grades," which may be ordered by the City Engineer, will be paid for at the rate bid for "Extra Excavation" per cubic yard.

### GALVANIZED IRON PIPE

The pipe shall be standard size, guaranteed wrought iron pipe, galvanized, full weight, and equivalent in quality in every respect to the pipe manufactured by A. M. Byers & Co., Pittsburgh. All pipe above 1¼ inch internal diameter must be lap welded. All pipe less than and including 1¼ inch inside diameter may be butt welded. No steel pipe will be accepted. The weights must not vary more than 5 per cent. from the weights given in the following table:

For ½ in. inside diam., wt. per ft.....	.84 lbs.
For ¾ in. inside diam., wt. per ft.....	1.12 lbs.
For 1 in. inside diam., wt. per ft.....	1.67 lbs.
For 2 in. inside diam., wt. per ft.....	3.66 lbs.
For 2½ in. inside diam., wt. per ft.....	5.77 lbs.
For 3 in. inside diam., wt. per ft.....	7.54 lbs.
For 3½ in. inside diam., wt. per ft.....	9.05 lbs.
For 4 in. inside diam., wt. per ft.....	10.72 lbs.

Connections shall be made to the main pipe line by means of a standard water pipe clamp with threaded outlet. When possible connection shall be made to the main line at a tapped plug. All threads of screw connections are to be unbroken and cut full depth. Before connections are made threads are to be well covered with steamfitters' cement. The pipe is to be laid with a cover of not less than two (2) feet. All galvanized iron pipe when laid shall be tested by hydraulic pressure to 300 lbs. per square inch.

**Payment.**—Galvanized iron pipe will be paid for at the rate bid therefor per linear foot in place, and the price so bid shall include all trenching and filling, necessary bushings, clamps, fittings and all labor necessary to place in position.

### VALVES GATE

All gate valves shall be iron-bodied, bronze-mounted, two-faced, wedge valves of some standard make. All valves shall be equal to those made by the Rensselaer Manufacturing Co., of Troy, N. Y. If required, detail plans of the valves proposed to be used shall be submitted to the City Engineer for his approval. Valves and seat rings shall be of composition metal, and valve stems of phosphor bronze, of some approved proportions. All valves shall satisfactorily stand a pressure of 300 pounds per square inch, both when closed and when open, and the contractor shall be required to



## WATER MAINS—Continued

### GATE VALVES

furnish a certificate of such test for each valve used. All valves, except by-pass valves, shall stand erect unless otherwise shown. By-pass valves shall lie on their sides. All valves shall be provided with a nut for a wrench, and shall open by turning to the left, and shall have an arrow indicating the direction of opening. Gate valves will be paid for at the respective rates bid therefor, and such payment will include the cost of the valves, together with all material and labor necessary for setting in place.

All gate valves having a larger diameter than fourteen (14) inches, shall be provided with a bevel gear and from two (2) to four (4) inch by-pass, according to the diameter used.

### DISTRICT GATE VALVES

The district valves are to have a chain of approved pattern and hand wheel. The chain will have a ring which shall be around one of the gland bolts; the links of the chain are to be such that a lock can be passed through any one, fastening two together, so as to prevent any turning of the valve hand wheel. The entire valve, wheel and chain are to be painted two (2) coats of pure lead paint, color bright scarlet, and then varnished as approved.

### BRICK VALVE CHAMBERS

Where shown on the plans, or where directed by the City Engineer, gate valves shall be enclosed in brick chambers provided with a cast iron frame and cover, as shown on standard detail plans.

When directed by the City Engineer, valve chambers shall be connected to the sewer, or other suitable outlet, by a four-inch sewer pipe drain, the labor and material for which shall conform in all respects to the standard city specifications for pipe sewers.

The brick used shall be of a good quality, sound and hard burned, and shall be laid in Portland cement mortar, mixed three (3) parts by volume of clean sand to one (1) part by volume of cement.

The concrete to be used in the base and cover is specified elsewhere in these specifications under the heading "Concrete."

The reinforcing material to be used shall be mild steel of an ultimate strength of 55,000 to 65,000 pounds per square inch and an elastic limit of not less than one-half the ultimate strength.

Cast iron covers shall be provided of design and size as shown in the detail drawings, and also as designated in the bill of material. They shall conform in quality of material, coating, marking and all other respects to special castings as specified elsewhere in these specifications under the heading of "Standard Specials" or "Special Castings."

**Payment.**—Valve chambers with reinforced concrete covers will be designated as large valve chambers, and will be paid for at the rate bid for "Large Brick Valve Chambers." Other valve chambers will be designated as small brick valve chambers, and will be paid for at the rate bid for "Small Brick Valve Chambers."

The price so bid in each case will include all labor and material in place to produce the finished result, but will not include the four-

## WATER MAINS—Continued

### BRICK VALVE CHAMBERS CAST IRON VALVE BOXES

inch sewer pipe drain, which will be paid for at the rate bid per linear foot in place for "Four-inch Sewer Pipe Drains."

All gate valves, except where they are enclosed in brick chambers or wooden boxes, shall be protected by an adjustable cast iron valve box, provided with a suitable cover and of a design satisfactory to the City Engineer. All valve boxes shall be coated as specified above for cast iron pipe.

Valve boxes will be paid for at the price bid for same, and the price so paid will be in full for furnishing and setting in place.

### WOODEN VALVE BOXES

Where shown on the plans, or where directed by the City Engineer, gate valves, including district gate valves, shall be protected by a wooden box, constructed of three (3) inch lumber and made in conformity with the standard drawings, unless otherwise shown on the plans.

Wooden valve boxes will be paid for at the price bid for the same, and the price so paid will be in full for furnishing all material and labor necessary for setting in place.

### HYDRANTS

Hydrants shall be located as shown on plans. They shall be of some standard make, at least equal to those made by the Rensselaer Manufacturing Co. If required, detail plans shall be submitted to the City Engineer for his approval. All hydrants shall have bronze mountings, and be so arranged that all working parts can be removed without digging around or disturbing the barrel. They shall be set in a bed of broken stone or coarse gravel. Hydrants shall be connected to the main with a section of cast iron pipe, which shall conform both in material and laying to the requirements of these specifications for main pipe. Each branch shall be provided near the hydrant with an auxiliary gate valve placed vertically and provided with a suitable cast iron valve box. This gate valve shall conform to the foregoing specifications. All hydrants and auxiliary gate valves shall have flanged ends.

Hydrants must have a waste orifice for draining them, so located and designed that when all hose and steamer ports are closed and the main valve slightly opened, water will be forced through the waste orifice under pressure. The waste orifice shall have a suitable threaded connection for attaching a drain pipe.

The cast iron tees for hydrant connections are to have lugs cast on the outlet for the insertion of rods to tie the hydrant to the main. A cast iron hub and flange connection, made in accordance with standard drawings, is to be bolted on to each auxiliary hydrant gate valve. Hydrants are to be shackled to the main pipe by two iron rods attached at one end to lugs cast on the outlet tee in the main pipe and at the other end to lugs cast on the hub and flange connection mentioned in the paragraph last above. The price of these rods, together with all nuts necessary to attach them, is to be included in the price bid for pipe for hydrant connections. These rods are to be painted with two coats of P. & B. paint.

The dimensions and details shall be as follows:

## WATER MAINS—Continued

### HYDRANTS

Inside diameter of cast iron pipe hydrant connection .....	6 inches	8 inches
Inside diameter of stand pipe, not less than....	7 inches	9 inches
Depth below sidewalk....	3 feet	3 feet
Diameter of valve opening, not less than.....	5 inches	6¼ inches
Size of auxiliary gate valve .....	6 inches	8 inches
Number and size of nozzles .....	2—2½ in. 1—4 in.	3—2½ in. 1—4 in.
Size of valve nut.....	5-sided as per templet	5-sided as per templet
Number of nozzle threads per inch .....	Per samples	Per samples
Diameter at top of threads, hose nozzles...	furnished by	furnished by
Diameter at top of threads, steamer nozzles	City Engr.	City Engr.
Diameter of shackle rods.	¾-inch	1 inch

That portion of hydrants below the surface of the ground shall be thoroughly repainted with "P. & B." or some other preparation approved by the City Engineer. The portion above the ground shall be repainted with two coats of dark green. The paint above the ground to be applied after the hydrants are set and tested.

Hydrants shall be provided with an independent valve for each hose nozzle. All hydrants shall open by turning to the left. They shall be able to stand a pressure of 300 pounds when the hydrant valve is closed, and of 300 pounds when the valve is open.

Hydrants will be paid for at the rate bid therefor, and this payment will be in full for the hydrant proper, the auxiliary gate valve and valve box, the hub and flange casting, all bolts, nuts and gaskets, laying, jointing, and setting thereof in place, including all excavation and re-filling, and all other materials and labor necessary for a finished result, but will not include the tee on the main line.

When the auxiliary gate valve is provided with a brick chamber, in place of the cast iron valve box, the sum of \$4.00 will be deducted from the bid price of each hydrant.

**Hydrant Connections.**—"Hydrant connections" will be paid for at the rate bid therefor per linear foot, and such payment to be in full for furnishing, laying, jointing, and all other material and labor necessary for the completed result. "Hydrant connections" will be measured from socket of tee on main line to socket of hub and flange casting at hydrant.

Where shown on the plans or when directed by the City Engineer existing hydrants are to be reset. The work will conform in all respects to the specifications for setting hydrants as mentioned elsewhere in these specifications. Where existing hydrants are blocked to the main line the same method will be used in resetting unless it is found necessary in the judgment of the City Engineer to shackle them, in which case some approved form of shackling to the main line with iron rods will be used.

**Payment.**—Resetting of hydrants will be paid for at the rate bid for "Hydrants to Be Reset," and the price so bid shall include all labor and material necessary to place and connect

### RESETTING EXISTING HYDRANTS

## WATER MAINS—Continued

### RESETTING EXISTING HYDRANTS

the hydrant in its new position, but will not include new shackle rods or new pipe for hydrant connections, which will be paid for at the rate bid for "Shackle Rods" and "Hydrant Connections," as mentioned elsewhere in these specifications.

### HYDRANT DRAINS

When ordered by the City Engineer, waste orifices of hydrants are to be connected to the sewer or other outlet, by galvanized wrought iron pipe of size as called for. It is to conform in all respects to the requirements for "Galvanized Iron Pipe," as specified elsewhere in these specifications.

**Payment.**—Hydrant drains will be paid for at the rate bid therefor per linear foot, and such payment will be in full for furnishing and laying the pipe, including all trenching, back-filling, fittings and all labor necessary to place in position.

### HYDRANT EXTENSIONS

All two-flanged extensions, such as vertical extensions in the barrel of hydrants, or horizontal extensions between the hydrant and auxiliary gate valve, shall conform in quality of material, coating, marking and all other respects to special castings as specified elsewhere in these specifications under the heading of "Standard Specials" or "Special Castings." In all cases the contractor must see that the drilling in flanges of extensions will fit the drilling in the flanges of hydrant barrels or gate valves, as the case may be, and in no case will the city be responsible for any error in these drillings.

**Payment.**—All vertical hydrant extensions will be paid for at the rate bid for "Vertical Hydrant Extensions" per pound in place, and the price so bid will include all machine work, extension of hydrant rods, bolts, nuts, washers and gaskets. All horizontal hydrant extensions will be paid for at the rate bid for "Horizontal Hydrant Extensions" per pound in place, and the price so bid will include all machine work, bolts, nuts, washers and gaskets.

**Lumber.**—All lumber used in the construction of wooden pipe shall be clear, sound, straight-grained yellow fir or the best quality of California redwood, and entirely free from knots, dry rot, pitch seams, cracks, wind shakes, sap wood, or other defects that might impair its strength or durability. All lumber used shall be subject to inspection before being milled into staves and again before being made into pipe. All pipe shall be subject to inspection before being put into the trench, and any pipe containing defective lumber shall be rejected. All lumber, before being made into staves, shall be thoroughly seasoned by either air drying or kiln drying. The staves shall be planed to true circular outline of the pipe, both inside and outside, and the edges shall be planed to true radial lines. The ends of all pipe shall be sawed off square and turned smoothly to correspond with the coupling used; the ends to be of a proper size to make a tight fit when the pipe is driven into the couplings, valves or specials. It shall be laid in sections of such length as the contractor may decide,

### MACHINE BANDED WOODEN PIPE

**MACHINE  
BANDED  
WOODEN  
PIPE**

**WATER MAINS—Continued**

but not more than ten (10) per cent. of the sections shall be less than ten (10) feet in length.

**Banding.**—The pipe shall be banded with double galvanized iron or steel wire, having a tensile strength of not less than 60,000 pounds nor more than 70,000 pounds per square inch. The spacing of the banding shall be as shown in following table, but no banding wire smaller than No. 4 Washburn & Moen's gauge will be allowed, and the maximum spacing on any sized pipe and under any pressure will be three (3) inches. In winding, the bands must have sufficient tension to impress the band slightly into the wood, but bands that have broken the fibre of the wood will subject the section of pipe to condemnation. All sections of pipe over 12 feet in length shall have banding with staples in middle of joint.

The banding shall be coated with a mixture of pure refined asphalt and tar, of proper consistency. This coating must adhere strongly to the iron and must show no tendency to flow when exposed to the sun in summer, or to become so brittle as to scale off in winter. All pipe after the bands have been coated shall be carefully handled in order that the coating may be injured as little as possible.

All pipe with exposed banding wire on which rusting or corroding has commenced will be rejected. All bands, where the coating has been injured and where rusting has not commenced, shall be thoroughly painted with hot applications of the same kind and consistency of coating material as that put on at the factory, as soon as practicable and to the satisfaction of the City Engineer.

**Spacing Table**

SIZE OF PIPE		6"	8"	10"	10"	12"	14"	16"	18"	20"
Thickness of Shell	up to 200 foot head	1 $\frac{1}{8}$ "	1 $\frac{1}{4}$ "	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "
	above 200 foot head	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "
SIZE OF WIRE		No. 4 Diam. 0.225			No. 2 Diam. 0.263		No. 1 Diam. 0.283			
HEAD IN FEET		SPACING IN INCHES								
50		3	3	3	3	3	3	3	3	3
100		3	2 $\frac{1}{16}$	2 $\frac{3}{16}$	3	2 $\frac{1}{2}$	2 $\frac{7}{16}$	2 $\frac{1}{8}$	1 $\frac{7}{8}$	1 $\frac{11}{16}$
150		2 $\frac{7}{16}$	1 $\frac{13}{16}$	1 $\frac{7}{8}$	2	1 $\frac{5}{8}$	1 $\frac{5}{8}$	1 $\frac{7}{16}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$
200		1 $\frac{11}{16}$	1 $\frac{5}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{3}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{16}$
250		1 $\frac{7}{16}$	1 $\frac{1}{16}$	....	1 $\frac{3}{16}$	1	1 $\frac{1}{16}$	1 $\frac{1}{16}$	$\frac{3}{4}$	1 $\frac{1}{8}$
300		1 $\frac{7}{16}$	$\frac{7}{8}$	....	1	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	$\frac{5}{8}$	1 $\frac{1}{16}$

Washburn and Moen Gauge. Tensile strength of wire 60,000 pounds per square inch. Factor of safety 5.

Spacing in inches =  $43,400 \frac{d^2}{D H}$  where d = Diam. of Wire.

D = Diam. of Pipe, and H = Head in Feet.

**MACHINE  
BANDED  
WOODEN  
PIPE**

**WATER MAINS—Continued**

**Couplings.**—No coupling shall be less than six (6) inches lengthwise with the pipe, and all must be a true circle transversely with the axis of the pipe. Cast iron couplings, connecting sections of the wooden pipe, shall be of a good quality of gray iron castings, uniform in thickness, smooth outside, free from blow or sand holes, or other imperfections. They are to be thoroughly cleaned and coated, as specified for cast iron pipes. The cast iron must have a minimum tensile strength of 18,000 pounds per square inch. Wrought iron or lap-welded tubing coupling will not be allowed.

**Samples.**—All intending bidders will be required to submit samples of the wood pipe they intend to use in this contract to the City Engineer for approval. Each sample must show a coupling complete, and the fastening of the banding at the beginning and ending of a section of pipe. Couplings and fastenings must be approved by the City Engineer. Bids must state what kind of coupling is to be used.

**Standard Specials.**—All standard specials shall be made of the same quality of iron as specified for cast iron pipe, and shall be coated with a similar preparation of coal tar pitch varnish, or such other coating as may be approved by the City Engineer. They shall conform to the dimensions shown on the plans, and shall not vary more than five per cent. either way from the computed weights. The hubs must be on true circles concentric with the axis of the pipe. Cast iron plugs shall be furnished and set where necessary. Where directed these plugs shall be furnished with yokes put on in a manner satisfactory to the City Engineer. All plugs shall be tapped for four-inch screw pipe, and treated as plugs for cast iron pipe.

**Special castings, trenching, back-filling and measurement** for wooden water pipe are subject to the same specifications as shown above for cast iron pipe.

**Pipe Laying.**—All pipe shall be carefully laid to the grades and alignment given. All pipe shall be carefully swept out and cleaned of any earth or rubbish that may be inside the pipe before or during the laying of the pipe. The pipe shall be laid by carefully driving the coupling on the pipe with hardwood blocks and heavy maul or ram, and then driving the next joint of the pipe into the coupling. No driving of both coupling and pipe at the same time will be allowed. Walking over the bare wooden pipe at any time is prohibited, especially when laid in the trench. Pipe laid in the trench, whose bands show the coating abraded, must be taken up and a perfect specimen laid in lieu thereof.

**Tests.**—When necessary, in the judgment of the City Engineer, suitable pipe lengths, together with couplings, shall be selected from the pipe to be laid and subjected to a hydraulic pressure to determine the efficiency of the longitudinal and transverse joints of the couplings. Such pressure shall be not less



## WATER MAINS—Continued

### MACHINE BANDED WOODEN PIPE

than one hundred pounds more than the static pressure for which the pipe is built. Under such pressure these joints shall develop no leaks whatever, and if such leaks develop the lot of pipe from which the joint was selected shall be rejected. The contractor will also be required to furnish samples of the different sized wires to be used on the pipe. Such samples to be tested by the City Engineer for tensile strength, as specified above. All wooden pipe, after being laid and coupled, shall be subject to a test of fifty pounds more than the static head pressure, and any defects or leaks shall be remedied by the contractor in a manner satisfactory to the City Engineer. When necessary, in the judgment of the City Engineer, any defective pipe shall be removed and replaced with sound material. The cost of making all tests, as specified above, shall be borne by the contractor, who shall furnish all pumps, gauges and appliances necessary; the City, however, reserving the right to test and approve any gauges used.

**Payments.**—Wooden pipe and standard specials will be paid for at the rate bid therefor per linear foot of completed pipe, and such payment will be in full for furnishing and laying the pipe and couplings, and all standard specials as shown on the plans, and shall also include all trenching, jointing, back-filling, restoring of street surface, relaying of paving or planking, and all other material and labor as specified above, or necessary for the completed work. Any standard specials not shown on the plans, which may be ordered by the City Engineer, will be paid for at the rate of six cents (\$0.06) per pound in place. In case any such standard specials, as shown on the plans, are omitted in the work, a corresponding reduction will be made from the estimate. Any excavation above that shown on the profiles, or specified under "Alignment of Grades," which may be ordered by the City Engineer, will be paid for at the rate bid for "Extra Excavation," per cubic yard.

**Maintenance of Wooden Pipe.**—In addition to the bonds and sureties hereinbefore mentioned, which the City Charter and the laws of the State of Washington require to be furnished by the contractor, a surety bond amounting to not less than twenty (20) per cent. of the full amount of the contract, as shown by the final estimate, shall be furnished by the contractor previous to the release and payment of the thirty (30) per cent. held for thirty (30) days under the City Charter. Said bond shall be furnished by some approved surety company, and shall be conditioned that the pipes, together with all valves, hydrants and other appurtenances, shall be operated without expense to the City of Seattle arising from defective materials or workmanship during and for the period of one (1) year from and after the payment of the thirty (30) per cent. reserve.

Said bonds shall be further conditioned that said pipe, together with the gates, hydrants, and other appurtenances, shall, at the expira-

## WATER MAINS—Continued

### MACHINE BANDED WOODEN PIPE

tion of said period of one year, be in perfect condition and repair and free from all leaks or other defects arising from or caused by defective materials, during said period of one year, which may be performed without interfering with the operation of said pipe, shall be performed by the contractor at his own expense; such other repairs or replacing of defective materials as may be necessary shall be performed by the City Water Department, and the contractor shall be required to pay into the City Treasury the cost of all materials and labor necessary therefor.

Said bonds shall be further conditioned that the contractor shall assume all damages to public or private property arising from or caused by defective material or workmanship in any portion of the work during the said period of one (1) year.

It is understood that the contractor will receive no compensation or payment for any of the costs or expenses of repairing or replacing any defective material in said pipe and its appurtenances, beyond the amount of the final estimate, and that the cost of all such repairs or replacing of defective material shall be included in the respective prices bid for the several parts of this improvement. It is expressly understood and agreed that the acceptance of the work by the Board of Public Works relates to its apparent condition only, and shall not release the contractor from liability to repair any defects in the pipes, or replacing of any defective valves, hydrants, or other appurtenances, so far as any defects may develop during the said period of one (1) year.

### ADJUST- MENT OF WATER MAINS

Where shown on the plan, or where ordered by the City Engineer, the existing water mains are to be adjusted to the finished grade of the streets. Water mains to be adjusted for grade are to be raised or lowered in such a manner and by such means as will not interfere with the supply of water to consumers who may be connected therewith. Mains are to be lowered, or raised, without turning the water out of same, except in special cases where written permission of the City Water Department is obtained. As soon as the main is adjusted to grade, and before it is covered with earth, and while it is full of water under full service pressure, it shall be carefully tested for leaks by the City, which shall be carefully stopped in a workmanlike manner.

The contractor shall give twenty-four hours' notice to the City Engineer's Office and to the City Water Department before he commences to adjust any section of water mains, and he shall not proceed with the work until he has been notified by each department that he may do so. The City Water Department will furnish a man who will be authorized to close and open gate valves and service cocks, and in no case shall the contractor open or close gate valves or service cocks. Service connections will be cared for by the City Water Department, and their adjustment will not be a part of this contract.

## **ADJUST- MENT OF WATER MAINS**

### **WATER MAINS—Continued**

Water mains to be adjusted will be paid for at the rate bid therefor per linear foot, and the price so bid shall include the cost of making any adjustments as shown on the plans for this improvement, and the price so bid shall include all excavation, labor, supervision, testing, the furnishing of all necessary blocking and other material necessary to secure the finished result; and shall include also the adjustment of all gate valves and valve boxes and other appurtenances except hydrants.

Should the City Engineer order any additional adjustments of water mains, the same will be paid for per linear foot at the rate bid for "Additional Adjustment of Water Mains for each six inches of depth," and the price so bid shall be in full for any additional adjustment caused by change of grade or other cause. In estimating this additional adjustment, the average difference between the final position of the pipe and the position as shown on the plan will be taken. If the average adjustment for any section is six (6) inches or less, the actual number of linear feet in the section will be allowed for; if the average adjustment is one (1) foot or less, but more than six (6) inches, twice the actual number of linear feet in the section will be allowed for, etc.

In all work connected with the adjustment of water mains, the quality of work and material shall conform to the City of Seattle standard specifications.

The Board of Public Works reserves the right to have the City Water Department adjust all water mains, hydrants, etc., or to require the contractor to make such adjustments at the rate bid therefor.

Should the Board of Public Works direct that the Water Department adjust any water main or hydrant, then the contractor shall pay into the City Treasury, to the credit of the Water Fund, such a sum of money as is equal to the actual cost of the work performed by the Water Department. The contractor will in that case be allowed such amount on his final estimate.

### **Miscellaneous Items**

**Connections to Existing Mains.**—All connections of water mains in use will be made by the City Water Department. Any crosses or other special required to be inserted in any main already in use shall be furnished by the contractor and set by the City Water Department. The contractor shall furnish the specials, as shown on the plans, and all other material required, and shall make all necessary excavations at his own expense. The labor of cutting and inserting the special will be performed by the City Water Department. The contractor shall give at least twenty-four hours' notice when the service of the Water Department is required.

The City Water Department will charge the contractor for this labor, and the amount so charged shall be paid into the City Treasury.

## **ADJUST- MENT OF WATER MAINS**

### **WATER MAINS—Continued**

to the credit of the Water Fund. The amount so paid by the contractor will be returned to him in the estimates.

**Service Connections.**—As soon as the section satisfactorily stands the required test, the Water Department will make any service connections or changes of connection required. The contractor will leave open the section of trench until such connections have been made, except at street crossings and where back-filling is specially directed by the City Engineer.

For the purpose of supplying consumers with water, it is understood and agreed that the City of Seattle shall have the right, at such time, or times, and at such place or places, as the Board of Public Works may elect, during the progress of the improvement, to attach corporation cocks to the main or mains to be constructed hereunder, and the attaching of any such corporation cock or cocks shall not be construed as an acceptance by the City of Seattle of any part of the work to be performed under this contract.

**Removal of Old Pipe.**—The contractor will be required to give proper care and protection, during construction, to any water pipes or mains in use.

As soon as service connections have been made all the old pipe will be taken up and removed by the Water Department. When the old pipe does not come in the same trench as the new pipe the entire work of digging up, taking out and removing such old pipe and back-filling will be performed by the Water Department. When it does come in the same trench all excavation and back-filling shall be performed by the contractor, when directed by the City Engineer.

**Maintenance of Roadway.**—After the trenches have been flushed, and before the final release of the contract, the street surface shall be restored and any surplus earth removed. In all cases the contractor shall maintain the roadway over the water main constructed for a period of thirty (30) days after the acceptance of the water main by the Board of Public Works, and in no case will the thirty (30) per cent. of the total amount of the contract reserved for thirty (30) days under the provisions of the City Charter be paid to the contractor until the roadway shall have been leveled or surfaced to the satisfaction of the City Engineer.



## CLEARING AND GRUBBING

### PAVING

The present planking, sills, wooden curb and gutter or any other pieces of lumber or debris, which may be found on or within one foot of the sub-grade or of the present surface of the street, where such surface is below sub-grade, shall be taken up and entirely removed from the premises; except that existing cross-walks, curbs and gutters which may be of use for planking streets, shall be removed in such manner as to sustain as little damage as possible, and carefully piled and guarded until used. All concrete and wood walks, where shown on the plans to be removed, and all bulkheads, retaining walls, rocks and stumps which may be found in this improvement shall be entirely removed. Where necessary to make a neat and finished piece of work when complete, all concrete and wood landings, alley crossings and existing pavements shall be entirely removed. Care must be taken during the progress of clearing and grubbing and removal of bulkheads to support the existing sidewalks. The contractor will be required to make such provisions as the City Engineer may direct, to care for existing travel; the cost of such work to be included in the price bid for Clearing and Grubbing. The work of clearing and grubbing shall be commenced only at such place or places within the limits of the improvement as the City Engineer may direct, and the area over which said work may be extended at one time shall be as the City Engineer may deem proper and designate.

**Payment.**—Clearing and Grubbing, as specified above, will be paid for at lump sum bid for the same, as listed on the proposal.

## SUB- GRADING

Under this head is included all excavations and embankments required for the formation of the sub-grade, making approaches to abutting streets and alleys, and all other excavation or embankment connected with or incident to the completion of the work. All slopes between the sidewalks and property shall be carefully redressed after the completion of the improvement.

**Preparation of Sub-Grade.**—After the surface of the street has been cleared, as specified for clearing and grubbing, to the satisfaction of the City Engineer, all wood, including any sills, cross-sills, blocks, or ties, and all boxes, wooden drains or posts, dead pipes, or other materials not proper to remain in the sub-foundation, which may be found more than one (1) foot below the sub-grade of the street, or below the present surface of the street where

## SUB- GRADING

such surface is below sub-grade, shall be removed by the contractor under the direction of the City Engineer.

The City Engineer shall be the sole judge as to what shall constitute unsuitable or improper materials to remain in the sub-foundation, and in order to ascertain the presence of unsuitable materials he may cause to be dug, holes or trenches of such dimensions and lengths and in such directions and to such depths as he may deem necessary. If sinking spots develop, the City Engineer may require the same to be excavated to such depth as may be necessary to investigate and determine the cause of such sinking and the necessary remedy therefor, and such remedy they may require to be used. Such excavations, unless otherwise ordered, shall be refilled with suitable earth or material, the same to be done in layers and thoroughly tamped or water settled. The amount of earth so removed shall be paid for at the rate bid for sub-grading. No other payments whatsoever will be made on the above work.

**Excavation and Embankment.**—After the ground has been cleared of all objectionable materials, it shall be excavated or filled, as may be required, to an even surface throughout, leaving or adding such an amount of suitable earth within the portion being graded, that when thoroughly rolled and compacted, as hereinafter specified, said surface will be at such depth below the finished surface as the plans and specifications may require.

All material taken from excavations shall be deposited in adjacent embankments. Material wasted from excavations shall be disposed of by the contractor as the City Engineer may direct, and no extra allowance will be made for hauling and disposing of the same. Side slopes, when required, shall be made as directed by the City Engineer. All slopes shall be dressed to a true line and surface, and in case any material shall slide into excavation during the progress of the work, the same shall be removed by the contractor and no extra payment will be allowed therefor beyond the prices bid per cubic yard for earthwork.

All embankments shall be made of suitable material, spread in layers not exceeding one foot in thickness, and well rolled until a hard and unyielding surface is obtained. The contractor shall furnish all material for embankment not found within the district covered by this contract. Embankment slopes shall be dressed to a uniform line and shall have such inclinations as the City Engineer may direct.

Where there are parking strips between the sidewalks and the curbs, the same shall be filled in or excavated by the contractor, and if filled in, shall be with suitable material, which shall be raked off to a smooth and even surface, uniform from the sidewalk to the curb, unless otherwise directed by the City Engineer. All parking strips shall be sowed with white clover seed, of good quality, using one (1) pound to three hundred (300) square feet, then carefully raked in.

## PAVING—Continued

### SUB-GRADING

**Rolling.**—After being trimmed as above described, the surface shall be thoroughly compacted with a steam roller, weighing not less than ten (10) tons until all settlement ceases. As the rolling proceeds all spots or sections settling below grade must be brought up to grade by the contractor, by being filled with such soil or material as the City Engineer may select or designate to a reasonable height above grade; the same shall then be thoroughly flushed or water settled and the rolling continued until a hard and uniform surface has been obtained conforming to the grade and cross-section required.

Any portion of the surface of the sub-grade which may be inaccessible with the steam roller shall be thoroughly tamped, to the satisfaction of the City Engineer, with a rammer ten (10) inches in diameter, weighing not less than forty (40) pounds. When rolling, as herein specified, is done with the steam roller belonging to the City of Seattle, the contractor will be required to pay for its use on this work at the following rates, to-wit: One dollar and fifty cents (\$1.50) per hour for each and every hour the roller is in use, and in no case will less than four (4) hours in succession be charged at one time to the contractor for its use. The engineer's salary will be paid by the City, the cost of fuel shall be paid by the Local Improvement District. The engineer in charge of said steam roller will be at all times under the direction of the City Engineer. The number of hours the roller has been in use will be charged to the contractor, as returned by the City Engineer or his representative.

All earth work in this improvement will be classed as "sub-grading."

**Measurement.**—Earthwork will be measured as follows: All earth excavated for the formation of sub-grade, or for approaches to adjoining streets and alleys and redressed slopes, as specified above, shall be measured in excavation. Where such excavation exceeds the embankment, payment will be made for the excavation only. Where embankment exceeds excavation, payment will be made only for the net measurement of such embankment, no allowance being made for shrinkage. No extra payment will be allowed for depositing the earth in fills, or for removing earth from the district.

**Payment.**—All sub-grading will be paid for at the rate bid therefor per cubic yard as listed on the proposal, such payment to be in full for all work, including rolling and preparation of the finished sub-grade and parking strips, as specified above.

### CURB INLETS

Curb inlets shall be constructed as shown on the plan or as directed by the City Engineer. They shall be set in a neat and workmanlike manner, conforming to the existing curb and gutter unless otherwise directed by the City Engineer. They shall be bedded in concrete as shown in detail on the plans. The connection from the inlet to the catch basin shall be

## PAVING—Continued

### CURB INLETS

made in a straight line, and no bends whatever will be allowed.

**Payment** will be at the rate bid for each as listed on the proposal, and will be in full for all labor and material in the completed work.

### EXTRA WYES

Where shown on the plan or as directed by the City Engineer, extra wyes shall be constructed the sizes indicated. Payment for same will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in furnishing and setting the same.

### SIDE SEWERS

Where shown on the plans or as directed by the City Engineer, side sewers shall be constructed according to the standard plans and specifications for sewers. All ends of side sewer connections at the curb line shall be one (1) foot only above the flow line of the main sewer, unless otherwise directed by the City Engineer.

**Payment** for side sewers will be at the rate bid per linear foot as listed on the proposal, and shall be in full for all labor and material furnished in the completed work.

### SIDE SEWERS RELAID

Where shown on the plan or as directed by the City Engineer, existing side sewers shall be relaid in the manner provided above for side sewers.

**Payment** for side sewers relaid will be at the rate bid per linear foot as listed on the proposal, and shall be in full for all labor and material furnished in the completed work.

### GRANITE CURBING

Where shown on the plan or as directed by the City Engineer, curb stones made from the best quality of granite, of the dimensions shown on the plans, shall be set. For straight curbing, blocks shall not be less than four (4) feet in length. Stones for the curved corners shall be of the length shown on the plans. The top surface and the outside face down to the surface of the gutter shall be line work, having four cuts to the inch. The face of the stones for a distance of five (5) inches below the surface of the gutter, and the back of the stone for a distance of four (4) inches below the top of the curb, shall be uniformly pointed to an even surface. The bottom of all curbs shall have a true setting bed, so that the curbs shall have a uniform depth throughout. The remaining portions of the stones shall be uniform, and shall be true to line and free from depressions. All cut surfaces shall be true and out of wind. The top of all curb stones shall be cut with a slope of one-quarter ( $\frac{1}{4}$ ) of an inch in six inches. The top angle of the street side shall be cut to a curve having a radius of one inch. The ends of all stones shall be full to square and shall make joints not exceeding one-quarter ( $\frac{1}{4}$ ) of an inch in width. All joints shall be filled with cement mortar, consisting of one (1) part Portland cement and two (2) parts clean sand. Trench for curb shall be carefully excavated at least five (5) inches below the bottom of the stone, and shall be wide enough to receive the concrete footing and backing shown on the plans. The concrete at the face of the stone shall be brought

## PAVING—Continued

### GRANITE CURBING

up and made continuous with the concrete in the pavement foundation. The amount of concrete back of the curb stone shall in all cases be not less than that shown on the standard plan.

### ARMORED CONCRETE CURBING

Armored concrete curbing shall be constructed as shown in detail on the plans or as directed by the City Engineer. The concrete shall be composed of one (1) part Portland cement to three (3) parts sand and five (5) parts clean gravel. No stones to be over one and one-half ( $1\frac{1}{2}$ ) inches greatest diameter. Armored concrete curbs shall be faced with a coating of cement mortar three-quarters ( $\frac{3}{4}$ ) of an inch thick, mixed one (1) part Portland cement to one (1) part sand. The cement facing and concrete back shall be constructed at the same time. Special care shall be taken to secure a thorough bond between the two, and also to secure a thorough bond between the curbing and the concrete foundation of the pavement. The concrete shall be thoroughly tamped until free mortar flushes to the surface. The contractor shall provide all necessary forms and tools to construct the curbing as shown in detail on the plans and according to these specifications.

The upper edge on the face of the curb is to be reinforced and protected by a galvanized iron or steel bar, known as the "Wainwright" bar, or other bar of similar and equally good pattern, approved by the City Engineer.

The material used for forms must be dressed on the edges and on the side next the concrete, and must be set securely so as to allow the concrete to be thoroughly rammed. All forms to be set so that the curb, when completed, will conform accurately to the line and grade given for same.

The concrete shall be thoroughly mixed to the satisfaction of the engineer in charge, and enough clean water added to make it of a proper consistency. The concrete shall then be placed in the forms in layers of four (4) or five (5) inches and thoroughly rammed until the mortar entirely covers the surface.

The protection bar of galvanized iron or steel shall be accurately placed on the edge of the curb formed by the intersection of the top surface with the edge of the curb. This bar must conform accurately to the line and grade of the curb, and extend three (3) feet past the point of curve on all curves including alley returns. After the bar is set, and while the top of the curb or mortar is still soft, it shall be thoroughly troweled and smoothed.

After the forms are removed, any defects on the face of the curb must be corrected, and any faults or interstices filled with cement mortar, and smoothed so that the top and face of the curb for a depth of eight (8) inches shall be smoothed and free from defects.

The contractor shall protect the curbing from all damage from traffic and from the weather, and in warm and dry weather shall keep the curb moist by sprinkling as often as the City Engineer may direct.

## PAVING—Continued

### ARMORED CONCRETE CURBING

All angles in the curb shall be of armored concrete or granite, cut and dressed to true curves, of such radii as may be shown on the plan.

### CONCRETE CURBING

Where shown on the plan or as directed by the City Engineer, curbing shall be constructed of concrete, except corners of alley crossings and street intersections, which may be of dressed granite or armored concrete, as directed by the City Engineer.

Concrete curbing shall be constructed as shown in detail on the plans. The concrete shall be composed of one (1) part Portland cement to three (3) parts sand and five (5) parts clean gravel. No stones to be over one and one-half ( $1\frac{1}{2}$ ) inches greatest diameter. Concrete curbs shall be faced with a coating of cement mortar, three-quarters ( $\frac{3}{4}$ ) of an inch thick, mixed one (1) part Portland cement to one (1) part sand. The cement facing and concrete back shall be constructed at the same time. Special care shall be taken to secure a thorough bond between the two, and also to secure a thorough bond between the curbing and the concrete foundation of the pavement. The concrete shall be thoroughly tamped until free mortar flushes to the surface. The contractor shall provide all necessary forms and tools to construct the curbing, as shown in detail on the plans and according to these specifications.

The contractor shall protect the curbing from all damage from traffic and from the weather, and in warm and dry weather shall keep the curb moist by sprinkling as often as the City Engineer may direct.

**Expansion Joints in Curbs.**—The contractor shall put in an expansion joint at each margin of the street and alley and at intervals not exceeding 150 feet.

The expansion joint shall be made by putting in an iron sheeting one-eighth ( $\frac{1}{8}$ ) of an inch in thickness and the size of a cross section of the curb, with a layer of gray felt one-quarter ( $\frac{1}{4}$ ) of an inch in thickness and the size of a cross section of the curb, on each side of the iron sheeting.

After the concrete has set, the iron sheeting shall be removed. When this is done, care shall be taken to see that a free joint exists through the curb. (If not, the curb shall be chipped until a free joint does exist.)

There shall be no extra payment for making this joint beyond the price paid for Concrete Curb.

The extension of 3-inch sewer pipes through the concrete curb, or any 3-inch sewer pipe used in any other part of the district, shall be paid for as listed on proposal.

**Measurement.**—All curbing will be measured on the curb line.

**Payment.**—All curbing will be paid for at the rate bid for the same per linear foot as listed on the proposal, and shall be in full for all labor and material furnished in the completed work.



## PAVING—Continued

### SIDEWALK REPAIRING OLD LUMBER NEW LUMBER

**Wood Sidewalks.**—Wherever the present wooden sidewalks extend to the line of the proposed curb, such sidewalks, or such portions thereof as may be necessary, shall be taken up and all lumber found therein shall be neatly and carefully piled, and immediately after the setting of the curb, said sidewalks shall be rebuilt, using therein all old lumber which the City Engineer may consider suitable to remain in the structure, with the addition of such new lumber as may be necessary to render the new structure substantial and to the satisfaction of the City Engineer. All lumber shall be cut, fitted and bedded as directed or as shown on plans.

When directed by the City Engineer, existing wooden sidewalks and landings shall be extended to the new curbs. The covering planks to be two (2) inches by eight (8) inches, dressed on upper side.

The work of repairing, reconstructing or extending sidewalks will be paid for per M. feet, B.M., of lumber in the finished structure, as hereinbefore stated, and bids shall be submitted for old and for new lumber.

**Payment** for relaying old lumber shall include all nails and spikes, and shall be per M. feet, B.M., as listed on the proposal, including the cost of all labor incident to handling, cutting and replacing such lumber in the work.

**Payment** for laying new lumber shall include all nails and spikes, and shall be per M. feet, B.M., as listed on the proposal, including the cost of all labor incident to the handling, cuttings and placing such lumber in the work.

### CONCRETE SIDEWALK REPAIRING

**Concrete Sidewalks.**—All damage done to concrete walks or curbs during the progress of the work on this improvement shall be repaired by the contractor under the directions of the City Engineer, using for such repairs materials conforming to the requirements of the standard specifications of the City of Seattle for concrete sidewalks. The cost of repairing such concrete walks or curbs shall be included in the prices bid for curbing per linear foot and for finished pavement per square yard. If the contractor fails to furnish the necessary labor and materials for such repairs when ordered, the City Engineer may cause said necessary labor and materials for such repairs to be furnished by other parties, and the cost thereof shall be deducted from such money as may be due to the contractor by reason of work performed or materials furnished for any part of this improvement.

Where concrete sidewalks have been built, but do not extend to the new curb, the extension shall be made by the contractor in accordance with the standard specifications of the City of Seattle for "Concrete Sidewalks."

**Payment** will be made for such new concrete sidewalk at the rate bid therefor per square yard, as listed on the proposal.

### SUB- DRAINS

When all clearing and grubbing, excavating, rolling, etc., shall have been done to the satisfaction of the City Engineer, there shall be

## PAVING—Continued

### SUB- DRAINS

excavated trenches for tile drains. Said trenches shall be excavated where shown by drawings or where directed by the City Engineer. The excavations shall be made to a true line at least three (3) inches below the bottom of the tile pipe. Gravel or broken stone shall then be spread so as to form a bed for the pipe. The pipe shall be hard-burned tile drain without sockets. It shall be laid on a true grade line as given by the engineer, and shall be laid and connected to the inlet provided for it in the catch basin wall, or to such other pipe or outlet as the City Engineer may direct. The trench will then be filled with screened gravel to the surface, care being taken to have at least three (3) inches of gravel surrounding the pipe.

**Payment.**—Such sub-drain will be paid for per linear foot as listed on the proposal. The price bid for such drain per linear foot must include the cost of all excavation and the cost of all material and labor necessary to construct the same in accordance with the plans and specifications. The cost of making the connection to any pipe or catch basin shall also be included in the price bid per linear foot.

### GRAVEL SUB- BASE

Gravel shall be laid as directed by the City Engineer. It shall be screened and free from dirt and soil. The smallest stones shall not be less than one-quarter ( $\frac{1}{4}$ ) of an inch in diameter, and the largest shall not exceed three (3) inches in any direction.

**Payment** for gravel will be at the rate bid therefor per cubic yard as listed on the proposal, and will be in full for all labor and material in the completed work, including all necessary excavation.

### CONCRETE BASE

Concrete for pavement foundation shall be composed of gravel, sand and cement, and shall be mixed and laid as hereinafter specified.

The sand used shall be clean, coarse and sharp. It shall be thoroughly washed until free from loam, clay or earthy particles. Sand will be rejected if more than five per cent. fails to pass a one-fourth inch sand screen standing at a pitch of one-half to one. All sand shall range uniformly from fine to coarse. Special care shall be taken in the selection of sand to be used in the wearing surface.

The gravel used shall be thoroughly washed until free from loam, clay or earthy particles. It shall range in size from one-quarter inch to two and one-half inches in diameter. Care shall be taken that the gravel shall range uniformly between these sizes. All gravel will be rejected which shows an undue proportion of fine gravel on the one hand, or large stones on the other, and of which more than five per cent. shall pass a screen having a mesh of one-quarter inch.

The proportions for mixing concrete shall be as follows: Seven (7) parts gravel; four (4) parts sand; one (1) part cement; said parts being taken by measure, one barrel of cement weighing not less than 376 pounds net to be taken as measuring three and one-half ( $3\frac{1}{2}$ ) cubic feet.



## PAVING—Continued

### CONCRETE BASE

**Cement Specifications.**—See page 11.

**Mixing.**—The manner of mixing shall be by one of the following methods:

(1) Concrete may be mixed by a machine of the "batch" type of a pattern approved by the City Engineer which admits of the accurate measuring of the materials.

(2) Upon a tight platform of evenly laid plank not less in area than three hundred and twenty-four (324) square feet, and not less than twelve (12) feet wide, a correct proportion of gravel shall be evenly spread, in no case more than eight (8) inches deep.

In a separate box the correct proportions of sand and cement shall be mixed dry until the whole mass is of one even color. The gravel shall then be well wetted and the mixture of dry cement and sand shall be evenly spread over it. In addition to the thorough wetting of the gravel, if in the judgment of the City Engineer it be necessary, sufficient water shall be added by means of a "rose-head sprinkler" to enable the material to become thoroughly incorporated, and the process of mixing shall be continued until the surface of each stone is well coated with mortar. Said concrete mixing must be done rapidly, and the mass at once deposited and quickly rammed until thoroughly compacted. The sand and gravel shall be accurately measured in boxes or casks. **No counting by shovels or other approximation will be allowed.** The entire thickness of concrete as shown by the drawings or stakes, or as directed by the City Engineer, shall be put down in one layer and rammed with iron-shod rammers seven (7) inches square, weighing not less than forty (40) pounds, brought to the correct crown and grade and left with a smooth and even surface.

An allowance will be made the contractor on the monthly estimates of concrete base laid but not covered with pavement as follows:

- 4-inch base, 60 cts. per sq. yd.
- 5-inch base, 75 cts. per sq. yd.
- 6-inch base, 90 cts. per sq. yd.

These allowances will be withdrawn as soon as the base is covered.

Grade stakes shall be furnished and set by the Engineer during the progress of the work when deemed necessary by him. These stakes must be maintained in place by the contractor until ordered removed by the Engineer, after which the holes shall be filled with cement mortar or concrete, and tamped flush with the surrounding surface.

Concrete base in this improvement shall be of the thickness shown on the plan, unless otherwise directed by the City Engineer.

Concrete base shall be allowed to set at least six (6) days undisturbed, and during this period shall be thoroughly wetted as often as may be directed by the City Engineer.

Wherever in this improvement the center of the street is not improved at the time the remainder of the street is improved, the contractor shall put in a one-inch by twelve-inch

## PAVING—Continued

### CONCRETE BASE

or one-inch by eight-inch header, as directed by the City Engineer. This header shall be staked and braced entirely to the satisfaction of the City Engineer.

**Payment** for concrete base will be included in the price bid for pavement.

### ADDITIONAL BASE

Where shown on the plan or as directed by the City Engineer, concrete base of extra thickness shall be laid, complying with all requirements as specified above for concrete base.

**Payment** for additional concrete base will be at the rate bid per square yard for each extra one (1) inch in thickness as listed on the proposal, and shall be in full for all labor and material furnished in the completed work.

### BRICK PAVEMENT

Where shown on the plan or as directed by the City Engineer, brick pavement shall be constructed, and shall consist of: 1st. One (1) layer of concrete of the thickness specified; 2nd. A layer of sand or sand cushion not less than one (1) inch thick, and not more than one and one-half (1½) inches thick; and, 3rd. A surface pavement of vitrified brick, with a grout filler as hereinafter specified.

**Brick.**—The brick or blocks to be used for any part of the surface pavement shall be straight, smooth, free from checks and fire cracks, and of such shapes as may be required by the drawings furnished. Two edges shall be beveled one-fourth (¼) of an inch. In size they shall be two and three-eighths (2¾) inches by four and one-eighth (4⅛) inches by eight and three-eighths (8¾) inches, and they shall not vary more than five (5) per cent. from the above given dimensions.

When broken, the fracture shall be smooth and straight, not conchoidal, and the texture of the brick shall be uniform throughout and not granular. The absorption of moisture of any block or portion thereof shall not exceed three (3) per cent. of the weight of any sample after thorough drying and immersion in water for three (3) consecutive days. No bricks will be accepted which contain lime or other soluble substances in such proportions as to cause spalling or pitting of the surface when soaked in water for three (3) consecutive days and then exposed to the air for a corresponding length of time.

The average crushing strength of two-inch (2-in.) cubes, taken from any part of the brick shall not be less than twelve thousand (12,000) pounds per square inch.

The specific gravity shall not be less than two and one-quarter (2¼), and each brick must be toughened by thorough annealing in the kiln.

Special shaped bricks or blocks if required shall be furnished of the same quality as the regular brick.

The loss in weight of any whole brick placed loose, either single or in lots, in a cast iron drum or hollow cylinder twenty-four (24) inches in diameter, similar to those used as rattlers in foundries, revolving at a rate not exceeding thirty (30) revolutions per minute,

## PAVING—Continued

### BRICK PAVEMENT

shall not be more than fifteen (15) per cent. after six hundred (600) revolutions, twenty-five (25) per cent. after two thousand (2000) revolutions, or thirty-five (35) per cent. after four thousand (4000) revolutions.

All brick will be inspected in a general way when the same are delivered upon the ground and samples will be selected by the City Engineer for such tests as he may deem necessary. The failure of several samples selected from any shipment or pile of brick to satisfactorily withstand any of the tests herein specified may, at the option of the City Engineer, cause the rejection of the whole of such pile or shipment, and the same shall be immediately removed by the contractor as hereinafter specified. If, during the progress of construction or after the completion of the pavement, any soft, fractured, spalled or otherwise defective or objectionable brick is detected in such pavement, such brick or bricks shall be immediately taken out and replaced by acceptable brick or bricks.

These conditions regarding the brick used in the pavement will be rigidly enforced during the entire time specified for maintenance by the contractor.

All brick shall have the edges beveled to a width of not less than one-quarter ( $\frac{1}{4}$ ) inch. All gutter bricks shall be selected with extra care.

**Sand Cushion.**—After the concrete shall have become well set, a sand cushion of clean, coarse sand shall be spread to the depth of not less than one (1) inch nor more than one and one-half ( $1\frac{1}{2}$ ) inches and brought to the proper surface by use of a templet.

**Brick Laying.**—Upon the sand layer the vitrified brick shall be laid, each course breaking joints and the courses laid true to true lines. No piece smaller than half a regular brick will be allowed in any part of the work. All bricks shall be laid in rows across the roadway, except near the curb, where it shall be laid in longitudinal rows. In the alley crossings the surface pavement shall be laid in cement mortar consisting of one (1) part of cement and five (5) parts sand, on the concrete foundation. At the street intersections the brick shall be laid as shown in detail on the plan.

Care shall be taken to use brick of the same degree of hardness, in the same locality. After the brick have been laid, the City Engineer may cause them to be sprinkled with water, and any soft brick which show up after this test shall be removed and replaced with brick of a suitable degree of hardness.

After being set each row shall be barred or driven together end on so as to make the smallest possible joint, and said rows shall be barred or driven together sidewise, every fifth course, to a perfectly straight line.

The bricks shall then be tamped down to a uniform surface with a paver's rammer ten (10) inches in diameter and weighing not less than seventy-five (75) pounds, no iron being

## PAVING—Continued

### BRICK PAVEMENT

allowed on its lower face to come in contact with the pavement. This tamping shall not be complete until each brick is brought to correct grade and crown of street, and if, after tamping is done, flat spots or any irregularities show, the brick must be removed and the cushion increased or decreased until a perfect surface is obtained.

After being tamped, the brick shall be rolled with a roller weighing not less than five tons until brought to a perfectly smooth and even surface.

At the gutters, along the railway tracks, or any other places shown, the foundation shall be laid and shaped as shown by drawings, and over the concrete enough wet sand or mortar shall be placed so that when set and sufficiently tamped the surface of the pavement shall conform to the lines and shapes shown on drawings.

The brick shall be carefully cut and fitted around all covers belonging to the sewer, water or lighting systems which may be found within the line of the improvement, and also around all catch basin covers and inlets. The surface of such covers shall be brought to true grade and elevation, and must be coincident with the surface of the surrounding pavement when finished.

**Grout Filler.**—Grout filler shall be used in the body of this pavement. After all defective brick have been removed and replaced by sound brick, and after the brick have been properly tamped and rolled, and brought to a true and even surface, conforming to the grade and crown required, and thoroughly wetted to the satisfaction of the City Engineer, the joints shall be completely filled with Portland cement grout. The grout shall be composed of one (1) part Portland cement to one (1) part clean fine sand. The cement and sand shall be mixed dry and sufficient water added to give the necessary fluidity. The grout shall be kept constantly stirred from the time the water is added until it is applied to the pavement. After being poured over the surface of the pavement it shall be swept into the joints with stiff brooms until no more settlement is apparent and the cement filling remains flush with the top of the bricks. After the joints are filled, the pavement shall be undisturbed by teaming or traffic of any kind for not less than seven (7) days.

**Payment.**—Brick pavement will be paid for at the rate bid for the same per square yard as listed on the bid blank, such payment to be in full for furnishing and placing in position all material required, including concrete base, sand cushion, brick, filling joints, sand coating, and all other labor and material required by the plans and this specification.

As shown on the plan, or as directed by the City Engineer, brick blocks of the following dimensions shall be used: Three and one-quarter ( $3\frac{1}{4}$ ) inches by four and one-eighth ( $4\frac{1}{8}$ ) inches by eight and three-eighths ( $8\frac{3}{8}$ ) inches, and shall otherwise correspond to the standard

### BRICK BLOCK PAVING

## PAVING—Continued

### BRICK BLOCK PAVING

specifications for paving brick, except that one edge shall be beveled as shown on the plan, and the other edge rounded to a radius of one-fourth ( $\frac{1}{4}$ ) inch. Grout filler shall be used as specified above under Brick Paving. All other requirements as specified above under brick paving shall apply to Brick Block Paving.

Payment for Brick Block Paving will be at the rate bid therefor per square yard as listed on the proposal, and will be in full for all labor and material in the completed work.

### ASPHALT PAVEMENT

Where shown on the plan or as directed by the City Engineer Asphalt Pavement shall be constructed.

**Asphalt Pavement Shall Consist of.**—1st. A layer of concrete of the thickness specified; 2nd. A binder course one (1) inch in thickness, and 3rd. A wearing course two (2) inches in thickness.

**Refined Asphalt.**—The asphalt employed in the preparation of the asphaltic cement for use in the asphalt paving mixture shall be a solid, natural bitumen obtained from some natural deposit that has been in use in the paving industry for at least five (5) years. It shall be so refined as to be in every respect uniform, of a character recognized as being suitable for asphaltic paving cement; must have been freed as far as possible from all foreign and organic matter and volatile oil, and at least 98.5 per cent. sol. in cold carbon disulphide, and must not contain more than two (2) per cent. of free carbon or soot. The penetration of this refined asphalt shall be 45° Dow or higher. When twenty (20) grammes are placed in an oven at a temperature of 300 degrees Fahrenheit for a period of five (5) consecutive hours, the loss shall not be greater than 3 per cent. by weight and the penetration of the residue shall not be less than 50 per cent. of that of original sample, these tests to be made under conditions and by methods employed in City Engineer's Testing Laboratory. The bitumen contained therein must be of a cementitious character, suitable to make, on proper admixture with the flux, a durable and satisfactory asphaltic paving cement, and shall be in all respects satisfactory to the City Engineer.

Satisfactory proof must be furnished that the asphalt proposed to be used has been in successful use as a paving material for at least three years.

**Flux.**—The oils used in the manufacture of the asphaltic cement shall be a petroleum from which the lighter oils have been removed by distillation. It shall be freed from coke and other impurities, and shall have a specific gravity of 18 degrees to 22 degrees Baume and fire test of 300 degrees Fahrenheit, and shall not contain more than ten (10) per cent. of paraffine.

The flux or petroleum substitute should be a residue from the distillation of California petroleum, with steam agitation at a temperature not to exceed 620 degrees Fahrenheit.

It shall have the following characteristics:

## PAVING—Continued

### ASPHALT PAVEMENT

(1) It shall be soluble in carbon bi-sulphide to the extent of 99 per cent., and in 88 degrees naphtha to the extent of 90 per cent.

(2) It shall be free from water, and shall not flash below 350 degrees Fahrenheit in a New York State oil tester, and shall have a density of not less than .98 or 12.9 degrees Baume, or more than 1.050 or 9.3 degrees Baume at 25 degrees Centigrade when referred to water at the same temperature.

(3) It shall volatilize not more than 5 per cent. of oil when heated for seven hours at 325 degrees Fahrenheit according to method employed in City Engineer's laboratory.

(4) The residue from heating the oil in the same way to 400 degrees Fahrenheit for seven hours shall be a soft flux, not hard enough to give a penetration of less than 130 degrees Dow Penetration Machine.

(5) It shall not yield more than 6 per cent. fixed carbon on ignition.

(6) Under the microscope, beneath a cover glass, it shall appear free from insoluble or suspended matter.

**Sand.**—The sand shall be clean, moderately sharp, silicious sand. It shall contain not more than two per cent. of loam, mica, clay or other objectionable impurities. Not less than twenty (20) per cent. shall pass a No. 100 screen; not more than forty per cent. shall pass a No. 80 screen, and not more than two per cent. shall be retained on a No. 10 screen, and the whole shall pass a No. 8 screen.

**Filler.**—The filler shall be powdered mineral matter of such a degree of fineness that the whole of it shall pass a 50-mesh screen, and at least 66 per cent. shall pass a 200-mesh screen.

**Asphaltic Cement.**—The refined asphalt and flux of a character corresponding to that described in the foregoing paragraphs, shall be combined as follows for the preparation of asphaltic cement:

To the melted asphalt at a temperature of not over 350 degrees Fahrenheit the flux, after being heated to about 200 degrees Fahrenheit, is to be added in such proportions as to produce an asphaltic cement having a consistency as indicated by the Dow Penetration Machine of about 65 degrees at a standard temperature of 77 degrees Fahrenheit.

While the oil or flux is being added, agitation shall be maintained by means of an air blast or live steam, and shall be continued until the asphaltic cement is homogeneous.

The agitation shall be continued for at least three (3) hours before attempting to use in pavement mixture, during which time the temperature shall be maintained at from 300 degrees to 325 degrees Fahrenheit.

Should the finished cement not prove of proper consistency, it shall be modified by the addition of further oil or melted asphalt, as may be necessary. The asphaltic cement while in use must be thoroughly agitated.

For every lot or shipment of asphalt or asphaltic flux used upon this contract, the con-



## PAVING—Continued

### ASPHALT PAVEMENT

tractor shall furnish a statement giving the selling agent or company, the refinery that refined the asphalt or prepared the flux, the field or locality from which the crude asphalt or flux was obtained, and a refining report of tests or penetration of each lot or run, with numbers corresponding to a batch or lot number plainly stenciled on each barrel or container. This report to be delivered to the department laboratory at the earliest possible date to allow sufficient time for sampling and making of tests as herein mentioned to verify refinery report and determine the suitability of the material offered before it will be accepted for use on this work.

Before beginning the operation of the plant, the City Engineer will assign, at the expense of the improvement district in which the asphalt is to be laid, a man skilled in the testing and mixing of asphalt paving mixtures, whose duty it shall be to supervise the testing, preparation and mixing of the various ingredients that enter into the making of a first-class asphalt paving mixture, and a part of whose duty it will be to see that none but competent men be employed in the various departments about the plant.

To facilitate the necessary test, and to provide for proper control of the plant work, the contractor shall provide a room convenient to the plant and well protected from dust and atmospheric changes (provided with telephone connections with the City Engineer's office), of approximately 150 square feet floor area and at least 9 feet from floor to ceiling, and provided with city water, gas, etc., and in which is provided a closet large enough for the penetration work, and in which closet the temperature can be raised 77 degrees Fahrenheit inside of thirty (30) minutes and maintained at that temperature constantly for a period of at least four (4) hours during such variation of weather and temperature as will occur when asphalt pavements are permitted to be put down.

This room shall be properly fitted up with the following testing apparatus for taking the penetration of and testing asphalt paving mixtures:

One apparatus, either of the Dow or New York Testing Laboratory Penetrometer Type, and a clock or pendulum for accurately measuring seconds.

At least two sets of standard 8-inch brass-bound sieves, from 10 to 200 mesh to the linear inch inclusive, as follows:

- 10 mesh to the linear inch
- 20 mesh to the linear inch
- 30 mesh to the linear inch
- 40 mesh to the linear inch
- 50 mesh to the linear inch
- 80 mesh to the linear inch
- 100 mesh to the linear inch
- 200 mesh to the linear inch

These sieves to be in nests of eight, with tight covers and dust pan, all to be approved by the City Engineer.

## PAVING—Continued

### ASPHALT PAVEMENT

With the above sieves shall be provided a suitable balance or scale of about one and one-half or two pounds capacity for quickly and accurately weighing the percentage of the different sand residues remaining or passing the different mesh sieves.

There shall be provided two Baume hydrometers for liquids lighter than water, with a suitable hydrometer jar, two thermometers, Fahrenheit scale for measuring ordinary room temperatures, 6 asphalt thermometers with metal case of the type in use for taking temperatures of asphalt mixtures on the street and with a range of from about 200 degrees Fahrenheit to 400 degrees Fahrenheit, 12 thermometers with a range of from 1 degree Fahrenheit to 600 degrees Fahrenheit, 50 quart size Mason fruit jars, with screw top, for bringing samples of liquid flux to Engineer's laboratory, 500 seamless tin boxes with covers, of about 2-ounce capacity, for penetration and other samples, 1 roll (about 40 pounds) of good manila wrapping paper, of the kind used for making patent stain test, 100 sample bags of about one pound capacity, for taking miscellaneous samples.

All of the above apparatus and supplies to be subject to the approval of the City Engineer. As the conditions under which asphalt pavements are used may vary, and the ingredients used therein may change from time to time, other tests may be prescribed by the City Engineer; the apparatus for which must be furnished by the contractor free of cost to the City, upon the written request of the City Engineer.

Each plant must be provided with a suitable portable platform scales, with a platform at least 30 inches by 42 inches, and a weighing capacity of at least 2,500 pounds, for the use of the yardman and kettlemen in making up kettle charges.

Each melting kettle must be provided with some efficient means of agitation, to be approved by the City Engineer.

The dipping kettle, or kettle from which it is customary to draw the heated asphaltic cement for the pavement mixtures must be fitted with efficient mechanical agitation, of a kind to be approved by the City Engineer.

In the yard, and convenient to each plant, there shall be the following quantities of paving materials:

- (1) 200 cu. yds. of sand that has been tested and accepted.
- (2) 100 cu. yds. of binder material that has been tested and accepted.
- (3) 200 tons of refined asphalt that has been tested and accepted.
- (4) 20 tons of asphalt flux or residuum oil that has been tested and accepted.
- (5) 10 tons of inorganic dust that has been tested and accepted.

At the time of signing the contract, the contractor shall designate the plant or plants which he expects to use in the preparation of the asphalt mixture for this particular contract, and after such plant or plants are desig-



## PAVING—Continued

### ASPHALT PAVEMENT

nated and after the Engineer's Office has certified as to the acceptability of the plant or plants for the work in question, a change to some other plant or plants will not be allowed except upon the written permission of the City Engineer.

There must be installed in the plant and yards such contrivances and machinery as will insure the plant being operated with the least amount of dust, noise, smoke and nuisance to the surrounding community; there must be installed, convenient for the use of the plant employees, a satisfactory sanitary closet; and the yard and plant must be provided with hose, water plugs and fire extinguishing apparatus so as to reduce the fire risk to the plant and neighboring buildings to the least amount possible under the circumstances; and it shall be the duty of the contractor at all times to so maintain the plant or plants that he is operating in a clean, sanitary manner, and to produce the least amount of nuisance and procure the least amount of fire risk to the surrounding property, and to proceed at once to remedy such defects upon the written request of the City Engineer.

Before acceptance of the plant, a thorough inspection of all equipment and machinery will be made by the City Engineer, and certificate must be obtained from him showing that the testing room is satisfactory and that it contains the required apparatus. Any defects appearing after such certificate has been issued and permission given to proceed with the work shall be immediately removed. If not so removed, the permission to use the plant will be revoked.

Samples of asphaltic cement and of all materials used in its manufacture shall be supplied to the City Engineer in suitable tin boxes or cans, when required, and he shall have access to all branches of the work at any time.

**Binder.**—The binder course shall consist of suitable, clean, broken stone, or a clean, hard burned clinker, in every respect equal and similar to that produced by the burning of the city refuse at the Municipal Refuse Destructor No. 1, passing a one (1) inch screen, not less than five per cent. nor more than ten per cent. of which shall pass a No. 10 screen; to this may be added not more than ten per cent. of fine gravel that will pass a three-quarter ( $\frac{3}{4}$ ) inch ring. The stone or clinker shall be heated by passing through revolving heaters to a temperature not exceeding 350 degrees Fahrenheit, and then thoroughly mixed by machinery with asphaltic cement of suitable temperature and consistency and in such proportions that the resulting binder will have life and gloss without an excess of asphaltic cement. Should the binder appear dull from overheating or lack of cement, it will be rejected.

The binder mixture, prepared as above, shall be hauled to the street when heated, and carefully spread upon the foundation (which shall be first thoroughly swept clean), with hot iron rakes and shovels, to such depth that after having received its final compression it shall

## PAVING—Continued

### ASPHALT PAVEMENT

be at least one inch thick, and shall then be immediately rolled with a five-ton steam roller. Rolling shall be continued while the binder is in a hot plastic condition.

Such portions of the binder as it may be impossible to roll shall be thoroughly rammed with hot iron tampers.

Should the binder show rich patches after rolling, these patches must be removed and replaced with suitable material.

The upper surface of the binder course shall be made exactly parallel with the surface of the finished pavement, and the whole course when finished must be compact and particles bound firmly together.

**Wearing Surface.**—Upon the binder course, prepared and laid as above specified, and thoroughly swept free from rubbish, shall be laid an asphalt wearing surface. It shall be composed of asphaltic cement, prepared as above specified, sand, finely powdered mineral matter, mixed in such proportions as shall produce a tough, compact and durable pavement; but in no case shall the percentage of the bitumen in the wearing surface, soluble in carbon bi-sulphide, be less than twelve (12) per cent.

The sand and the asphaltic cement shall be heated separately by means of suitable apparatus to about 300 degrees Fahrenheit, and never above 350 degrees Fahrenheit. Special care must be taken that the sand be uniformly heated throughout. The finely powdered mineral matter, while cold, shall be thoroughly mixed with heated sand, in the necessary proportions, and the combined sand and finely powdered mineral matter then mixed with the asphaltic cement at the required temperature, in the proper proportions, and by suitable apparatus, to effect a thoroughly homogeneous composition.

The wearing surface, prepared as above indicated, shall be delivered on the work in suitable trucks or dump wagons, at a temperature, regardless of the length of haul or temperature of the air, of not less than 275 degrees Fahrenheit, nor more than 350 degrees Fahrenheit. The contractor will be required to make such provisions for transportation as will secure this condition.

It shall at once be spread uniformly over the binder course with hot shovels and rakes, in such manner as to give a uniform and regular grade, and to such depth that after having received its final compression it will have a net thickness of not less than two (2) inches.

After having been spread, the mixture shall be compressed with a roller, weighing not more than two and one-half ( $2\frac{1}{2}$ ) tons. It shall then be rolled with a steam roller weighing not less than five (5) tons, after which a small amount of hydraulic cement shall be swept over it. This shall be followed by a roller of not less than ten (10) tons; the rolling to be continued as long as it makes any impression on the surface, and in no case for less than five hours for each thousand square yards of pavement.

## PAVING—Continued

### ASPHALT PAVEMENT

All portions of the pavement surface not accessible to the roller shall be compressed by tamping and smoothed with hot irons.

Special care shall be taken to thoroughly tamp the hot asphalt mixture around any projecting manhole or catch basin covers.

Special care must also be taken to prevent the iron rakes, shovels, tampers, rollers, etc., from becoming overheated.

The resulting pavement must show a close-grained, even and smooth surface, true to grade and cross-section, and free from all hollows or inequalities.

No binder or wearing surface shall be laid in rainy weather, nor unless the surface of the concrete or binder is perfectly dry.

**Asphalt Gutters.**—On all streets in this district where asphalt is used for gutters a strip not less than eighteen (18) inches in width along the gutter line shall be coated with a coat of asphaltic cement, and ironed in with hot irons.

**Measurements** shall be the same as for other pavement.

**Payment** for same shall be included in price bid for "Asphalt Pavement."

**General Requirements.** — Whatsoever the character of the asphalt used, or the method of manipulation and laying, the pavement shall conform to the following requirements:

The pavement, when laid down, shall be dense, fine grained, hard and durable, of smooth and even surface, and free from any depressions which will retain water. It shall contain no water nor any appreciable amount of light oils, nor matter volatile at a temperature of 250 degrees Fahrenheit. It shall yield, when extracted with carbon bi-sulphide, not less than twelve (12) per cent. of pure bituminous matter. All of the mineral matter shall pass a No. 8 screen, and not less than twenty-five (25) per cent. shall pass a No. 100 screen, while the remainder shall be graduated between these limits.

The proportions, and physical and chemical properties, of the oil and asphalt and the asphaltic cement, sand, and finely powdered mineral matter in the wearing surface, shall be such as to produce the above described results, and shall be in all respects satisfactory to the City Engineer.

All exposed surfaces of castings shall be cleaned and then painted with one coat of hot asphalt. All exposed surfaces of gutters and curbs that come in contact with asphalt pavement shall be painted one coat of hot asphalt, special care being taken in painting curbs not to paint above the top of the gutter. Payment for this work will be included in the price bid for asphalt pavement.

None but skilled workmen shall be employed in mixing and laying the asphalt pavement.

**Payment.**—Asphalt pavement will be paid for at the rate bid for same per square yard as listed on the proposal, such payment to be in full for furnishing and placing all materials,

## PAVING—Continued

### ASPHALT PAVEMENT

including the concrete base, binder course, wearing surface and all other labor and materials required by the plans and this specification.

### SANDSTONE BLOCK PAVEMENT

Where shown on plan or as directed by the City Engineer, the roadway shall be paved with sandstone blocks, laid upon a proper concrete foundation.

The blocks shall consist of good quality of silicious sandstone, having angular grains, hard, durable and satisfactory in every respect to the City Engineer. They shall not be less than three and one-half ( $3\frac{1}{2}$ ) inches nor more than five (5) inches in thickness; not less than five (5) inches nor more than five and one-half ( $5\frac{1}{2}$ ) inches deep, and not less than eight (8) inches nor more than twelve (12) inches in length. The stones shall have parallel sides and ends, with right angle joints. All points of the stones to be broken off, so that when set in position the joints shall not exceed one-half ( $\frac{1}{2}$ ) inch in thickness. The top and bottom surfaces of the stones to be parallel, the top surface to be hammer dressed if necessary, so that it shall have an approximately plane surface. The blocks shall be carefully cut and fitted around any manhole or catch basin covers.

All stone shall show a sharp rough fracture, and shall not be below the average hardness and toughness of the grade of stone proposed to be furnished.

All stone showing lamination which appear to cleave easily, show lack of complete formation or signs of disintegration, shall be rejected.

Stones shall be bedded in sand cushion, having an average thickness of about two (2) inches. They shall be laid in right angle courses across the street. Each course shall be of uniform thickness and upon completion of every fourth course, the course shall be driven together and straightened by the use of a heavy sledge and wooden block. The blocks shall be thoroughly settled by ramming, and the finish surface shall conform to the grade and cross section shown. After the surface has been thoroughly compacted, it shall be swept clean and thoroughly wetted to the satisfaction of the City Engineer, and the joints and spaces between the stones shall be filled with Portland cement grout, composed of one (1) part Portland cement to three (3) parts clean fine sand.

The sand and cement shall be mixed dry, and sufficient water added to give the necessary fluidity. The grout shall be kept constantly stirred from the time the water is added until it is applied to the pavement. It shall be swept into the joints with proper brooms, until the joints are completely filled to the surface.

**Bidders Will Be Required** to submit samples of sandstone blocks which they propose to use on this improvement, with their commercial names, and no stone will be accepted that is not equal or superior to the samples submitted.

## PAVING—Continued

### SANDSTONE BLOCK PAVEMENT

**Payment.**—Sandstone Block Pavement will be paid for at the rate bid for the same per square yard as listed on the proposal, and such payment shall be in full for furnishing and placing in position all material required by the plans and above specifications.

### GRANITE BLOCK PAVEMENT

When shown on the plan or as directed by the City Engineer, Granite Block Pavement shall be constructed.

The blocks shall be of granite, of a durable, sound and uniform quality. The stone shall be of the same quality as to hardness, color and grain. No out-crop, soft, brittle or laminated stone will be accepted.

Size of blocks will be not less than three and one-half ( $3\frac{1}{2}$ ) nor more than four (4) inches thick; not less than five (5) nor more than five and one-half ( $5\frac{1}{2}$ ) inches deep, and from eight (8) to twelve (12) inches long. The surface of the blocks to have parallel and rectangular sides and ends and so prepared that when in place and resting against the adjoining stone, the joints in their widest part shall not exceed one-half ( $\frac{1}{2}$ ) inch in width.

Stones are to be split or broken with top surface hammer-cut or axed off smooth; sides and ends being dressed, when necessary, to secure the one-half ( $\frac{1}{2}$ ) inch joints as specified.

Upon the concrete base is spread a layer of clean, dry coarse-screened bedding sand, and on this sand the blocks are to be laid in straight and even courses of uniform depth at right angles with the line of the street, unless otherwise directed by the City Engineer; with close joints, longitudinal joints broken by a lap of at least three (3) inches; sufficient sand being used to bring the blocks to grade and form for the finished roadway. After they have been thoroughly rammed as hereinafter provided, they shall be carefully fitted around all catch basins, manholes, inlets and other openings. No piece smaller than one-half ( $\frac{1}{2}$ ) a block to be used. All blocks not uniform in width, or improperly laid, shall be taken out and proper ones set in their places. Enough clean gravel in size from one-eighth ( $\frac{1}{8}$ ) to one-quarter ( $\frac{1}{4}$ ) of an inch is to be spread over the blocks, raked and swept into the joints to fill them half full. The blocks are then to be thoroughly rammed to the satisfaction of the City Engineer to a firm, unyielding bed, the surface parallel to the grade and crown required. Blocks broken in process of ramming shall be removed and replaced by sound blocks thoroughly tamped. Rammers used in compacting the blocks shall be of size and make as specified by the City Engineer. No ramming is to be done within fifteen (15) feet of the face of the paving that is being laid.

After the surface has been thoroughly compacted, it shall be swept clean and the remaining portion of the joints and spaces between the blocks filled with cement grout, composed of one (1) part of Portland cement to two (2) parts of clean fine sand. The sand and cement shall be mixed dry, and sufficient water added to make the necessary fluidity. The grout shall be kept constantly stirred from the time the

## PAVING—Continued

### GRANITE BLOCK PAVEMENT

water is added until it is applied to the pavement. The surface of the pavement shall be kept sufficiently wet to allow the grout to penetrate freely into the joints. The grout shall be swept into the joints with proper brooms until they are completely filled to the surface.

**Bidders Will Be Required** to submit samples of the granite blocks which they propose to use in this improvement, with their commercial names, and no granite block will be accepted that is not equal or superior to the samples submitted.

**Payment.**—Granite block pavement will be paid for at the rate bid for the same per square yard as listed on the proposal, and such payment shall be in full for furnishing all labor and placing in position all material required by the plans and above specifications.

### PAVEMENT RELAID

Where shown on the plans or as directed by the City Engineer, existing pavement shall be torn up and relaid. In relaying, all standard specifications for paving shall apply as in new work. No extra payment will be allowed for the tearing up of the old pavement other than that allowed in "Pavement Relaid."

**Payment** for pavement relaid will be at the rate bid per square yard as listed on the proposal, and shall be in full for all labor and material furnished in the completed work.

**Measurements.**—All pavement, including alley crossings, will be determined by horizontal measurement, but no allowance will be made for curvature of cross section.

All traffic of any kind, except on planks, shall be rigidly prohibited on completed pavement for ten (10) days after the grout is filled in, or until in the opinion of the City Engineer the pavement has become thoroughly set.

### CONCRETE GUTTERS (Paving)

Where shown on the plan or as directed by the City Engineer, concrete gutters (paving) shall be constructed according to the details on the standard plan.

**Payment** for concrete gutters (paving) shall be at the rate bid per square yard, as listed on the proposal, and shall be in full for all labor and materials furnished in the completed work.

### BRICK GUTTERS

Where shown on the plans, or where directed by the City Engineer, brick gutters, of the dimensions specified, shall be constructed of vitrified brick.

All brick used shall be smooth, conforming to the general requirements for paving brick, as specified under "Brick Pavement." Whenever the roadway pavement is asphalt or stone blocks, then the brick gutters adjacent to same shall be laid in a bed of cement mortar three-fourths ( $\frac{3}{4}$ ) of an inch in thickness, mixed one (1) part Portland cement to five (5) parts sand. Whenever the roadway pavement is brick, the brick gutters shall be laid on a sand cushion similar to that used for the brick pavement in the roadway. After being laid and thoroughly wetted to the satisfaction of the City Engineer, the brick shall be carefully tamped and



## PAVING—Continued

### BRICK GUTTERS

brought to a smooth and even surface, conforming to the grade and crown. All joints shall be completely filled with Portland cement grout as specified above under "Brick Pavement."

Measurement shall be the same as for other paving.

Payment for brick gutters will be per square yard as listed on the proposal, and shall be in full for all labor and material furnished for the completed work.

### BRICK ALLEY CROSSINGS

Where shown on the plans, or as directed by the City Engineer, brick alley crossings of the dimensions specified shall be constructed of vitrified brick. All brick used shall be smooth, conforming to the general requirements for paving brick as specified above under "Brick Pavement." They shall be laid on a sand cushion three-quarters ( $\frac{3}{4}$ ) of an inch in thickness. After being laid and thoroughly wetted to the satisfaction of the City Engineer, they shall be carefully tamped and brought to a smooth and even surface conforming to grade and crown. All joints shall be completely filled with Portland cement grout, as specified above under "Brick Pavement."

Measurement shall be the same as for other pavement.

Payment for brick alley crossings will be at the rate bid therefor per square yard as listed on the proposal, and will be in full for all labor and material in the completed work.

### STONE ALLEY CROSSINGS

Where shown on the plans or as directed by the City Engineer, stone alley crossings will be constructed according to the details of the standard plan for same.

Payment for stone alley crossings will be at the rate bid per square yard for same as listed on the proposal, and will be in full for all materials and labor furnished in the completed work.

### WOODEN STOPS

Where shown on the plans or as directed by the City Engineer, wooden stops shall be placed along the edge of the pavement where the same is not otherwise protected. Said wooden stops shall consist of a continuous sound fir timber eight (8) inches by eight (8) inches, solidly bedded in concrete as shown by drawings, on which shall be spiked a continuous plank three (3) inches by twelve (12) inches, as shown. For Alley Pavement a three-inch by 6-inch piece shall be spiked to a four-inch by four-inch. After the setting of the concrete, the earth surrounding such stops shall be properly surfaced and tamped to the level of the general surface.

Payment.—Wooden stops will be paid for per linear foot as listed on the proposal, and the price bid must include the cost of all materials and labor necessary to construct the same in accordance with the plans and specifications and to the satisfaction of the City Engineer.

### MONUMENT CASES

Where directed by the City Engineer, the contractor shall furnish and set cast iron monument cases. They shall conform to the details

## PAVING—Continued

### MONUMENT CASES

shown on the plans, and to the general requirements of the City of Seattle for cast iron pipe, as specified under Water Main Construction. In setting monument cases care should be taken that they are so set that there will be no sump left in the surface of the pavement.

Payment.—Monument cases will be paid for at the rate bid for the same as listed on the proposal; such payment to be in full for furnishing and placing in position, including all material and labor necessary therefor.

### OLD LUMBER RELAI

Adjusting Cross Streets.—The surface of all connecting streets, roadways or walks, which by reason of this improvement fails to conform to the general surface of the finished improvement, shall be made to conform to such finished surface by filling with suitable material or by excavating, as the same may require, and all planking shall be neatly brought to grade and adjusted so as to form a continuous surface, to the satisfaction of the City Engineer. Such adjacent streets as may be designated by the City Engineer shall be planked with the lumber taken from the existing planking, curbs, gutters and crosswalks, and piled as directed under "Clearing and Grubbing."

Payment.—This work will be paid for at the rate bid for "Relaying Old Lumber," per M. feet, B.M., as listed on the proposal, and shall be in full for all labor and materials furnished in the completed work.

### COAL FOR STEAM ROLLER

As directed by the City Engineer, the contractor shall furnish coal of a good quality for steam generating purposes for the operation of the city's steam roller if the same is used on this improvement.

Payment for same shall be at the rate bid per cwt. as listed on the proposal.

### REBUILDING CATCH BASINS

Where shown on the plan or as directed by the City Engineer, the existing catch basins shall be rebuilt in the positions shown. The contractor shall use such old material as may be directed, and shall furnish all new material required, including all standard connections and making all necessary excavation.

Payment for "Rebuilding Catch Basins" will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### MOVING CATCH BASINS

Where shown on the plan or as directed by the City Engineer the existing catch basins shall be moved to the position shown. The contractor shall furnish all material and make the necessary standard connections and do all required excavating.

Payment for "Moving Catch Basins" will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

### MOVING INLETS

Where shown on the plans or as directed by the City Engineer, existing inlets shall be moved to the new positions. The contractor to furnish all new material required and to reset such inlets in the manner as specified for new work.



## PAVING—Continued

### MOVING INLETS

Payment for moving inlets will be at the rate bid for each as listed on the proposal. Such payment shall be in full for all labor and material furnished in the completed work.

### ADJUSTING INLETS

Where shown on the plan or as directed by the City Engineer existing inlets shall be adjusted to the proper elevation. The contractor to furnish all new material required and to reset such inlets in the manner as specified for new work.

Payment for adjusting inlets will be at the rate bid for each as listed on the proposal, and shall be in full for all material and labor furnished in the completed work.

### ADJUST- MENT OF MANHOLE, CATCH BASIN, ETC., COVERS

Where shown on the plan or as directed by the City Engineer, manhole, catch basin or similar covers shall be adjusted to the proper grade in the manner as specified for setting covers in the new work. In setting manhole, catch basin, flush tank, gate chamber or similar covers, care should be taken that they are set to the grade and contour of the street in which they are placed, and that the pavement is brought up flush with said covers, especially in asphalt pavement.

Payment for adjusting catch basin, manhole, etc., covers shall be at the rate bid for each as listed on the proposal, and shall be in full for all labor and material furnished in the completed work.

### CAST IRON VALVE BOXES ADJUSTED

Shall be adjusted to the proper grade as directed by the City Engineer.

Payment for same will be at the rate bid therefor as listed on the proposal, and will be in full for all labor and material in the completed work.

**Opening of Streets for Use.**—Whenever in the judgment of the City Engineer a sufficient length of roadway has been completed, the final sand covering shall be spread over the pavement, the approaches to connecting streets and alleys shall be made as hereinbefore specified, and such portion of the improvement shall be opened for free use by the public, but in no case shall such opening be considered as an acceptance of such portion or portions of the improvement by the City of Seattle, and such portion or portions of the improvement shall be subject to the full conditions as to maintenance and acceptance as herein set forth.

**Maintenance.**—No bids for asphalt pavement will be received unless accompanied by a separate bid for maintenance of said pavement for a period of five (5) years. Such bid for maintenance to be made in accordance with the special specifications prepared therefor.

## PLANKING

### CLEARING AND GRUBBING

In this contract, the term "Clearing and Grubbing" shall be construed to include the removal from the district to be improved of all old planks, stringers, logs, rock or other improper material. Any old lumber, which in the judgment of the Engineer shall be of use in any portion of the improvement, shall be carefully piled where directed and guarded by the contractor until used. Any old lumber not thus set aside for this improvement, which in the judgment of the Superintendent of Streets shall be deemed of use to the Street Department of the City of Seattle, shall be set aside by the contractor and removed by said department. All old lumber not used in the improvement or removed by the Street Department as aforesaid, shall be destroyed or otherwise disposed of by the contractor. No old lumber or debris of any kind will be allowed to be dumped into the bay or deposited upon any streets or alleys, or upon any private property except by written consent of the owner of the same.

**Payment.**—Payment for clearing and grubbing will be made at the lump sum bid for same as listed on the proposal, which shall include all of this class of work throughout the district to be improved.

### SUB- GRADING

Under this head is included all the excavation or embankment necessary to bring the portion of roadway required to be planked to the necessary sub-grade, also such excavation or embankment as may be necessary for approaches or to make the proper grade upon which to construct any sidewalks included in the contract. The contractor will be required to find his own borrow pits for all earth required to be furnished in excess of the excavation within the limits of the improvement. No objectionable earth will be allowed used.

**Payment** for sub-grading shall be included in price bid for lumber per M. feet, B.M., in the completed work.

### PLANKING OR REPLANK- ING

The various portions of the district indicated on the plan or as directed by the City Engineer shall be planked with fir planking, cut to length as shown on detail of the plan. The planks or pieces shall be sized on one side and of dimensions shown on the plan, except as hereinafter specified or shown on the plan at certain points where pieces of varying widths will be required. The lumber for planking shall be of uniform thickness, and shall be laid with that side of the lumber cut nearest the heart of the tree downward; provided that in case pieces with approximately square sections are specified instead of planks, such pieces

## PLANKING—Continued

### PLANKING OR REPLANK- ING

shall be "vertical grain"; where planks are specified, each plank shall be nailed to the stringer with wire nails of sufficient length to give at least four (4") inches penetration into the stringer, arranged two (2) nails over the stringers at the ends of each plank, and one nail at the end of each intervening stringer, "staggered"; where square pieces are used for planking each piece shall be "toe nailed" at every stringer with one wire nail of sufficient size, as designated by the City Engineer.

The stringers shall be of the sizes and spaced as indicated on the plan. They shall be solidly bedded in the prepared sub-grade so that their upper surface is uniformly the thickness of the planking below the grade prescribed for the finished surface except where otherwise specially directed by the Engineer. The earth must be thoroughly tamped under and around all stringers. In case of muddy or springy sub-grade the contractor shall furnish and lay suitable material such as cinders, to secure dry tamping.

Such curb and gutter-boards as are shown on the plan, with all necessary blocking and spiking, shall be furnished and laid, and the planking shaped and fitted to the same or to any existing curb or gutter, as shown on the plan.

At certain points in the district shown on plan where corners are to be turned or planking fitted to curves of the street railway portion, the planking shall be laid as ordered by the City Engineer by the process known as "fanning."

Measurements for planking or replanking shall be taken on the slope. No allowance whatever will be made for the curvature of cross section.

Payment for planking or replanking shall be for lumber per M. feet, B.M., as listed on the proposal, and shall be in full for all labor and materials in the completed work.

## BRIDGES

### PILING

The contractor shall furnish, drive and cap all piles necessary to be driven to sustain the roadway, in accordance with detail plans or as directed by the City Engineer.

Bents shall be driven fifteen (15) feet six (6) inches between centers, and the position of each bent shall be located by the City Engineer.

Each pile shall be driven true and plumb at the point indicated. All piles must be of yellow fir, winter cut, straight and sound in every particular, free from large knots or other imperfections. They shall not be less than nine (9) inches nor more than fourteen (14) inches in diameter at the smaller end, nor less than fourteen (14) inches at cut-off. All dimensions to be measured under the bark. They shall tape uniformly from end to end. There will not be allowed any second growth piles to be used in this improvement.

They must be driven until they will not penetrate more than two (2) inches under a fifteen

## PLANKING—Continued

### PILING

(15) foot fall of thirty-five hundred (3500) pound hammer, and under no condition shall a pile have less than four-foot penetration. They shall be cut off at an elevation given by the City Engineer, said cut-off being on a true line to give the caps a firm bearing. The tops of all piles shall be neatly chamfered so as not to project beyond the edge of the caps. All points of contact between timbers, such as tops of piles and posts and bearings of caps on piles, and all stringers and caps, shall be thoroughly coated on both faces with Carbonlineum Avenarius, or some other equally efficient preparation approved by the City Engineer.

Payment will be made for piling at the rate bid per linear foot as listed on the proposal of pile in completed structure, measurement to be made from point of cut-off, which shall include the furnishing, driving and cutting off of same as above specified. No payment will be allowed whatever for the pile above the cut-off.

### BRIDGE LUMBER

**Sub-Structure.**—Caps shall be ten (10) inches by twelve (12) inches, and shall be placed upon piles in such manner as to give a true line to the ends thereof. Caps on pile bents shall be drift-bolted to each pile with drift bolts three-quarters ( $\frac{3}{4}$ ) inch by twenty-two (22) inches, driven one to each cap at each pile. They shall be countersunk at least one (1") inch and the hole filled with hot pitch or asphalt.

Stringers shall be furnished and laid on bents, erected as hereinafter specified, and of size and spaced as shown on plans. Each stringer shall not be less than thirty-two (32) feet in length, and they shall be laid upon caps so as to make lap joints alternating upon succeeding caps, except the outer stringers, which shall have butt joints. All stringers shall be toe-nailed to the caps with forty (40) penny wire nails, two to each cap.

The bridge shall be planked with fir planks, five (5) inches by twelve (12) inches, sized on one side and laid close. Each plank shall be nailed to the stringers with nine (9) inch wire nails, arranged two (2) nails in the stringer at the end of each plank and one nail at each intervening stringer, staggered.

**Sidewalk** to be constructed as hereinbefore specified.

Payment will be made for superstructures, including caps, stringers, planking and sidewalk, at the rate bid for lumber per M. feet, B.M., in completed structure, and shall be in full for furnishing and placing in position all material and labor, including all nails, spikes and drift bolts in the completed structure.

**Posts.**—Where posts are to be used instead of piling they shall be of the dimensions and construction as shown on the plans.

Payment for same shall be per M. feet, B.M., in the completed structure, the same as the other portions of the structure, as specified above.

## PLANKING—Continued

### RAILING

Railing or fences shall be constructed where deemed necessary by the City Engineer, in conformity with plans furnished by him, and such railing or fences shall be built of dressed lumber of dimensions shown on drawings, or as directed by the City Engineer. The lumber used in the construction of said railings or fences shall, when in position, be painted with two coats of mineral paint mixed with linseed oil (and unless such railings or fences is specially classified on the bid blanks for this improvement as furnished by the City Engineer, such railings or fences shall be paid for at the rate of ten [10] cents per linear foot), and in any cases the price paid per linear foot of railings or fences shall include all material and labor, such as lumber, nails, spikes, excavating for posts, cutting, fitting and painting; all work to be done as directed and to the satisfaction of the City Engineer.

Payment for railing shall be per linear foot as listed on the proposal, and shall be in full for all labor and material in the completed work.

### ADJUSTING EXISTING PLANKING, ETC.

When shown on the plan or as ordered by the City Engineer, all adjustments necessary to existing cross-walks, planking, curbs and gutters, manhole and catch basin or similar covers, to make a neat and finished work shall be done by the contractor in a workmanlike manner.

Payment for adjusting existing planking, etc., shall be included in the rate bid for lumber per M. feet, B.M., as listed on the proposal, and will be in full for all labor and material in the completed work.

## MISCELLANEOUS ITEMS

### CONCRETE

When necessary to use concrete for sewer support, gate chambers or similar work, the same shall be used as directed by the City Engineer. It shall be a mixture composed of one (1) part Portland cement, three (3) parts sand and six (6) parts gravel. The materials used shall be of the same quality and mixed in the same manner as provided for under "Concrete Sidewalks."

Payment for concrete as above specified will be at the rate bid therefor per cubic yard as listed on the proposal, and will be in full for all labor and material in the completed work.

### EXTRA EXCAVA- TION

Any excavation not shown on the profiles, or specified above under Alignment and Grades (see Water Mains), or any excavating ordered by the City Engineer not covered otherwise by the specifications; or in case it is necessary to abandon any work necessitating excavation which was to have been paid in some other manner than by excavation, the amount of earth so removed will be computed and paid for at the rate bid therefor per cubic yard as listed on the proposal for extra excavation, and will be in full for all labor and material furnished on the same, including all back-filling, water settling, tamping, etc., necessary to make the same satisfactory to the City Engineer.

### LUMBER

Where shown on the plan or as directed by the City Engineer, lumber shall be used in this improvement. It shall be sound, live, yellow fir, free from loose, large or rotten knots, wind-shakes, pitch seams or other imperfections which may impair its strength or durability. No lumber shall be used which shows less than six annular rings of growth per inch. The City Engineer shall be the sole judge of the amount of sap which may be allowed. All dressed lumber shall not exceed or vary more than one-fourth ( $\frac{1}{4}$ ) of an inch less than the specified dimension, and all rough lumber shall not vary more than one-eighth ( $\frac{1}{8}$ ) of an inch from the specified dimension. All lumber to be used under these specifications shall be measured by "Pacific Coast standard dimensions," domestic list 5, dated January, 1909. Where otherwise acceptable, "Eastern Size" lumber as specified by "Standard Classification Grading and Dressing Rules" of the Associated Bureau of Grades, of date of May 1, 1910, may be used, but the price to be allowed for the same will be reduced in the same ratio that "Eastern" size differ from "Pacific Coast" size, in each case assuming the piece to be dressed one side and one edge, and shall meet the re-

## MISCELLANEOUS ITEMS—Continued

**LUMBER**      requirements as specified in this paragraph unless more particularly specified elsewhere.

Payment for lumber will be at the rate bid therefor as listed on the proposal, and will be in full for all material and labor in the completed work.

## GENERAL STRUCTURES

All structures not described herein shall be constructed in accordance with plans to be furnished by the City Engineer, or as directed by him, and all materials and labor therein will be paid for only as classified on the proposal for this improvement, which can be obtained at the office of the City Engineer.

## PLANS AND SUPERINTENDENCE

General plans for this improvement, showing the location and the method of construction of the several parts thereof and the character and dimensions of the materials to be used therein, will be furnished by the City Engineer, and such plans are hereby made a part of these specifications and will be strictly enforced. During the progress of the work the City Engineer may furnish additional plans and may make such alterations of the original plans as he may deem necessary, and the contractor shall, upon receiving notice of such additional plans or alterations, obtain a copy of the same and cause the work to be prosecuted in conformity with such plans and to the satisfaction of the City Engineer. This improvement shall be made under the superintendence of the City Engineer, and any orders or directions given by him or his duly appointed representative shall be respected and immediately and strictly obeyed by the contractor or any overseer in charge of the work. It is hereby understood that wherever the term of Engineer or City Engineer is mentioned in these specifications it shall mean himself or any representative duly appointed by him.

## GENERAL STIPULATIONS

It will be further expressly agreed between the parties to the contract for this improvement that the contract is made subject to the following conditions and stipulations:

**First.** The contractor is required to furnish all necessary labor and materials, and to fully complete the said work in accordance with the plans and specifications, and to the satisfaction of the City Engineer, for the prices bid. Bidders must examine and judge for themselves as to the location of the proposed work, the nature of the excavation to be made, and the work to be done. It is understood that the whole of the work to be performed under the contract for this improvement is to be done at the contractor's risk, and he is to assume the responsibility and risk of all damages to the work or to property on the line of said work which may be occasioned by floods, backwater, caving of the street, settling of the foundation of buildings, or for any cause whatever. The contractor shall not assign or transfer the contract for this improvement or sublet any of the work embraced in it, without the written consent of the Board of Public Works.

**Second.** The contractor shall commence the work at such points as the City Engineer may direct, and shall conform to his directions as to the order of time in which the different parts of the work shall be done.

**Third.** Whenever the contractor is not present on the work, orders will be given to the superintendent or overseer who may have immediate charge thereof, and shall by them be received and strictly obeyed. And if any person employed on the work shall refuse or neglect to obey the directions of the City Engineer or Board of Public Works in anything relating to the work, or shall appear to be incompetent, disorderly or unfaithful, he shall, upon the requisition of the engineer, be at once discharged, and not again employed upon any part of the work.

**Fourth.** The contractor will be required to observe all City Ordinances in relation to obstructing streets, keeping open passage ways and protecting the same where exposed, maintaining signals, and generally to obey all laws and ordinances controlling or limiting those engaged on the works, and the said contractor expressly stipulates and agrees to erect and maintain good and sufficient guards, barricades and signals at all unsafe places at or near where the said work and improvement contemplated herein is to be done or made, and to indemnify and save harmless The City of Seattle from all suits and actions, of every name and description, brought against the said City for, or on account of, any injuries or damages received or sustained by any party or parties, by reason of the failure of said contractor to erect or maintain such guards, barricades, or signals, or by or in consequence of any negligence of said contractor or his or their agents or employes, in carrying on said work, or by or on account of any act or omission of said contractor in the performance of said work; and it is agreed by the contractor that so much of the money which shall be due to him or them under and by virtue of the contract for this improvement as shall be considered necessary by the Board of Public Works, may be retained by The City of Seattle until all suits or claims for



#### GENERAL STIPULATIONS—Continued

damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of said Board, in addition to the percentage reserved as otherwise herein provided.

**Fifth.** To prevent all disputes and litigation it is further agreed by the contractor that the City Engineer shall in all cases determine the amount of work to be paid for under the contract for this improvement, and his estimates and decisions shall be final and conclusive, subject to the approval of the Board of Public Works.

**Sixth.** The City Engineer or Board of Public Works shall have the right to make changes in the location, construction, form, dimensions, grades and alignments, Y's, manholes, catch basins, ducts, cables, and other connections and constructions, and make any variations in the quantity of the work to be done, as exhibited in the schedule of prices or bid for said work, and to entirely exclude any of the items of work relating to said quantities at any time, either before the commencement of the work, or during the progress, without thereby altering or invalidating any the prices herein named; should such action diminish the amount of work that would otherwise be done, no claim shall be made for damages on the ground of loss of anticipated profits on work so dispensed with; and should such action be taken after the commencement of any particular piece of work, and result thereby in extra cost to the contractor, the City Engineer shall estimate the amount to be allowed therefor, which he shall consider fair and equitable, and his decision shall be final and conclusive.

**Seventh.** The contractor shall not be allowed to dig up or occupy with material any more of the street than there is absolute necessity for in the prosecution of the work, and of such necessity the City Engineer shall be the sole judge.

**Eighth.** The contractor shall give forty-eight hours' notice, in writing, when he shall require the services of the Engineer for laying out any portion of the work. He shall dig all stake holes necessary to give grades. He shall furnish and keep on the work, at all times, a spirit-level and straight-edge, of such form and size as directed by the Engineer. He shall furnish all lumber for stakes, under direction of the Engineer, and shall carefully preserve all stakes when set; and in case any of them have to be replaced by the Engineer, the contractor shall be charged the expense thereof, and the same be deducted from his estimates.

**Ninth.** The contractor shall not disturb any monuments or stakes found on the line of the improvement until ordered by the Engineer. A penalty of twenty-five dollars will be imposed for each monument disturbed without orders, and the amount deducted from the estimates.

**Tenth.** The contractor shall provide for the flow of all water courses, sewers or drains, intercepted during the progress of the work, and replace the same in as good condition as he found them, or shall make such final provisions for them into the sewer, or otherwise, as the Engineer shall direct. The use of any portion of the sewers shall not be construed as the acceptance of them by the Board of Public Works.

**Eleventh.** The contractor shall support, by timbers or otherwise, all water pipes, conduits, poles, wires or other apparatus owned by The City of Seattle which may in any way be affected by the work, and do everything necessary to support and sustain the same, over, along or across said street. In case any of said water pipes, wires, poles or apparatus shall be damaged, they shall be repaired by the authorities having control of the same, and the expense of such repair shall be deducted from the amount due the contractor on his final estimate.

#### GENERAL STIPULATIONS—Continued

**Twelfth.** It is further specially agreed that if at any time the City Engineer is of the opinion that the work is unnecessarily delayed, and will not be finished within the prescribed time, he shall notify the contractor, in writing, to that effect. And if the said contractor shall not, within five days thereafter, take such measures as will, in the judgment of said Engineer, insure the satisfactory completion of the work, the Board of Public Works may then notify the said contractor to discontinue all work under the contract for this improvement; and it is hereby agreed that the said contractor shall immediately respect such notice and stop work and cease to have any rights to the possession of the grounds. The Board of Public Works may thereupon employ such force as they may deem advisable to complete the work, and charge the expense of all labor and materials necessary for such completion to the said contractor; and the expense so charged shall be deducted and paid by The City of Seattle out of such moneys as may be then due, or may afterward become due, to the said contractor under and by virtue of the contract for this improvement, and in case such expense is less than the sum which would have been payable under such contract if the same had been fulfilled by the said contractor, then said contractor shall be entitled to receive the difference; and in case such expense is greater the said contractor shall pay to the City the amount of such excess so due. And if the said contractor shall assign the contract for this improvement or abandon the work thereon, or shall neglect or refuse to comply with the instructions of the City Engineer relative thereto, or shall in any manner fail to comply with any of the specifications or stipulations herein contained, or with the requirements of the Charter, or Ordinances of the City, the Board of Public Works shall have the right to annul and cancel said contract, and to relet the work or any part thereof, and such annulment shall not entitle the said contractor to any claim for damages on account thereof, nor shall it affect the right of the City to recover damages which may arise from such failure.

**Thirteenth.** No claim for any extras under this contract will be considered by the Board of Public Works or City Engineer unless the same shall have been submitted previous to the final acceptance of the work and the passage of the final estimate.

**Fourteenth.** In case any extra work is required for which a price has not been included in the contract for this improvement, the same shall not be begun until a price therefor shall have been agreed upon, in writing, by the contractor and the City Engineer. If, for any reason, the said extra work cannot be performed at an agreed price, it will be paid for at the actual cost of all labor and material required, together with ten per cent. additional.

**Fifteenth.** The City of Seattle reserves the right to construct any sewer or sewers, or to lay any water mains, or to grant permits to the interested parties to lay gas mains, steam pipes, conduits, etc., or to build up and adjust or construct any manholes, lamp-poles or catch basins, or to reset or renew any frames or covers for manholes, lamp-poles, catch basins, water or gas stop-cocks or gates or to grant permits for private connections with sewer, water or gas pipes, at any time prior to the completion of the foundation for the paving material covering over the line of the same in any parts of this improvement, and the contractor shall not interfere with or place any impediment in the way of any person or persons who may be engaged in doing such work as has been mentioned, and the Board of Public Works reserves the right of suspending the work on any part of this improvement at any time during the construction of the same for the purpose above stated. In any such case the contractor shall not be entitled

## GENERAL STIPULATIONS—Continued

to any damages, either for the digging up of the street or for the delay, but he shall be allowed and paid for any material or labor made necessary on his part, such reasonable sum (to be determined at contract rates) as may be agreed upon between him and the City Engineer, and the time specified for the completion of his contract shall be extended as many days as he was thus delayed.

**Sixteenth.** The said contractor agrees to pay the wages of all persons and for assistance of every kind employed upon or about said work, and for all materials purchased therefor, and The City of Seattle may withhold any and all payments under this contract until satisfied that such wages, assistance and materials have been fully paid for.

**Seventeenth.** The contract for this improvement shall take effect and be in force only upon its approval by the Board of Public Works of The City of Seattle, and shall be assigned only with the written consent of said Board, endorsed thereon, and no assignment that shall be made shall release the contractor therefor, or his or their sureties, from any liabilities arising under said contract.

**Eighteenth.** And it is further agreed that said work shall be performed in workdays of not more than eight hours each, except in cases of extraordinary emergency; and that this contract may be canceled by the Board of Public Works in case such work is not performed in accordance with the provisions of this contract above specified, and no case of extraordinary emergency shall be construed to exist in any case where other labor can be found to take the place of labor which has already been employed for eight hours in any calendar day.

**Nineteenth.** The material excavated from trenches shall be laid compactly on the sides of the trench and kept trimmed up so as to be of as little inconvenience as possible to the traveling public and to adjoining tenants.

**Twentieth.** The contractor shall not obstruct the gutter of any street, but shall use all proper measures to provide for the free passage of surface water along the gutters.

**Twenty-first.** The contractor shall keep the trenches free from water during the progress of the work, as no pipe or masonry shall be laid in the water.

**Twenty-second.** The contractor shall, at his own expense, shore up, protect and make good, as may be necessary, all buildings, walls, fences or other property injured, or liable to be injured, during the progress of the work; and the contractor will be held responsible for all damage which may happen to neighboring property or the street, from neglect of this precaution, or from any other cause connected with the prosecution of the work.

**Twenty-third.** All fees, or royalties for any patented invention, article or arrangement, that may be used upon, or be in any manner connected with the work, or any part thereof, connected with these specifications, shall be included in the price mentioned in the proposals, and the contractor shall protect and hold harmless the City against any and all demands for such fees or royalties, and before the final payment is made on the contract the contractor must furnish acceptable proof of proper and satisfactory release from all such claims.

**Twenty-fourth.** The City Water Department will charge the contractor for city water used in settling earth at the rate of one dollar and forty cents (\$1.40) for every one hundred (100) cubic yards of material water-settled.

**Twenty-fifth.** Where there now exists a pipe leading from a sand box or catch basin to the main sewer, said pipe shall, if in the proper location, be connected and used as the outlet

## GENERAL STIPULATIONS—Continued

pipe for a new basin and a deduction of thirty (30) cents per foot made from the price bid for catch basins for each and every foot of existing outlet pipe used in connection with the new catch basins.

**Twenty-sixth.** The contractor shall have charge of, and be responsible for, the entire line of sewers for whose construction he has contracted until their completion and acceptance. He shall also be liable for any defects which may appear on his work before the final payment specified herein.

**Twenty-seventh.** The Board of Public Works reserves the right of suspending the work at any point and any time should said work interfere with other improvements. In any such case the contractor shall not be entitled to any damages, but the time specified for the completion of his contract shall be extended as many days as he was thus delayed.

**Twenty-eighth.** The contractor shall do whatever is necessary to keep in position and protect from injury all water pipes, lamp-posts, service pipes, and all other fixtures that may be met with in carrying on the work.

**Twenty-ninth.** In case any of the said water pipe or other fixtures be damaged, they may be repaired by the parties having control of the same, and the expense of such repairs shall be deducted from the amounts which may become due the contractor.

**Thirtieth.** It is agreed that if the contractor for this improvement or The City of Seattle shall be unable to complete any portion or portions thereof by reason of court proceedings enjoining the construction or completion of any portion or portions thereof, it shall in the discretion of the City Engineer be impracticable to construct or complete any other portion or portions thereof, then, and in any such case, the contractor shall waive any and all claim or claims for damages by reason of such inability to construct such portion or portions of said improvement, and the City Engineer shall have the right to report such improvement as completed, file his final estimate thereon as provided for in the full completion of other local improvements in The City of Seattle, and such contractor shall agree to accept in full payment of such improvement, and as a cancellation of his contract therefor a sum of money for his labor performed, and materials furnished in strict accordance with his bid for such contract, on the basis of the work actually performed or materials and labor actually furnished in said work to the date of stopping thereof. Should the court proceedings allow the work to be resumed prior to the issuance of the notice of completion on said work by the City Engineer, then the contractor on being ordered by the City Engineer shall proceed with the work immediately, carrying out the contract in full according to all original intents or modifications of the court, as the case may be, at the prices as specified in the original contract, and no extra payment will be allowed said contractor for change in price of material or labor or for any other reason whatsoever. Whatever time elapses after the contractor has been ordered to stop on the work and his being ordered to proceed again will not be considered as a part of the time allowed on the contract.

**Thirty-first.** Contractors shall not pile material on any pavement without first covering the pavement with planks or in a manner satisfactory to the City Engineer. All material shall be compactly placed.

**Thirty-second.** The plan of the improvement and these standard specifications, together with the proposal and such special specifications as may be attached thereto, shall form the complete specifications for this improvement, and shall be considered as a whole. The special specifications accom-

## GENERAL STIPULATIONS—Continued

panying the proposal are intended to modify, and shall take precedence over the standard specifications. The standard specifications are sub-divided under the following heads: Original Grading, Resurfacing and Sidewalks, Sewers, Water Mains, Paving, Planking, and Miscellaneous Items. Any item which appears under different subheads shall be construed and applied under the subhead corresponding to the improvement being made, provided that when two or more classes of work are done under one improvement at the same locality, then each corresponding specification may in turn be applied.

**Thirty-third.** The City Engineer shall be the sole judge of the suitability of all materials entering into the construction of this improvement.

**Thirty-fourth.** All materials shall be subject to inspection by the Engineer or his inspector, who will select samples in such numbers and quantities as he may deem necessary and subject the same to such tests as may be necessary to determine their qualities as herein specified, and he will accept or reject the materials in accordance with the results of such trials. Such tests may be repeated upon the arrival of different shipments, as frequently as may be necessary to insure the acceptance of only such materials as shall comply with the provisions of the plans and specifications to the satisfaction of the City Engineer. All materials rejected by the City Engineer or his inspector shall be removed from the premises and adjacent surroundings by the contractor within twenty-four (24) hours after he has been notified of their rejection. If this condition is not implicitly complied with, the City Engineer reserves the right of causing such rejected materials to be removed by other parties, the cost of such removal to be deducted from any money then due or which may become due to the contractor.

**Thirty-fifth.** All materials necessary for the construction of this improvement must be of good quality, and all labor must be first class.

**Thirty-sixth.** Wherever the words "force account" are used in these specifications, they shall be taken to mean actual cost of work plus ten (10) per cent.

**Thirty-seventh.** Wherever the words "City Engineer" are used herein, it shall be and is understood to refer to the City Engineer of The City of Seattle, and to his duly appointed assistants or inspectors, limited by the particular duties entrusted to them.

## STANDARD SPECIFICATIONS

For the improvement of E. Pike St. from  
Millrose Ave. to Broadway  
by widening pavement

as provided by Ordinance No. 25595, creating Local Improvement District No. 2290.

Examined and Approved by the Board of Public Works:

July 19-10  
R. W. Thompson Chairman  
Attest: C. B. Bagley Secretary

Contractor

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File No.

*Vault*

# The City of Seattle

Department of Public Works

## CONTRACT

for the improvement of

*E. Pike St*

from

*Melrose*

to

*Broadway*

by

*widening pavement*

with

*Oliver & Hull*

Imp't authorized by Ord. No.

*23595*

Local Improvement District No.

*2290*

Filed

191

City Comptroller

By

Deputy