

Warrant - 1916

CITY OF SEATTLE
DEPARTMENT OF PUBLIC WORKS

1916

Specifications and Contract

FOR A

Highway Bridge

To be constructed on Eastlake Avenue produced
over the Lake Washington Canal

PAYMENT BY WARRANTS
REDEEMABLE IN CASH

A. H. DIMOCK, M. A. S. C. E., City Engineer
F. A. RAPP, Structural Engineer



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FOREWORD.

These specifications and accompanying plans for the construction of a bascule bridge and approaches over the Lake Washington Canal at Eastlake Avenue produced, were prepared by the City Engineer's Department of the City of Seattle and were presented to the Board of Public Works at a session held December 31st, 1915; they were ordered referred to a committee composed of the Superintendent of Water, Superintendent of Public Utilities and Superintendent of Streets for examination and report. At a session of the Board of Public Works held January 7th, 1916, the specifications and plans were approved.

The official advertisement was ordered to be printed in the official paper, beginning January 26th, 1916, and running for thirty days thereafter.

NOTICE TO CONTRACTORS.

LAKE WASHINGTON CANAL BRIDGE.

Notice is hereby given that sealed proposals will be received by the undersigned secretary of the Board of Public Works of the City of Seattle up to 10 o'clock A. M., Friday, March 3, 1916, for the construction of a steel bascule bridge and appurtenant works.

No proposal will be considered except as same is made strictly in conformity with the advertisement therefor and upon the forms of proposals furnished by the Board of Public Works, bound together with the specifications, general clauses and form of contract, which must be submitted unbroken and unaltered in every particular.

The work to be performed will include the construction of the concrete substructure with steel superstructure, operating machinery and electric equipment of a bascule bridge at Eastlake Avenue produced over the Lake Washington Canal.

Each bid must be accompanied by money, a satisfactory surety bond approved by the Mayor and City Comptroller of the City of Seattle, or a certified check payable to the order of the City Comptroller of the City of Seattle for a sum not less than five per cent (5%) of the amount of the bid.

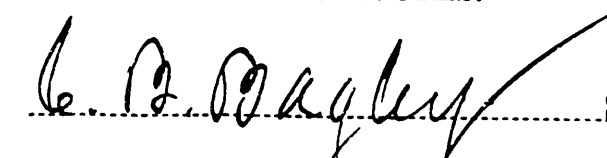
A charge of five (\$5.00) dollars will be made for each set of plans and specifications, to cover cost of printing and mailing, and will not be returned.

Special attention of bidders is called to the state law and city charter regarding the number of hours constituting a day's work, and the minimum wage scale.

The Board of Public Works reserves the right to reject any or all bids.

Proposals must be endorsed on envelope "Bid for Construction of Lake Washington Canal Bridge" "Proposition No.," the blank to be filled out with the number or numbers of the propositions contained in the bid.

By order of the Board of Public Works.

 Secretary.

Date of first publication, January 26, 1916.

PROPOSALS.**1. General.**

Sealed proposals endorsed with the title of the work and the name of the bidder will be received by the Board of Public Works of the City of Seattle at its office in the City Hall until 10 o'clock A. M., March 3, 1916, for furnishing, delivering and building in place all temporary work and for furnishing and delivering all material, tools, labor and all appliances, and appurtenances required in the performance of all necessary operations for the complete construction and erection of a highway bridge at Eastlake Avenue produced over the Lake Washington Canal, as well as for the removal of all obstructions found on the bridge site which might otherwise interfere with the construction of the bridge, according to the accompanying plans and the following specifications and such additional plans and instructions as may be furnished from time to time. The said Board will proceed without unnecessary delay to award the contract to the lowest and best bidder with adequate security. The Board reserves the right to reject any or all bids.

2. Method of Awarding Contract.

Proposals may be made for the construction of all propositions of the bridge as one contract, or for such of the propositions as may be desired. If the contractor desires to bid on all propositions of the bridge as one contract, he must fill out the proposal sheet with the items for all propositions assembled. If he desires to bid on any of the propositions separately he must fill out the proposal sheets for such proposition or propositions.

Permission will not be given for the withdrawal, modification or explanation of any bid or proposal.

3. Bidders to Examine Site.

Bidders are notified to examine thoroughly the site of the proposed work, on which a bid is submitted, these specifications, the plans, the form of proposals and form of contract therefor as to the accuracy of the given quantities and as to the nature of the proposed work and to the conditions under which it shall be performed, and it is to be understood that the contractor shall not have any claim for additional work on account of any misunderstanding as to the quantities of the work or the conditions under which it shall be done. If there be any doubt or obscurity as to the meaning of any part of the same, before making their proposals, intending bidders should ask the City Engineer for an explanation.

4. Bidders in Default.

The Board of Public Works is by the City Charter prohibited from entering into any contract for the doing of any work or labor, or the furnishing of any skill or material, with any person who, within two years prior thereto, shall have made default in the payment of any just claim for any work or labor performed, or for any skill or material furnished pursuant to any such contract with such party, or with any person who, within two years prior thereto, shall have assigned, abandoned, surrendered or failed to complete any such contract, except as herein authorized, or who shall have failed to comply with any of the provisions of the City Charter relating to public works.

5. Evidence of Competency.

Bidders must present evidence to the Board of Public Works, if required, that they are fully competent and have the necessary facilities and pecuniary resources to furnish and deliver the materials or supplies and to do the work as called for by these specifications in a satisfactory manner and in the time specified.

6. Nature and Intent.

The nature and intent of these specifications and drawings are to provide for the work herein enumerated to be fully completed in every detail for the purpose designed, and the contractor hereby agrees to furnish everything necessary for such construction, notwithstanding any omissions in the drawings or specifications.

7. Informal Bids.

Bidders are warned that all bids which are deficient in either of the following requirements will be rejected as informal:

(a) All bids for this construction must be made upon the printed blanks provided therefor by the Board of Public Works.

(b) No bid will be received if detached from the form of contract with which it is bound, nor must any of the accompanying papers be detached therefrom; but the entire package must be unbroken and in good order, and enclosed in a sealed envelope when the bid is deposited, and the successful bidder will be required to enter into the contract which is attached to his proposal for this construction.

(c) Bids must be made on every item noted on the blanks for proposals provided for this construction. The prices must be stated, both in words and figures, in the respective places provided for the same on said blanks.

(d) All bids shall be accompanied by a certified check payable to the order of the City Comptroller, or a surety bond, for a sum of not less than five (5%) per cent of the amount of the bid, and no bid shall be considered unless accompanied by such check or surety bond, and, if the contract be let, all checks or surety bonds shall be returned to the bidders, except that of the successful bidder, which shall be retained until a contract be entered into for making this construction between the bidder and the City, in accordance with such bid. If the said bidder fails to enter into such contract in accordance with his bid within ten (10) days from the date at which he is notified that he is the successful bidder, the said check and the amount thereof shall be forfeited to the City, or, if a surety bond accompanied the bid, the necessary legal steps will be taken by the City to recover an amount equal to five (5%) per cent of the amount of the bid. Before such contracts between the successful bidder and the City shall be valid or binding against the City of Seattle, the contractor shall enter into a joint and several bond with the City of Seattle, for the use of said City, and also for the use of all persons who may perform or cause to be performed any work or labor, or furnish or cause to be furnished, any skill, labor or materials in the execution of such contract, which bond shall be in the full amount of the contract price agreed to be paid for the performance of such contract.

GENERAL STIPULATIONS APPLYING TO ALL PROPOSITIONS.

8. Accompanying Plans Part of Specifications.

The accompanying plans shall form part of these specifications. Anything shown on plans and not specified, or specified and not shown, shall be executed as though it were both fully shown and specified.

9. Dimensions.

All dimensions must be taken from the figures on the plans and not by scaling the drawings.

10. Contractor to Check Plans.

The plans furnished by the City shall be carefully checked by the contractor before beginning work. Should

any errors be found in the plans, the attention of the City Engineer shall be called to such fact. Any work performed after discovery of such errors shall be done at the contractor's risk unless authorized. In case of discrepancy between plans and specifications, the plans shall be followed unless otherwise instructed by the City Engineer.

11. Changes of Plans.

The City Engineer or Board of Public Works shall have the right to make changes in the location, construction, form, dimensions, 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 of 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.

12. Changes Ordered in Writing.

No changes in either plans or specifications will be permitted under any circumstances, unless the same shall have been ordered in writing by the City Engineer. No claims on oral orders for any changes will be allowed.

Should the City Engineer desire to make any changes in plans at any time during the progress of the work, he will issue written orders, stipulating the remuneration in the event of increasing the amount of work to be done or the diminution of contract amount in the event of lessening the amount of labor and material to be furnished.

13. All Clauses to Apply to Changes.

All clauses in the specifications and contract shall apply to any change, additions or deviations, in like manner, and to the same extent as to the works at present projected; and no changes, additions, or deviations shall annul or invalidate either the contract or the bond.

14. Claim for Extras.

No claim for any extras under this contract will be considered by the Board of Public Works or City Engineer un-

less the same shall have been submitted previous to the final acceptance of the work and the passage of the final estimate. In case any extra work is required for which a price has not been included in the contract for this construction, 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 superintendence, labor and material required, together with twelve (12) per cent additional for labor and material, which shall include payments under workmen's liability law.

15. Quantities Furnished to Bidders.

Any quantities given or assumed are approximate only, and are given merely for the purpose of canvassing bids, the City of Seattle assuming no responsibility for the correctness of the same. Should the quantities called for by the plans be increased or diminished, only the actual quantities furnished in the finished structure shall be paid for at the prices stated in the bid.

16. Contractor's Responsibilities.

The contractor is required to furnish all necessary labor and materials, and to fully complete the 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 construction 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 have charge of and be responsible for the entire contract until its completion and acceptance. He shall also be liable for any defects which may appear on his work before the final payment specified herein. The fact that an inspector was always present during the progress of any construction does not relieve the contractor from responsibility for any defects discovered after the completion of the work.

17. Quality of Materials and Workmanship.

Any material necessary for the construction of any part of the work not specified herein shall be of good quality. All

workmen employed shall be skilled in the performance of the special work to which they are assigned.

18.—Assignment of Contract.

The contract for this construction shall take effect and be in force only upon the approval of the contractor's bond by the Mayor and the City Comptroller, and shall be assigned only with the written consent of the Board of Public Works, endorsed thereon. No assignment that may be made shall release the contractor therefor, or his sureties, from any liabilities arising under said contract.

19. Instructions to Contractor.

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. 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.

20. Other Contractors' Work.

Each contractor will be required to perform his work in the proper sequence in relation to other work, as may be directed by the City Engineer, and properly join his work to existing or new construction.

21. Hours of Labor.

And it is further agreed that work done in this state shall be performed in work days 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.

22. Rates of Wages.

The contractor shall pay, or cause to be paid to his employees within the State of Washington on the work herein specified, not less than the current rate of wages paid by the

City of Seattle for work of like character, and in any event, not less than Two and Seventy-five Hundredths Dollars (\$2.75) per day. The contractor on the work herein specified shall give preference in this city to citizens of the United States who are heads of families.

23. City Ordinances and State Laws.

All work shall be done in accordance with the City ordinances and state laws. The contractor shall take out and pay for all permits required by the City. He shall pay for all water used on the work at the current rates. He shall not draw water from any hydrant until the required permit is secured.

24. Removal of Debris.

At the completion of his work the contractor shall remove all boxing, false work, earth or other unsightly material accumulated and caused by his operations, and shall leave the site in as good condition as it was before beginning work.

25. Payment of Wages.

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.

26. Engineers—When Wanted.

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 new lumber for stakes, all under direction of the Engineer, and shall carefully preserve all stakes when set. In case any stakes have to be replaced by the Engineer, the contractor will be charged the expense thereof, and the same will be deducted from his estimate.

27. Contractor to Furnish Help.

The contractor shall furnish the City Engineer with such unskilled assistance as may be required to give the grades and lines necessary while the bridge is in course of erection.

28. Protection During Work.

The contractor will be required to observe all City Ordinances in relation to obstructing streets, keeping open passageways and protecting the same where exposed, maintaining signals, and to obey all laws and ordinances controlling or limiting those engaged on the works. The said contractor expressly stipulates and agrees to erect and maintain good and sufficient guards, barricades and signals at all unsafe places on the works and to indemnify and save harmless the City of Seattle from all suits and actions, of every name and description brought against the 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 employees, 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 under and by virtue of the contract for this construction 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 damages as aforesaid shall have been settled, and evidence to that effect is furnished to the satisfaction of said Board of Public Works in addition to the percentage reserved as otherwise herein provided.

29. Damage to Existing Improvements.

All damage done to existing improvements during the progress of the work on this bridge 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 the various items used. 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 construction. No payment will be made for this work.

30. Protection of Private Property.

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, or any improvements whatsoever, from neglect of this precaution, or from any other cause connected with the prosecution of the work.

31. Forfeiture of Contract.

It is further especially 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 (5) days thereafter, take such measures as will, in the judgment of the said City 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 construction; 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 construction, 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.

If the said contractor shall assign the contract for this bridge, 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 rights of the City to recover damages which may arise from such failure.

32. Patents.

All fees for any patented invention, article or arrangement that may be used upon or in any manner connected with any part of the work as called for by these specifications, shall be included in the price as bid, and the contractor further agrees to indemnify and save harmless the City of Seattle and defend any claims, suits and actions at law that may be brought against the City on account of any patented invention, article or arrangement that may be used by the contractor in connection with any part of the work to be done by virtue of these specifications. This clause shall not include any patents granted for the type of movable bridge shown on the accompanying plans.

33. Injunctions.

It is agreed that if the contractor for this construction, 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 and 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 work, and the City Engineer shall have the right to report such work as completed, file his final estimate thereon as provided for in the full completion of local improvements in the City of Seattle, and such contractor shall agree to accept in full payment of such work, 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.

34. Inspection.

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.

35. Final Acceptance.

Any material or workmanship which does not satisfy the requirements of these specifications may be rejected by the City Engineer at any time before the final acceptance of the work, and the contractor shall make good all deficiencies at his own cost. The fact that authorized inspectors have accepted said material or workmanship shall not make the City of Seattle liable for additional cost above that specified in the contract for replacing the same with material and workmanship acceptable to the City Engineer on final acceptance.

36. Extension of Time.

The contractor shall not be entitled to any claim for damages for any hindrance or delay from any cause whatever, in the progress of the work or any portion thereof; but such hindrance may entitle said contractor to an extension of time for completing this contract sufficient to compensate for the detention, the same to be determined by the City Engineer, provided the City Engineer shall have immediate notice, in writing, of the cause of detention and shall consider such cause sufficient. No payments other than the final payment

will be allowed after the expiration of the contract time or after the expiration of such additions to the contract time as may be allowed in accordance with the conditions stated above.

37. Decision of Questions.

The right is hereby reserved to the City Engineer to finally decide all questions arising as to the proper performance of said work and the amount of work to be paid for under the contract, and in case of non-compliance with the contract, in any manner, the City Engineer may suspend said work at any time. He may also adjust the difference of damages or price, if any, which the contractor, failing to properly do such work, in such case of default, should pay to the City according to the just and reasonable interpretation of said contract. In all such matters the decision of the City Engineer shall be final and conclusive between the parties hereto.

38. Meaning of Terms.

Whenever the words "City Engineer" are used herein, it shall be, and it 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. Whenever the words "City" and "Board of Public Works" are used herein, they shall be, and are, understood to refer to the corporation of the City of Seattle, of which the Board of Public Works is its duly authorized agent. Whenever the word "Contractor" is used herein, it shall be, and is, understood to refer to the party or parties contracting to do any of the work described herein, furnish materials therefor, or the legal representatives of such party or parties.

QUALITY OF MATERIALS.

39. Lumber.

All lumber shall be Douglas fir, practically free from sap, shall have been cut from live trees, sawed true, with square straight edges, shall be out of wind, full size and shall be free from wind shakes, pitch seams, large or loose knots, decayed wood, worm holes, wane and other defects impairing its strength or durability.

40. Inspection.

All lumber delivered shall be subject to inspection by an authorized representative of the City Engineer. When any

lumber is rejected, the contractor must immediately remove the same from the site of the structure. The City Engineer shall be the sole judge of the amount of sap which may be allowed. All dressed lumber, except as otherwise specified, shall not exceed or vary more than one-fourth ($\frac{1}{4}$) of an inch less than the specified dimensions for each side surfaced, and all rough lumber shall not vary more than $\frac{1}{4}$ inch from specified dimension.

41. Creosoted Lumber.

Lumber for creosoting shall be No. 1 Common Yellow fir, sized to exact dimensions and shall be sufficiently true and well seasoned to admit of proper treatment. This lumber shall be inspected before treatment.

42. Mixed Charges.

Seasoned, and green or freshly sawed material must not be mixed together and treated in same charge, and none should be treated which is not at the time free from rot, and in proper condition for use after treatment so far as splits or breaks are concerned; if any such is received from the mills it should not be treated unless the inspector directs it to be done.

43. Piling Charges.

Square timber must not be treated in the same charge with planking, nor ties with planking, and sufficient one (1) inch strips must be placed between each tier, with from one-half ($\frac{1}{2}$) to one (1) inch space left between each piece, so that the oil can have free access to all surfaces.

44. Level of Oil in Cylinder.

After the material is placed in the cylinder, it must be immersed in creosote oil of a temperature ranging between 160° and 170° F. and kept covered during the entire boiling or heating period under at least 4 inches of oil in the shallowest place; the engineer on duty must from time to time during the boiling, satisfy himself by bleeding the cylinder that such is the case.

45. Steam Regulation.

In the case of green, or freshly sawed material, steam must thereafter be regulated through the heating coils so that the temperature within the cylinder is kept gradually rising as fast as the condensation will permit until 202° F. is reached, with 215° F. as the maximum; after which the steam

pressure must only be such as to maintain a regular and constant temperature within the cylinder between these figures, until such time as the amount of condensation per cubic foot per hour collecting in the hot well of the condenser shows the interior of the wood to be thoroughly dry, when steam pressure in the coils should be released.

46. Temperature of Oil.

In the case of thoroughly seasoned material, the temperature of the oil in the cylinder must be allowed to rise slowly and steadily until 190° F. is reached, with 192° F. as the maximum; and kept between these figures until such time (dependent upon the dimensions), as the interior of the wood shall have become sufficiently warmed up to enable it to take the required amount of oil, when the steam pressure in the coils should be released.

47. Injection of Oil.

The cylinder should then (in each case) be filled up with creosote oil from the storage or working tank, of a temperature ranging between 160° and 170° F.; and pressure from the pump applied until the gauge shows 5 lbs. pressure in the cylinder, to insure the fact of the cylinder being actually full, after which the connection between storage tank and cylinder should be closed, and the connection between measuring tank and cylinder opened. Additional pressure must then be applied slowly and steadily until the material has taken the proper amount of oil, forced in under such conditions as will insure its complete retention in the wood after the drip is over, and figured at the weight of the dry oil per gallon at 165° F.; the cylinder doors may then be opened, provided the temperature within is below 200° F.

48. Rejects and Penetration.

After treatment, the material must be free from all heat checks, water bursts and other defects due to inferior treatment, which would impair usefulness or durability for the purposes intended. The penetration of black oil midway between the ends for a 10 lb. treatment should be at least $\frac{3}{4}$ of an inch deep on dimension timber, and on planking at least $\frac{1}{2}$ inch deep, with a correspondingly greater depth for an increased quantity of oil.

49. General Conditions.

All material shall be treated to the entire satisfaction of the inspector of the City of Seattle, he being allowed full

access at all times to the facilities used in the treatment while it is in progress; but the fact of an inspector being at the plant shall not relieve the Treating Company's officials from the responsibility of seeing that the treatment of all material is properly and carefully done, with the agreed penetration of oil in each case, based on the contract amount.

50. Tests.

Before the cylinder charge is disposed of, the depth and character of the penetration must be ascertained by boring one or more auger holes after the wood has cooled, in as many pieces of each class of material as may be necessary for the purpose; and such pieces as are not found to be fully treated in accordance herewith must be returned to the cylinder with a subsequent charge for further treatment without extra cost therefor; should more than 10% of the total number of pieces treated be found defective, the entire charge must be so returned. No material must be removed from the treating yard until all auger holes are tightly plugged with creosoted plugs.

51. Intent of Specifications.

The intent of these specifications is that the wood, when it comes out of the cylinder and after all drip is over, shall contain the full weight of oil to the cubic foot, forced in at such pressure and under such conditions as to enable the wood cells and fiber to retain it permanently; but as there is more or less rebound of oil out of the wood after pressure is released, a checking up of the oil on hand against the total contract absorption of the various charges shall be made each twenty-four hours, timber and piling being kept separately; and if any difference is found to exist, a coefficient shall be established and used until the next checking shows the necessity for a different one.

52. Gauges and Thermometers.

The pressure gauges and thermometers must be compared and tested at frequent intervals with standard test appliances kept on hand for that purpose, and all differences corrected.

53. Supervision and Handling.

Competent and experienced engineers shall be in charge of the treatment night and day, and required to make frequent examinations of the temperature during the boiling especially when a maximum heat is being applied; the ther-

mometers being located so that they will correctly record heat conditions within the cylinders, and at the same time be convenient to get at. In handling material after treatment, sharp dog or cant hooks must not be used in any way whereby the full protection of the treatment is likely to be lessened; where it may be necessary, as in the case of piling, they must be used within the spaces two feet from the large end and six feet from the point. Any material broken or otherwise damaged in treatment or by careless handling, while in the Treating Company's care until delivered to its destination as per contract, will be rejected and the Treating Company must submit new pieces therefor.

54. Quality of Oil.

The oil must be pure dead oil of coal tar without adulteration, with a specific gravity of 1.065 to 1.125 at a temperature of 60° Fahrenheit. It shall show upon distillation by the retort method:

0°-170° Centigrade	not more than 0.5%				
170°-210°	" " "	"	3.0%		
210°-235°	" " less "	1.0%	nor more than 15.0%		
235°-270°	" " "	10.0%	"	"	20.0%
270°-315°	" " "	20.0%	"	"	30.0%
315°-360°	" " "	20.0%			

Residue shall be soft and shall not be over 30% of the original sample.

55. Submission of Oil Sample.

Before the first treatment begins, the Treating Company must furnish a gallon sample of the oil proposed to be used hereunder, same to be sent to the City Chemist for analysis; and in case a different oil is thereafter used, a new sample must be sent as above for further examination.

56. Sand.

Sand shall be coarse, sharp and thoroughly washed until free from loam, clay, vegetable or earthy matter; all sand, except that used for mortar, shall pass a 1/4 inch screen and not more than thirty-five (35) per cent nor less than fifteen (15) per cent shall pass a No. 30 sieve. 1/4 inch screen shall be considered as 1/4 inch clear opening between wires. No. 30 sieve shall be considered as .021 inches clear opening between wires. All percentages to be determined by weight.

57. Gravel.

Gravel must be washed until free from all foreign matter except sand, and shall range uniformly in size from

$\frac{1}{4}$ inch to $1\frac{1}{2}$ inches in diameter. Gravel ranging uniformly from $\frac{1}{4}$ inch to 3 inches may be used where approved. Not more than two (2) per cent shall pass the $\frac{1}{4}$ inch screen. The $\frac{1}{4}$ inch screen shall be considered as $\frac{1}{4}$ inch clear opening between wires. The above sizes of gravel shall be understood to refer to the longest diameter.

58. Cinders.

Cinders shall be clean, hard clinker, free from sulphur and ranging from that which will pass through a ring $\frac{1}{4}$ inch in diameter to that which will pass through a ring $1\frac{1}{2}$ inch in diameter.

59. Cement.

The cement shall be a true Portland cement, dry and free from lumps or foreign material, and of a brand whose usage has proven it to possess the proper qualifications and uniformity for the work intended. It must be delivered on the work in original packages in good condition, properly labeled and showing where made.

60. Protection of Cement.

It must be protected from rain and dampness and delivered on the work in advance in such quantity as to afford the Engineer ample time and opportunity to conduct tests.

61. Volume of Bag.

A bag of cement shall contain ninety-four (94) pounds of cement net, a barrel consisting of four (4) bags will be considered as measuring three and one-half ($3\frac{1}{2}$) cubic feet.

62. Fineness.

Passing No. 200 sieve, not less than 85 per cent.

63. Set.

Initial set in not less than one (1) hour. Hard set in not less than two (2) hours or more than ten (10) hours.

64. Tensile Strength.

Briquettes made of one (1) part of cement and three (3) parts of Standard Ottawa Sand by weight, after one (1) day in moist air and six (6) days in clear water shall show a tensile strength of not less than 200 pounds per square inch and after one (1) day in moist air and twenty-seven (27) days' immersion, not less than 300 pounds per square inch.

65. Boiling Test.

Pats about three (3) inches by four (4) inches across by one-half ($\frac{1}{2}$) inch thick in the center and tapering to a thin

edge should be made upon a clean glass plate about four (4) inches square, from cement paste of normal consistency. This pat is exposed in any convenient way in an atmosphere of steam, above boiling water in a loosely closed vessel for five (5) hours and at the end of that time should remain firm and hard and show no signs of cracking, distortion or disintegration.

66. Additional Tests.

In addition to the tests above specified, all cement will be subject to such other tests as may be necessary to determine whether or not the cement possessed 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 any cement fail to make good concrete or mortar, its further use will be prohibited, regardless of the fact that it has satisfactorily withstood the tests hereinbefore specified.

67. Water used in mixing concrete shall be City water.

68. Relations Between Contractors.

If portions of the improvement for the bridge are let to separate contractors, each such contractor shall prosecute his work without interfering in any way with the work of such other contractors. The contractors for the substructure or superstructure shall not be allowed the use of the timber approaches, in case the same are completed prior to the work involved in the other contracts, for the transportation of heavy materials without the written permission of the City Engineer. They will, however, after the acceptance of the approaches by the city, be allowed to use the same for the transportation of workmen or light materials.

The City Engineer shall designate as between contractors at any time who shall have the right of way and shall notify the contractor having the right of way to proceed with dispatch and the other contractors to abstain from interference with such contractor.

The city shall not be liable to the contractor for delays, loss or damage accruing out of any other contractor.

69. Time of Completion.

In case the entire work of constructing the bridge is let to one contractor the time of beginning, the time of completion and rate of progress of construction of each portion shall be as specified for each independent proposition.

SPECIFICATIONS

FOR

TIMBER APPROACHES TO THE BRIDGE OVER THE LAKE WASHINGTON CANAL AT EASTLAKE AVENUE PRODUCED

PROPOSITION NO. 1

70. General Requirements.

The work contemplated under these specifications consists in furnishing all labor, material, tools and appliances for building a wooden trestle bridge and Howe truss spans, according to the accompanying plans [City Engineer's File Nos. Sheets and Nos. Sheets] and these specifications, including the necessary pile piers, false-work and clearing of the site of the work and removal of obstructions.

Also the installation of a complete fire protection system, including all piping, fixtures and fittings, frost protection, etc., complete in place and ready for operation, except that the contractor will not be required to make the connection to the City mains, but will be required to complete the piping to points designated on plans, and furnish fittings that may be designated at these points on the plans.

If so required in order to secure effective rolling of the surface of pavement, the upper curb timber, together with the sidewalk decking, shall be left off until the pavement is finished.

The contractor will not be required to furnish the rails, splice bars or bolts for street railway tracks, but will be required to furnish spikes and lay rails.

71. Materials of Construction—Lumber.

All timber entering into the construction of the truss portion, except roadway and sidewalk planking and roadway and sidewalk stringers and handrails, shall show not less than ninety per cent (90%) heart on each side and edge, measured anywhere in the length of the piece; shall be out of wind and free from shakes, splits or pitch pockets over one-eighth ($\frac{1}{8}$) inch wide or three (3) inches long. Knots shall not be over one and one-half ($1\frac{1}{2}$) inches in diameter nor closer together on each surface than one in any four linear feet, but if knots

are one (1) inch or less in diameter, one in any three linear feet will be allowed.

Stringers under electric railway tracks shall show not less than ninety per cent (90%) heart on each side and edge measured across the surface anywhere in the length of the piece; shall be out of wind and free from shakes, splits or pitch pockets over three-eighths ($\frac{3}{8}$) inch wide or five (5) inches long. Knots greater than two (2) inches in diameter will not be permitted within one-fourth ($\frac{1}{4}$) of the depth of the stringer from any corner nor upon the edge of any piece. Knots shall in no case exceed three (3) inches in diameter.

Caps, posts and sills shall show not less than eighty-five per cent (85%) heart on each of the four sides measured across the surface anywhere in the length of the piece; shall be out of wind and free from shakes, splits or pitch pockets over one-half ($\frac{1}{2}$) inch wide or five (5) inches long. Knots shall not exceed one-quarter ($\frac{1}{4}$) the width of the surface of the piece in which they occur and shall in no case exceed three (3) inches in diameter, nor shall they appear on the corner of any piece; knots in groups will not be allowed. The quantity of knots permitted shall be subject to the discretion of the City Engineer.

Longitudinal struts or girts, cross braces, sash and sway braces, shall show on one side all heart, the other side and two edges shall show not less than eight-five per cent (85%) heart measured across the surface anywhere in the length of the piece.

Roadway stringers and sidewalk stringers, sidewalk decking and handrails shall conform to specifications for stringers under electric railway tracks.

All other timber shall conform to specifications for caps, posts and sills.

72. Steel Rods, Plates and Structural Shapes.

Steel rods for trusses shall conform to the Standard Specifications of the American Society for Testing Materials for Billet Steel Concrete Reinforcements Bars, Serial Designation A15-14, with the following additions and exceptions: The rods shall be made by the open hearth process and shall conform in physical properties to the plain bar structural steel grade.

Bars with upset ends shall have the upsets made by upsetting the body of the bar. Absolutely no welds will be allowed. After upsetting and before threading all rods shall be properly annealed.

Threads shall be United States Standard and shall be full and smoothly cut. Nuts shall be of United States Standard dimensions of the same material as the rods and shall fit the threads so snugly that they can be screwed on by the hands with some difficulty.

Threads will be coated with white lead and tallow.

In shipping, care must be taken to protect the threads from injury.

No badly rusted or pitted bars will be accepted. Tests will be made on full sized specimens for bars up to one square inch in cross section. Tension test specimens for larger size bars may be machined to the shape and dimensions shown in paragraph 170, Fig. 2. Bend test specimens may be one inch by one-half inch in section.

Test specimens shall be cut cold from the upset end of the bar after the same has been annealed and shall fairly represent the material and treatment.

Plates and shapes shall conform to the requirements specified in paragraphs 163 to 183, inclusive, for the above material.

Inspection shall be as specified in paragraphs 186 to 188, inclusive.

73. Castings.

Castings shall conform to the American Society of Testing Materials Specifications for Gray Iron Castings, Serial Designation A48-05, with the following modifications and additions:

The tensile test shall be omitted.

The presence of sand or blow holes or defects of any kind that will injure the piece for the purpose intended or a variation in weight of any piece of more than two per cent under or five per cent over the weight calculated from the drawings shall be cause for rejection.

Finished castings must be handled by the foundry for complete inspection by the City Engineer's Inspector, and after acceptance, shall be wire brushed until clean and immediately coated with three coats of P. & B. paint or equal. Finished surfaces shall receive one coat of white lead and tallow.

74. Piles.

Piles shall be winter cut from sound yellow fir trees; shall be close grained and solid, free from defects such as injurious ring shakes, large and unsound or loose knots, de-

cay or other defects which may materially impair their strength or durability.

Piles must be butt cut above the ground swell and have a uniform taper from butt to tip. Short bends will not be allowed. A line drawn from the center of the butt to center of tip shall lie within the body of the pile.

All piles must be peeled soon after cutting. All knots shall be trimmed close to the body of the pile.

All piles shall be not less than nine (9) inches in diameter at the smaller end, for lengths up to thirty (30) feet, eight (8) inches for lengths from thirty (30) to fifty (50) feet, and seven (7) inches for lengths over fifty (50) feet. They shall not be more than fourteen (14) inches in diameter at the smaller end or less than fourteen (14) inches at cut-off. All dimensions will be measured under the bark.

Piles to be used without preservative treatment may show sap not to exceed a ring whose thickness is twenty (20) per cent of the radius of the pile at the large end and twenty-five (25) per cent of the radius at the small end. Piles shall show not less than an average across the butt section of six (6) rings per inch. The proportion of summer wood in any ring on the butt section shall not be less than one-third (1-3) the thickness of the ring.

All piles must be driven true and plumb at the points indicated, and until they will not penetrate more than an average of one (1) inch per blow for the last three (3) blows, under a fifteen (15) foot fall upon the solid unbroomed head of the piles, of a thirty-five hundred (3500) pound hammer, and under no condition shall a pile have less than eight (8) foot penetration. They shall be cut off at the elevations given by the City Engineer, cut-offs being on a true line in order to give the caps a firm bearing. The tops of all piles to 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, must be thoroughly coated on both faces with hot Carbolineum Avenarius, hot creosote or some other equally efficient preparation approved by the City Engineer.

Piles shall be driven with a hammer weighing not less than thirty-five hundred (3500) pounds and the height of fall shall be from twelve (12) to fifteen (15) feet. They shall have their butts protected by metal band or cushions or other means of preventing damage and shall be handled and driven in a manner that will ensure them against injury. Where the strata are of such a nature that driving is liable

to injure the piles they may be jetted with the permission of the City Engineer or his authorized representative.

75. Painting.

All exposed surfaces of woodwork and iron work of the truss portions except the upper surface of walks shall receive two coats of an approved brand of lead base paint of gray color costing not less than One Dollar and Fifty Cents (\$1.50) per gallon.

Payment for painting shall be included in the respective prices bid for lumber in place.

The portions excluded by the term "exposed surfaces" shall be the inside of the outside stringers, all sides of the intermediate stringers and underside of the deck.

On the other hand, all painted portions of the structure that lie close together after erection shall be painted as per specifications before being assembled. Included in this description are the leaves of the chords and posts and floor beams of the trusses.

All paint shall be delivered on the work in unbroken packages and the City Engineer or his authorized representative shall be furnished with satisfactory vouchers for all paint.

All cuts and daps and contacts of timber and timber, and timber and metal, abutting ends of pieces, etc., in all parts of the structure, truss portion and trestle shall receive a thorough coating of hot Carbolineum Avenarius or other approved creosote oil before being assembled.

76. Superstructure of Trestle Portion.

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

Caps shall be placed upon piles in such a manner as to give a true line to the ends thereof, and be drift-bolted to each pile with drift bolts three-quarters ($\frac{3}{4}$) inch by eighteen (18) inches, countersunk at least one (1) inch and the holes filled with hot pitch or asphalt.

Stringers shall be furnished and laid on bents, dimensioned and spaced as shown on plans. Each stringer must be at least thirty-two (32) feet in length and be laid upon caps so as to make lap joints alternating upon succeeding caps, except the outer stringers, which must have butt joints. All stringers must be toe-nailed to the caps with forty (40) penny wire nails, two to each cap.

Planking to be sized on one side and laid close. Each plank shall be nailed to the stringers with six (6) inch wire

nails, arranged two (2) nails in the stringer at the end of each plank and one nail at each intervening stringer, staggered.

Sidewalks to be constructed as shown on the plans.

The lumber used for railing shall be sized four sides and be painted with two coats of white lead as per specifications in Paragraph 75 hereof, and in all cases the price paid per thousand feet b. m. of railing 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.

77. Sprinkler System.

A sprinkler system consisting of $2\frac{1}{2}$ inch and 4 inch galvanized steel pipe is to be installed as shown on plans. The pipe shall conform to the standard specifications for galvanized iron pipe except that this pipe is to be galvanized steel instead of galvanized iron and shall have a weight of 5.74 pounds and 10.67 pounds per foot respectively.

Where shown on the plans, $2\frac{1}{2}$ inch Gate Valves of the automatic drip type are to be installed, equal and similar to those shown in Fig. 51, of Page 68 of the Ludlow Valve Manufacturing Company, catalogue of 1910.

Brass Hose Nipples and Caps together with chain and fastenings are to be installed as shown in the plans and on Page 364 of Crane Company's catalogue No. 40.

All Iron Fittings are to be galvanized, malleable, bead, screw fittings.

PAYMENT.

Payment for all work specified herein will be made at the respective rates bid for the items listed on the proposal, and such payment shall be in full compensation for all labor and material necessary or incidental to the completed work.

78. Lumber.

Payment will be made for the lumber in the completed structure only and will include all nails, spikes and drift-bolts, bolts and nuts, and washers in the trestle portion. In truss portion hardware will be paid for separately.

79. Steel.

Truss rods, turnbuckles, flat bearing plates, plate washers, steel channels, angle iron, built-up structural members, anchor bolts, nuts, bolts and nuts in truss portion, etc., shall be paid for at price bid per pound in place.

80. Cast Iron Castings, Etc.

All cast iron used in framing trusses, cast bed plates, drainage, inlets, etc., shall be included under this head and shall be paid for at price bid per pound in place.

81. Piling.

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

82. Galvanized Steel Down Spouts.

Galvanized steel down spouts shall be paid for per linear foot in place.

83. Steel Pipe.

Payment for 4 inch galvanized steel pipe will be per linear foot in place of 4 inch pipe only and will include all 2½ inch stand pipes, all fittings, fastenings, sawdust, boxing, all lumber and all labor and material complete in place except hose nipples and caps, gate valves and cast iron valve boxes.

84. Valves.

Payment of all gate valves will be complete in place.

85. Hose Nipples.

Payment of all hose nipples and caps will be complete in place per pair.

86. Valve Boxes.

Payment of all valve boxes will be complete in place.

87. Time Allowed for Completion.

The work embraced in the contract for this improvement shall be begun immediately after written notice so to do shall be given to the contractor by the City Engineer, and carried on regularly and uninterruptedly thereafter (unless the City Engineer or Board of Public Works shall otherwise, in writing, specially direct), with such force as to secure its completion prior to one hundred eighty (180) days after notice; the time of beginning, rate of progress and time of completion being essential conditions of the contract.

**SPECIFICATIONS FOR SUBSTRUCTURE.
PROPOSITION NO. 2.**

88. Specifications and Plans.

The substructure and appurtenant construction are shown on plans of the City Engineer's file No. 782-22, sheets F-1 to F-10, inclusive, and No. 782-22, sheets S-1, S-13, S-16, S-20 and S-21.

89. Description of the Work.

The substructure shall be built of concrete reinforced where indicated and shall consist of four units, two on each side of the axis of the waterway. Each unit shall consist of a footing course placed lengthwise of the bridge. Two shafts will be built on each footing, one at the channel end and one at the anchorage end. These shafts will be connected transversely and longitudinally of the bridge by concrete and steel girders and braces. A light curtain wall will be built on the outsides of the piers completely closing the space between the shafts.

It is intended that the footings shall rest upon a natural foundation of sand and gravel excavated in the bed of the channel.

90. Work Included.

The contractor will be required to furnish all materials, transportation, labor, tools and appliances required for:

- a. The excavation for the foundations.
- b. The construction and placing of all cofferdams, cribs or caissons required.
- c. The construction of all concrete work.
- d. Furnishing, bending and placing of all reinforcing steel.
- e. Placing of structural steel in anchor columns and girders mentioned in paragraph 116, together with grillages for same, structural steel in framework of machinery houses, and all anchor bolts required for connecting the structural steel work and machinery to the masonry.
- f. Furnishing and placing of bolts and fir timbers for attachments of bumping blocks at channel shafts.
- g. Constructing protection works.
- h. Furnishing and placing all cast iron manhole covers and angle iron rings, steel ladder rungs on trunion piers, steel ladders, vitrified pipe for cable openings, eye bolts for pole line anchorages, checkered plate in concrete sidewalk at break in floor, expanded metal under bearings, woven wire

gates and window guards and galvanized iron pipe hand-railings.

i. Furnishing, constructing and painting all wood partitions.

j. Furnishing and building all reinforced concrete partitions, and the reinforced concrete walls and roof of machinery houses.

k. Furnishing, placing and painting all doors and windows, hardware and wooden trim required and shown on plans to complete the operators' houses, towers, compartments below deck of bridge and machinery houses.

l. Furnishing and driving test piles.

m. All other labor and material necessary for the completion of the substructure in conformity with the plans and specifications, and for removing all existing structures or debris from the site of the work.

91. Payment.

Payment for the above will be made in the following manner:

a. For excavation: Per cubic yard of material removed from the area within the pier footing, sides to be considered vertical, which shall include the cost of all bracing, cofferdams, cribs or caissons.

b. For concrete of 1:2:4 mixture placed under water, which shall include all forms and bracing, per cubic yard.

c. For concrete of 1:3:5 mixture placed above water and below elevation 37.50, which shall include all forms and bracing, per cubic yard.

d. For concrete of 1:2:4 mixture placed above water and below elevation 55.5, which shall include all forms and bracing, per cubic yard.

e. For concrete of 1:2:4 mixture above elevation 55.5, which shall include all forms and bracing, per cubic yard. (Note: In this unit price must be absorbed the cost of all surface finish of sidewalks, floors, walls and roofs, and all special mixture parts, etc., of operators' houses. No extra compensation will be paid for any concrete work entering into the parts defined above.)

f. For all reinforcing steel in place, per pound.

g. For placing structural steel work, grillages and anchor bolts, per pound.

h. For furnishing and placing fir timbers for bumping blocks including bolts, a lump sum for each.

i. Constructing protection works, per lineal foot of piles below cutoff and per thousand feet board measure for timber remaining in the structure, which shall include all hardware.

j. For furnishing and placing chains on dolphins, including fastenings, per lineal foot.

k. For surface treatment of exterior of operators' houses and towers, per square foot.

l. For test piles, lump sum each.

m. For furnishing and placing cast iron manhole covers and angle iron rings, lump sum per set.

n. For furnishing and placing steel ladder rungs on trunion piers, lump sum per rung.

o. For furnishing and placing steel ladders, lump sum.

p. For furnishing and placing vitrified pipe for cable openings, per lineal foot.

q. For furnishing and placing eye bolts for pole line anchorages, lump sum each.

r. For furnishing and placing checkered plates in concrete sidewalks, lump sum each.

s. For furnishing and placing expanded metal under bearings, per square foot.

t. For furnishing and placing woven wire gates and window guards, per square foot.

u. For furnishing and placing galvanized iron pipe handrailings, per lineal foot of railing.

v. For furnishing, constructing and painting all wood partitions, lump sum.

w. Furnishing and building all reinforced concrete partitions, including reinforcement and surface finish, per square yard.

x. For furnishing, placing and painting all doors and windows, hardware and wooden trim required and shown on plans to complete the operators' houses, towers, compartments below deck of bridge and machinery houses, lump sum.

y. For furnishing and building the walls and roof of the machinery houses, including reinforcement and surface finish, per square yard of gross exterior surface; no deduction will be made for doors or windows.

92. Materials.

See general stipulations governing all propositions.

93. Storage of Cement.

The contractor shall provide a suitable building at the site of the bridge and in a location approved by the City Engineer to have a capacity for the storage of a sufficient

quantity of cement to enable samples to be taken at least twelve (12) days before the cement is used, and no cement will, under any circumstances be allowed to be used until such tests have been made. If the 7-day test shows the cement to be inferior, the cement may be held until the results of the 28-day test are obtained. The storage of cement shall be such as to thoroughly protect it from weather until used. All lumpy, dirty, or damaged cement shall be rejected; also all damaged or short-weight packages. The contractor will at once remove from the premises any cement that has been rejected.

Each car load or consignment of cement shall be stored by itself so that convenient access can be had thereto for sampling, counting of packages or removal. Cement in bags shall not be piled to a height exceeding seven (7) feet. Suitable accurate scales shall be provided by the contractor for weighing the cement in the storehouse.

The contractor shall notify the City Engineer when deliveries are to be made, a sufficient time in advance to allow the Engineer to have a representative present to sample the cement, and unless this is done, or if additional tests are necessary, the contractor shall rehandle the cement in the storehouse for the purpose of obtaining samples as directed.

The contractor shall employ competent storekeepers who can speak and understand the English language, who shall have charge of the cement storehouses and keep suitable records of the delivery and use of all cement. Copies of these records shall be furnished the Engineer at the close of each day's work, showing in such detail as he may reasonably require, the quantity of cement used during the day at each part of the work.

94. Bumping Block.

Shall be good, sound Douglas Fir, straight grained, and at least as good as the grade known as Select Fir Bridge Stringers.

95. Reinforcing Steel, Etc.

Reinforcing steel shall conform to the American Society of Testing Materials Specifications for Billet-Steel Concrete Reinforcement Bars—Serial Designation A15-14, page 98 of the 1915 Year Book of the Society. Structural steel grade deformed bars shall be used.

96. Excavation and Foundation.

The term excavation shall be assumed to cover all construction, machinery, work and labor necessary to complete

the excavation of the foundation area to the required elevation.

The contractor may use any means and methods that seem to him to accomplish this in the best manner provided he can show to the satisfaction of the City Engineer that the method he proposes to employ will lead to the desired result.

In order to receive the approval of the City Engineer it must be entirely practicable to do the work by the proposed method in such a manner:

(a) That the excavation can be done properly to the required depth and level.

(b) That the material under the piers below the foundation level will not be disturbed by excessive flow of water or otherwise.

(c) That the fresh concrete deposited shall not be exposed to currents of water that may wash out the cement.

(d) That concrete can be deposited continuously to elevation minus sixteen (—16).

(e) That if it should be found necessary by reason of the nature of the material in the foundation, or other causes, to change the foundation level of all or part of the foundation area, it should be practicable to do so without incurring any change in plan or excessive additional cost.

The excavation shall be carried down to the proper grade and level and shall be done in such a manner that material below the grade shall not be disturbed. The contractor shall upon completion of the substructure, remove all such parts of the temporary construction as may project into the clearance lines of the channel. The parts of temporary construction left in place shall be cut off at least one foot below extreme low water. No timber or bracing shall be left in cofferdams or cribs or forms in such a way as to extend into the concrete of the substructure, without the written consent of the City Engineer.

The price paid for excavation includes back-filling around the completed piers with the excavated material in such amount and in such manner as directed by the City Engineer. Any excavated material not used for such purpose shall be removed and disposed of by the contractor without direct payment therefor. The price paid for excavation also includes the removal and cutting off of temporary construction as specified above.

97. Foundation.

Referring to the previous paragraph on this subject, while the contractor shall submit to the City Engineer for approval

the details of the structures and appliances of his foundation plant, it shall be fully understood that such approval does not relieve the contractor from any responsibility in connection with this part of the substructure construction, but that all of the foundation work is entirely at his own risk and liability.

The borings made by the City on the foundation site of the bridge have been made with great care and the information obtained from them in regard to class, stratification and location of the different materials within the foundation area, and which is shown on the plan, is believed to be correct. The City shall not be held responsible in any manner if the actual conditions should be found different from what these borings indicated as shown on the plan.

98. Prosecuting the Work.

In order to shorten the time of construction as much as possible, the contractor will be required to prosecute the work on both sides of the channel as nearly simultaneously as practicable. The only exception that is contemplated in this requirement is in case it would involve the duplication of expensive pieces of equipment.

99. Test Piles.

The contractor shall, if required by the City Engineer, drive one or more test piles in each foundation when the excavation has reached elevation minus 32, or thereabout. The length of such test piles shall not be less than thirty (30) feet and shall preferably be driven with a steam hammer. If this is not practicable, a hammer weighing not less than thirty-eight hundred (3800) pounds shall be used. They shall be driven to refusal, which means an average penetration of not more than one-half ($\frac{1}{2}$) inch per blow for the last five (5) blows of a 3800 or 4000 pound hammer falling freely from a height of from thirteen (13) to fifteen (15) feet upon the solid unbroomed head of the pile. If a steam hammer is used the average penetration shall be 0.15 inch per blow for the last twenty (20) blows.

The leads of the pile driver shall be long enough to reach close to the bottom of the excavation and shall be held in position by stiff braces to insure firm support for the pile during driving.

These test piles shall be immediately removed by the contractor if so ordered by the City Engineer.

The price to be paid for furnishing, driving and pulling test piles, shall be a lump sum for each pile. It is to be

understood that the test piles if pulled shall become the property of the contractor, and if ordered by the City Engineer to be left in place, they become the property of the City without any additional cost to or above the lump sum bid for each test pile.

100. Concrete Work.

All masonry shall be of concrete properly reinforced where indicated and constructed so as to conform accurately to the lines, centers, elevations and dimensions shown on plans.

101. Proportions of Concrete.

Concrete placed under water shall be designated Class A concrete and shall be composed of one part Portland cement, two parts sand and four parts gravel.

Concrete in copings, beams, thin walls and columns which are usually classed as reinforced concrete and bearing areas under and around bearing plates, machinery frames and grillages, shall be designated Class B concrete and shall be composed of one part Portland cement, two parts sand and four parts gravel.

Concrete in the other parts of the structure, and in general the portions placed above water having large sections even though reinforced with steel bars, shall be designated Class C concrete and shall be composed of one part Portland cement, three parts sand and five parts gravel.

In case footings are put in with foundations unwatered Class C concrete will be used in place of Class A.

See notes on plans for more specific segregation of the various classes of concrete.

102. Measurement.

The method of measurement of the proportions of the various ingredients, including the water, shall be used which will secure uniform and accurate measurements at all times. The unit of measure shall be the cubic foot. A barrel containing not less than three hundred seventy-six (376) pounds net shall be assumed as three and five-tenths (3.5) cubic feet of cement. Fine and coarse aggregates shall be measured separately as loosely thrown into the measuring receptacle.

103. Portland Cement Mortar.

When Portland cement mortar is used for beds, joints, grouting and pointing, it shall be mixed in the proportion of one (1) part of cement to two (2) parts of sand.

104. Mixing of Concrete.

The mixing of the materials shall be done by a batch mixing machine of a type approved by the City Engineer. Each batch shall be mixed at **least 3 minutes** after all the materials are placed in the machine. Sufficient water shall be added so that the concrete shall be of a consistency required by the City Engineer.

Concrete, after the addition of water to the mix, shall be handled rapidly from the place of mixing to the place of final deposit, and under no circumstances shall concrete be used that has partially set before final placing. It shall be deposited in such a manner as will permit the most thorough compacting, such as can be obtained by working with a straight spade or slicing tool kept moving up and down until all the ingredients have settled in their proper place by gravity and the surplus water forced to the surface. The upper surface of all concrete while being placed shall be kept as nearly horizontal as practicable; it shall be thoroughly spaded at the surface of the forms in order to secure a smooth mortar surface.

105. Construction Joints.

When continuous work is interrupted, keys formed by embedding timbers or boxes in the concrete and such dowels or reinforcement as may be required by the City Engineer, shall be placed as directed. Concrete previously placed shall be roughened, thoroughly cleansed of foreign material and laitance, drenched and slushed with a mortar consisting of one part Portland cement and not more than two parts sand in order to make a good bond. The joints in beams, columns, etc., shall be located as shown on the plans, but when not shown thereon they shall be so located as to have the least effect upon the strength of the structure. The faces of concrete exposed to premature drying shall be kept wet or covered for a period of at least seven (7) days.

Any reinforcement or dowels furnished and placed by the contractor on account of the requirements in this paragraph, shall be paid for at the unit price bid for concrete reinforcement. The cost of making keys as required above shall be absorbed in the price bid for concrete.

106. Surface Finish.

The exposed surface of all masonry shall be uniformly even, free from open or rough spaces, exposed stone, depressions or projections above the surface. Top surfaces of bridge seats shall generally be struck with a straight edge

or floated after the coarse aggregates have been forced below the surface. The surface finish shall be spade, grout, rubbed, or tooled as indicated on the plans, but when not so indicated the contractor shall make a spade finish. A spade finish shall be obtained by forcing a flat blade spade vertically down between the concrete and the form and then pulling the top of the spade away from the form. Grout finish shall be made by applying to the surface previously spaded a wash of neat Portland cement grout mixed to the consistency of thick cream and applied with a whitewash brush or old broom. Rubbed finish shall be made on a spaded finish by rubbing the surface with a soft brick or block of wood while the concrete is still green. Care should be taken to use plenty of water either by dipping the brick or block into a pail or by throwing water on the wall with a brush or broom. Tooled finish shall be made on a previously spaded surface by cutting into the body of the concrete with a pointed tool or bush hammer. If after the removal of the forms, the spaded surface of concrete has depressions or holes, they shall be filled with one to two (1:2) cement mortar. If the surface is bulged, uneven, ununiform in color, or shows form joints, the contractor shall tool the surface to the evenness required by the specifications and shall then give the entire surface either a grout or tooled finish as directed by the Engineer in order to correct bad workmanship. The finish of ornamental work such as copings, etc., shall be finer than the balance of the work and shall preferably be either rubbed or tooled.

107. Long Columns, Etc.

Concrete in long columns or in deep, narrow walls, shall be placed through a tremie.

108. Concrete Placed Under Water.

All concrete deposited under water shall be placed by means of a water-tight tremie, unless otherwise permitted in writing by the City Engineer. The City Engineer's instructions as to placing concrete by tremie shall be strictly followed.

109. Continuity of Operation in Placing Concrete.

Whenever the City Engineer shall so direct, the contractor shall so conduct his work that the placing of concrete for any integral part of the structure shall be continuous and without any interruption whatsoever from start to finish. The contractor shall not begin to place concrete for any

integral portion of the construction until he shall have on the site of the work adequate materials which have been inspected and accepted to construct the said portion of the work without interruption.

110. Steel Reinforcement.

Steel reinforcement shall be placed in exact positions shown on the plans and held securely in place during the moulding of the concrete. All abrupt bends shall be avoided except where one steel member is bent around another. Vertical stirrups shall always pass around the main tension members or be thoroughly attached thereto. The minimum distance from the surface of the concrete to the steel shall be three (3) diameters unless otherwise stated on the plans. Reinforcement shall be of open hearth steel to meet the requirements of Paragraph 95 of these specifications, and shall be free from dirt, oil, paint, grease, mill scale or loose rust before concrete is deposited. All reinforcing bars shall be bent cold, to the dimensions and forms shown on the drawings, before they are placed in position. The bends shall be accurately made in a bending machine.

111. Forms.

Forms shall be well built, substantial and unyielding, properly braced or tied together by means of wire or rods, shall conform to the desired dimensions and contours of the concrete and shall be so constructed as to prevent the leakage of mortar. For all exposed surfaces the material used shall be two inch dressed shiplap or tongue and groove material, sound and free from loose knots, secured to the studding or uprights. For surfaces below extreme low water undressed lumber may be used. Where corners of the masonry and other projections liable to injury occur, suitable mouldings shall be placed in the angles of the forms to round or bevel them off. Planking once used in the forms shall be cleaned before using again. The forms must not be removed until the concrete has properly set, and until authorized by the City Engineer. In dry weather the forms shall be oiled before the concrete is placed against them. Forms for columns shall be removed before the shores are taken from beneath beams and girders. Forms on sides of beams and girders shall be splayed slightly in order that they may be more readily removed. Projecting wires and bolts or other devices used for holding the forms and which pass through the concrete, shall be cut off at least one (1) inch beneath the surface finish and the ends covered with cement mortar of

the same mix as used in the body of the work, and the contractor shall either rub or tool these surfaces to secure the desired result, if found necessary, without additional compensation.

112. Anchor Bolts, Grillages, Etc.

Anchor bolts, grillages, etc., which are to be built up in the masonry during construction, unless otherwise provided, shall be furnished by the contractor for the superstructure and placed by the contractor for substructure at exact location and elevation called for on the plans. They shall be free from oil, dirt, paint, grease, mill scale or loose rust.

113. Pipe, Conduits, Etc.

Pipes, conduits, etc., which are to be encased in concrete work, shall be furnished and placed by the contractor for the superstructure unless otherwise specified, but openings shall be left where necessary.

114. Position of Piers.

All piers, pedestals, and abutments, when finished, must be in exact position and to exact elevation, and all anchor bolts therein must be located with the greatest exactness in respect to both horizontal position and elevation. The contractor must provide all guide piles, anchors, cables, frames and forms that may be required to ensure this result.

It is distinctly understood by the contractor that the responsibility of getting all piers into correct position, both horizontally and vertically, lies with the contractor. The City Engineer will furnish such lines and grades as may be required.

115. Fenders.

Fenders shall be constructed in accordance with the plans. The piles shall be sound Douglas fir butt cut above the ground swell, from sound live trees when the sap is down, close grained and solid, and free from injurious ring shakes, large, unsound or loose knots or other defects which may materially affect their strength or durability. They shall have a uniform taper from butt to tip, be free from short bends, and a line drawn from the center of the butt to the center of the tip shall lie wholly within the body of the pile. They shall be peeled soon after cutting and all knots trimmed close to the body of the pile. Unless otherwise indicated, the minimum diameter at the tip shall be nine (9) inches for lengths up to thirty (30) feet, eight (8) inches for lengths

over thirty (30) feet, but not exceeding fifty (50) feet, and seven (7) inches for lengths over fifty (50) feet. The minimum diameter at one-quarter ($\frac{1}{4}$) length from the butt shall be twelve (12) inches, and the maximum diameter at the butt eighteen (18) inches. Piles shall be driven to good refusal. Framed lumber shall be of sound Douglas fir sawed to actual size specified within one-quarter ($\frac{1}{4}$) inch, be full length, square cornered and straight, close grained and free from defects such as injurious ring shakes, unsound or loose knots, knots in groups, decay or other defects which will materially impair its strength. Plank shall show at least eighty-five per cent (85%) heart on the girth anywhere in the length of the piece; provided, however, that if the maximum amount of sap is shown on either narrow face, the average depth of sap shall not exceed one-half ($\frac{1}{2}$) inch. Knots greater than one and one-half ($1\frac{1}{2}$) inches in diameter will not be permitted at any section within four (4) inches of the edges of the piece, but knots shall in no case exceed four (4) inches in their largest diameter. Caps and girts shall show not less than eighty-five per cent (85%) heart on each of the four sides, measured across the sides anywhere in the length of the piece; to be free from knots over two and one-half ($2\frac{1}{2}$) inches in diameter.

116. Steel Work to Be Erected by the Contractor.

The contractor shall unload from the cars or scows and transfer to the bridge site and erect in place all necessary structural steel and iron work in anchor columns, and main cross girders and appurtenant parts to be furnished by the contractor for the superstructure and shown on Drawing Nos. S4 and 5, 14, 15, and 16, and M 3. The price bid for this work shall be per pound of such steel or iron work erected in place, and the contractor shall unload, transfer to bridge site and erect in place all additional steel or iron work as may be deemed necessary for the complete building of this substructure at the same unit price.

117. Setting of Anchor Columns, Etc.

After the structural steel parts are set in place, they shall be thoroughly cleaned from rust and other foreign substances. The concrete around this steel work shall be thoroughly compacted by ramming, so that the concrete gets into perfect contact with the steel and that all possible crevices are thoroughly and completely filled.

All columns, bolsters, anchorage details, etc., shall be set on a bed or layer of cement grout. These layers of grout

shall be about one (1) inch thick, level on top and at the exact elevation marked on the drawings. They must be allowed to set hard before the metal work shall be erected.

The setting of all columns, girders, bolsters, anchor-bolts and other parts which serve as supports for or connect to the superstructure shall be set with the utmost care and accuracy and to the entire satisfaction of the City Engineer, and in no case shall concrete be placed around such parts before they are firmly held in place by proper temporary bracing, and before the accuracy of the setting has been checked and approved by the City Engineer or his duly authorized representative.

118. Painting.

All parts of the structural steel, particularly also all anchor rods and threads of such rods, not imbedded in concrete, shall, after erection, be painted with two (2) coats of paint as specified in paragraph 225.

119. Operators' and Machinery Houses.

There shall be four (4) operators' and two (2) machinery houses located as shown on plans. The contractor shall furnish and erect everything necessary to make operators' houses complete and ready for use. All labor and material used in the operators' houses, etc., shall be the best quality of its kind. All woodwork shall have a priming coat immediately after erecting and two (2) finishing coats of an approved color and brand of lead and linseed oil paint, costing not less than \$1.50 per gallon in barrel lots. The windows shall be fitted with the best quality of spring roller window shades of an approved color. All hardware shall be of the best quality to be selected by the City Engineer. Four (4) keys shall be furnished with all locks.

120. Begin Work: Time Allowed for Completion.

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. Work embraced in the contract for this construction is not to be commenced or material furnished until written notice has been given to the contractor by the City Engineer that the contract has been signed and accepted by the City of Seattle.

The work embraced in the contract for this construction shall be begun immediately after written notice so to do shall have been given to the contractor by the City Engineer, and

carried on regularly and uninterruptedly thereafter (unless the City Engineer or Board of Public Works shall otherwise, in writing, specially direct) with such force as to secure its completion prior to three hundred (300) days after notice: the time of beginning, rate of progress and time of completion being essential conditions of said contract.

SPECIFICATIONS FOR THE SUPERSTRUCTURE PROPOSITION NO. 3

121. Specifications and Plans.

The plans for the Eastlake Avenue bridge are contained in City Engineer's file No. 782-22, sheets S-1 to S-22 inclusive for the structural features, and 782-23, sheets M-1 to M-15 inclusive for the machinery and electrical requirements, and 782-22, sheets F-1 to F-3 for toilet rooms and bumping blocks, etc.

122. General Description.

The structure which will be of riveted construction throughout is to be a double leaf bascule bridge and will carry traffic across the Lake Washington Canal at Eastlake Avenue produced. It will have a roadway between trusses, forty (40) feet in width between guardrails and two sidewalks each six (6) feet in width outside the trusses. The center part of the roadway will carry two lines of street car tracks.

Each leaf will be raised and lowered by two electric motors geared to a pinion engaging a rack attached to each truss. When in lowered position and open for traffic the two leaves will be locked together. All control of the bridge will be automatic, and the operations of withdrawing the center lock pin, and raising the leaves will be interlocked. The roadway shall be protected by electrically operated safety gates when the bridge is in open position.

Each leaf shall be equipped to control separately and in addition both leaves shall be controlled from the south side of the canal.

123. Requirements.

The contractor will be required to furnish all labor, material, transportation and tools to manufacture, erect and paint in complete condition for travel and operation, the superstructure of the bridge including:

1. All structural steel work for the movable and fixed parts of the bridge.

2. The counterweights of concrete.
3. The roadway and sidewalk floor and pavement.
4. All the mechanical and electrical machinery and equipment required and specified for the operation and safeguarding of the bridge.
5. Toilet room fixtures, soil pipes, vent pipe and water connections for two toilet rooms.
6. All anchor bolts for connections of structural steel and machinery to masonry and where same are not set by contractor for the substructure, the contractor shall set them in place.

124. Payments.

The contractor will be paid for the work as follows:

- A. For all machinery work furnished and installed complete a price per pound.
- B. For all structural steel work a price per pound erected in place.
- C. Concrete for counterweights in place a price per cubic yard.
- D. Roadway floor and sidewalk floor,
 1. Roadway floor on movable section of bridge.
 2. Roadway floor on fixed section of bridge.
 3. Sidewalk floor on movable section of bridge.
- E. All electrical equipment furnished and installed in place a lump sum price.
- F. Toilet room fixtures a lump sum price erected.
- G. Roadway gates, a lump sum price.
- H. Meneely Fog Bell, a lump sum price.
- I. Copper ball vessel signals, a lump sum each.

CLASSIFICATION.

125. Machinery.

Under "Machinery" shall be included, trunnions, their cast supports, trunnion anchor, bolts, bearings, phosphor bronze and babbitt metal bushings, racks, shafting, gears, couplings, oil cups, brake levers, motor couplings, center locks, rail locks, stub shafts, gears and pinions, operating drum indicators, bolts, nuts and washers used in fitting up machinery parts, and similar parts of machinery which are made by the common processes of machine shop work as the term is generally understood.

126. Structural Steel.

Structural steel shall include all steel construction of trusses and floor system both on the movable and fixed parts

of the bridge, anchorages, grillages, bed plates, castings at breaks in floor, curb angles, anchor bolts, sleeves, gear casings, girders supporting the trunnions, steel framework of machinery houses, stairways, hand railings, bolts and nuts connecting structural steel parts, all bolts, nuts and washers required to connect floor, sidewalks and guard rail to structural steel on movable and fixed parts, galvanized steel angles, bolts, nuts, washers and clips required to secure street car rails to steel work on the movable and fixed parts, street car rails, and all other steel and cast iron and cast steel parts not included in machinery. Spikes, nails and screws for the floor system are not included.

127. Electrical Equipment.

This classification includes the furnishing and erecting complete in place ready for operation of all motors, solenoid brakes, controllers, switchboards, wiring, submarine cables, their attachments, fuses, circuit breakers, meters, switches, lights, warning signs, navigation signals, operators' telephone, conduits, limit-switches, indicators, and all interlocking equipment.

128. Roadway Gates.

The furnishing and installing and painting of four double arm, Buda Foundry, electric roadway gates complete with their motors, wiring and signal gongs ready for operation.

129. Fog Bell.

The furnishing and erection of one Meneely Fog Bell and two vessel signals complete with their pulleys, cords and attachments.

130. Roadway and Sidewalk Floor.

The price bid for the roadway on the movable section of the bridge shall include the subfloor of creosoted timber, roofing felt, bituminous joints and filler, and the creosoted block pavement, all in place, and also the laying of the street car tracks and angle iron. The price includes the furnishing of all spikes, nails and screws required.

Roadway floor on fixed part of bridge includes the reinforced concrete filler on buckle plates, creosoted block pavement and the bituminous joints and filler. Also the laying of the track rails.

The sidewalk floor on the movable section of the bridge consists of the stringers, flooring and guard rail in place.

The width of the roadway between curbs shall be considered as the width of roadway floor, and the distance from curb line to outer edge of sidewalk flooring shall be considered as the width of sidewalk.

131. Plans.

The City will furnish a complete set of general detail plans, which must be followed by the contractor in making out his shop drawings.

The contractor shall furnish complete shop drawings on sheets twenty-four (24) inch by thirty-six (36) inch in size of the structure which shall be submitted to the City Engineer for examination and approval before any material is ordered or any work done from them. After the plans have been approved and the tracings corrected, the contractor shall furnish the city with five (5) complete sets of blue prints of these plans, of which one set shall be on cloth.

DETAILS OF DESIGN GENERAL REQUIREMENTS

132. Open Sections.

Structures shall be so designed that all parts will be accessible for inspection, cleaning and painting.

133. Water Pockets.

Pockets or depressions which would hold water shall have drain holes, or be filled with waterproof material.

134. Symmetrical Sections.

Main members shall be so designed that the neutral axis will be as nearly as practicable in the center of section, and the neutral axis of the intersection members of trusses shall meet at a common point.

135. Strength of Connections.

The strength of connections shall be sufficient to develop the full strength of the member, even though the computed strain is less, the kind of strain to which the member is subjected being considered.

136. Minimum Thickness.

The minimum thickness shall be $\frac{3}{8}$ inch except for fillers and lattice bars and for the following items for which metal 5-16 inch in thickness will be allowed:

For web of sidewalk brackets.

For web of topchord members with twenty (20) per cent excess of section and located above the floor.

For web of I beam stringers.

For portal webs and brackets if situated entirely above the floor.

For framework of machinery houses.

For railings.

137. Pitch of Rivets.

The minimum distance between centers of rivet holes shall be three diameters of the rivet; but the distance shall preferably be not less than three (3) inch for seven-eighths ($\frac{7}{8}$) inch rivets and two and one-half ($2\frac{1}{2}$) inch for three-fourths ($\frac{3}{4}$) inch rivets. The maximum pitch in the line of strain for members composed of plates and shapes shall be six (6) inches for seven-eighths ($\frac{7}{8}$) inch rivets and five (5) inches for three-fourths ($\frac{3}{4}$) inch rivets. For angles with two gage lines and rivets staggered the maximum shall be twice the above in each line. Where two or more plates are used in contact, rivets not more than twelve (12) inches apart in either direction shall be used to hold the plates well together. In tension members composed of two angles in contact, a pitch of twelve (12) inches will be allowed for riveting the angles together.

138. Edge Distance.

The minimum distance from the center of any rivet hole to a sheared edge shall be one and one-half ($1\frac{1}{2}$) inches for seven-eighths ($\frac{7}{8}$) inch rivets and one and one-fourth ($1\frac{1}{4}$) inches for three-fourths ($\frac{3}{4}$) inch rivets and to a rolled edge one and one-fourth ($1\frac{1}{4}$) inches and one and one-eighth ($1\frac{1}{8}$) inches respectively. The maximum distance from any edge shall be eight (8) times the thickness of the plate, but shall not exceed six (6) inches.

139. Maximum Diameter of Rivets.

The diameter of the rivets in any angle carrying calculated strain shall not exceed one-quarter ($\frac{1}{4}$) the width of the leg in which they are driven. In minor parts seven-eighths ($\frac{7}{8}$) inch rivets may be used in three (3) inch angles, and three-fourths ($\frac{3}{4}$) inch rivets in two and one half ($2\frac{1}{2}$) inch angles.

140. Long Rivets.

Rivets carrying calculated strain and whose grip exceeds four diameters shall be increased in number at least one per cent for each additional one-sixteenth ($\frac{1}{16}$) inch of grip.

141. Pitch at Ends of Built Compression Members.

The pitch of rivets at the ends of built compression members shall not exceed four diameters of the rivets, for a length equal to one and one-half ($1\frac{1}{2}$) times the maximum width of member.

142. Compression Members.

In compression members the metal shall be concentrated as much as possible in webs and flanges. The thickness of each web shall be not less than one-thirtieth (1-30) of the distance between its connections to the flanges. Cover plates shall have a thickness not less than one-fortieth (1-40) of the distance between rivet lines.

143. Minimum Angles.

Flanges of girders and built members without cover plates shall have a minimum thickness of one-twelfth (1-12) of the width of the outstanding leg.

144. Tie Plates.

The open sides of compression members shall be provided with lattice and shall have tie plates as near each end as practicable. Tie plates shall be provided at intermediate points where the lattice is interrupted. In main members the end tie plates shall have a length not less than the distance between the lines of rivets connectng them to the flanges, and intermediate ones not less than one-half ($\frac{1}{2}$) this distance. Their thickness shall not be less than one-fiftieth (1-50) of the same distance.

145. Lattice.

The minimum width of lattice bars shall be two and one-half ($2\frac{1}{2}$) inches for seven-eighths ($\frac{7}{8}$) inch rivets, two and one-fourth ($2\frac{1}{4}$) inches for three-fourths ($\frac{3}{4}$) inch rivets, and two (2) inches if five-eighths ($\frac{5}{8}$) inch rivets are used. The thickness shall not be less than one-fortieth (1-40) of the distance between end rivets for single lattice, and one-sixtieth (1-60) for double lattice. Shapes of equivalent strength may be used.

146. Rivets in Flanges.

Five-eighths ($\frac{5}{8}$) inch rivets shall be used for latticing flanges less than two and one-half ($2\frac{1}{2}$) inches wide and three-fourths ($\frac{3}{4}$) inch for flanges from two and one-half ($2\frac{1}{2}$) to three (3) inches wide; seven-eighths ($\frac{7}{8}$) inch rivets shall be used in flanges three (3) inches and over, and

lattice bars with two rivets shall be used for flanges over five (5) inches wide.

147. Angle of Lattice.

The inclination of lattice bars with the axis of the member shall be not less than forty-five (45) degrees, and when the distance between rivet lines in the flanges is more than fifteen (15) inches, if single rivet bar is used, the lattice shall be double and riveted at the intersection.

148. Spacing in Lattice.

Lattice bars shall be so spaced that the portion of the flange included between their connection shall be as strong as the member as a whole.

149. Faced Joints.

Abutting joints in compression members when faced for bearing shall be spliced on four sides sufficiently to hold the connecting members accurately in place. All other joints in riveted work, whether in tension or compression, shall be fully spliced.

150. Bolts.

Where members are connected by bolts, the turned body of these bolts shall be long enough to extend through the metal. A washer at least one-fourth ($\frac{1}{4}$) inch thick shall be used under the nut. Bolts shall not be used in place of rivets except by special permission. Heads and nuts shall be hexagonal.

151. Indirect Splices.

Where splice plates are not in direct contact with the parts which they connect, rivets shall be used on each side of the joint in excess of the number theoretically required to the extent of one-third of the number for each intervening plate.

152. Fillers.

Rivets carrying strain and passing through fillers shall be increased fifty (50) per cent in number; and the excess rivets, when possible, shall be outside of the connected member.

153. Expansion.

Provision for expansion to the extent of one-sixteenth (1-16) inch for each ten (10) feet shall be made. Efficient means shall be provided to prevent excessive motion at any one point.

154. Fixed Bearings.

Movable bearings shall be designed to permit motion in one direction only. Fixed bearings shall be firmly anchored in the masonry.

155. Rollers.

Expansion rollers shall be not less than six (6) inches in diameter. They shall be coupled together with substantial side bars, which shall be so arranged that the rollers can be readily cleaned.

156. Bolsters.

Bolsters or shoes shall be so constructed that the load will be distributed over the entire bearing.

157. Wall Plates.

Wall plates may be cast or built up; and shall be so designed as to distribute the load uniformly over the entire bearing. They shall be secured against displacement.

158. Anchor Bolts.

Anchor bolts exposed to shear only shall extend not less than eighteen (18) diameters into the concrete. Anchor bolts securing against uplift shall be long enough to engage a mass of masonry, the weight of which is at least 1.5 times the uplift.

159. Counterweight.

The counterweight shall be so designed that it will balance the moving parts in any position, and so that they can be easily and properly adjusted for variation in weight by adding or removing definitely located weights. They shall be of concrete construction, built on and around a structural frame, thoroughly reinforced and hooped or else encased in steel plate boxes.

FLOOR SYSTEM

160. Floor Beams.

Floor beams shall be riveted directly to the trusses or girders.

161. Stringers.

Stringers shall be riveted to the webs of all intermediate floor beams by means of connection angles not less than one-half ($\frac{1}{2}$) inch in thickness.

162. End Spacers for Stringers.

Where end floor beams cannot be used, stringers resting on masonry shall have cross frames near their ends. These frames shall be riveted to girder or truss shoe where practicable.

**MATERIALS AND WORKMANSHIP
MATERIAL**

163. Process of Manufacture.

Steel shall be made by the open-hearth process.

164. Schedule of Requirements.

The chemical and physical properties shall conform to the following limits:

Elements Considered	Structural Steel	Rivet Steel	Steel Castings
Phosphorus max. { Basic	0.04 per cent	0.04 per cent	0.05 per cent
{ Acid	0.06 per cent	0.04 per cent	0.08 per cent
Sulphur, maximum	0.05 per cent	0.04 per cent	0.05 per cent
Ultimate tensile strength	Desired	Desired	Not less than
Pounds, per square inch.....	60,000	50,000	65,000
Elong. min. per cent in 8 in. fig 1....	1,500,000	1,500,000	15 per cent
Elong. min. per cent in 2 in. fig 2....	Ult. tensile str. 22	Ult. tensile str.	silky or fine
Character of fracture.....	silky	silky	granular
Cold bends without fracture.....	180° flat	180° flat	90° d=3t

The yield point, as indicated by the drop of beam, shall be recorded in the test reports.

165. Allowable Variations.

If the ultimate strength varies more than 4,000 lbs. from that desired, a retest shall be made on the same gauge, which, to be acceptable, shall be within 5,000 lbs. of the desired ultimate.

167. Chemical Analyses.

Chemical determinations of the percentages of carbon, phosphorus, sulphur and manganese shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt of steel, and a correct copy of such analysis shall be furnished to the engineer or his inspector. Check analysis shall be made from finished material, if called for by the purchaser, in which case an excess of twenty-five (25) per cent above the required limits will be allowed.

167. Form of Specimens.

Plates, Shapes, and Bars: Specimens for tensile and bending tests for plates, shapes and bars shall be made by cutting coupons from the finished product, which shall have both faces rolled and both edges milled to the form shown

by Fig. 1; or with both edges parallel; or they may be turned to a diameter of three-fourths ($\frac{3}{4}$) inch for a length of at least nine (9) inches, with enlarged ends.

168. Rivets.

Rivet rods shall be tested as rolled.

169. Pins and Rollers.

Specimens shall be cut from the finished rolled or forged bar, in such manner that the center of the specimen shall be one inch from the surface of the bar. The specimen for tensile test shall be turned to the form shown by Fig. 2. The specimen for bending test shall be one (1) inch by one-half ($\frac{1}{2}$) inch in section. (See Fig. 1.)

170. Steel Castings.

Steel castings shall conform to the requirements of the Standard Specifications of the American Society for Testing Materials for Steel Castings, Serial Designation A27-14, contained in the Society's Year Book for 1915.

Castings to be Class B Medium Grade.

Tension tests shall be the basis of purchase and acceptance.

Castings shall be free from blemishes, flaws or shrinkage cracks. When the bearing surface of any steel casting is finished there shall be no blow holes visible, exceeding one (1) inch in any direction nor exceeding one-half ($\frac{1}{2}$) square inch in area. The length of blow holes cut by any straight line laid in any direction shall never exceed one (1) inch in any one (1) foot. And in general no porosity will be allowed when the value of the casting for the purpose intended will be seriously affected thereby.

Castings that have defects fixed in any way without permission of the City Engineer or his representative shall be rejected.

Large castings shall be suspended and hammered all over. No cracks, flaws, defects or weakness shall appear after such treatment.

No sharp or unfilleted angles or corners will be allowed in any piece of material.

After complete acceptance by the inspector and before shipment, the unfinished surfaces of all castings shall be

thoroughly cleaned with wire brushes and coated with one coat of filler well brushed in and rubbed down, and one coat of graphite paint applied with round pound brushes. The kind of filler and paint will be indicated by the City Engineer. Finished surfaces shall receive one coat of white lead and tallow.

171. Annealed Specimens.

Material which is to be used without annealing or further treatment shall be tested in the condition in which it comes from the rolls. When material is to be annealed, or otherwise treated before use, the specimens for tensile tests representing such material shall be cut from properly annealed or similarly treated short lengths of the full section of the bar.

172. Number of Tests.

At least one tensile and one bending test shall be made from each melt of steel as rolled. In case steel differing three-eighths ($\frac{3}{8}$) inch and more in thickness as rolled, from one melt, a test shall be made from the thickest and thinnest material rolled. They shall be cut, whenever practicable, so as to retain two opposite surfaces as they come from the rolls.

173. Modifications in Elongation.

For material less than five-sixteenths ($\frac{5}{16}$) inch and more than three-fourths ($\frac{3}{4}$) inch in thickness the following modifications will be allowed in the requirements for elongation:

- (a) For each one-sixteenth ($\frac{1}{16}$) inch thickness below five-sixteenths ($\frac{5}{16}$) inch a reduction of two and one-half ($2\frac{1}{2}$) per cent will be allowed from the specified percentage.
- (b) For each one-eighth ($\frac{1}{8}$) inch in thickness above three-fourths ($\frac{3}{4}$) inch a deduction of one (1) per cent will be allowed from the specified percentage.

174. Bending Tests.

Bending tests may be made by pressure or by blows. Plates, shapes and bars less than one (1) inch thick shall bend as called for in paragraph 164.

175. Thick Material.

Full sized material for eye-bars and other steel one (1) inch thick and over, tested as rolled, shall bend cold one hundred eighty (180) degrees around a pin, the diameter of which is equal to twice the thickness of the bar, without fracture on the outside of bend.

176. Bending Angles.

Angles three-fourths ($\frac{3}{4}$) inch and less in thickness shall open flat, and angles one-half ($\frac{1}{2}$) inch and less in thickness shall bend shut, cold, under blows of a hammer without sign of fracture. This test will be made only when required by the inspector.

177. Nicked Bends.

Rivet steel, when nicked and bent around a bar of the same diameter as the rivet rod, shall give a gradual break and a fine, silky uniform fracture.

178. Finish.

Finished material shall be free from injurious seams, flaws, cracks, defective edges or other defects, and have a smooth, uniform and workmanlike finish. Plates thirty-six (36) inches in width and under shall have rolled edges.

179. Stamping.

Every finished piece of steel shall have the melt number and the name of the manufacturer stamped or rolled upon it. Steel for pins and rollers shall be stamped on the end. Rivet and lattice steel and other small parts may be bundled with the above marks on an attached metal tag.

180. Defective Material.

Material which, subsequent to the above tests at the mills and its acceptance there, develops weak spots, brittleness, cracks or other imperfections, or is found to have injurious defects, will be rejected at the shop and shall be replaced by the manufacturer at his own cost.

181. Allowable Variation in Weight.

A variation in cross section or weight of each piece of more than two and one-half ($2\frac{1}{2}$) per cent from that specified will be sufficient cause of rejection, except in case of sheared plates, which will be covered by the following permissible variations, which are to apply to a single plate.

182. When Ordered to Weight.

Ordered Weight Pounds per Square Foot	Permissible Variations in Weight of Plate for Width Given Expressed in Percentage of Ordered Weight									
	Under 48 in.		48 in. incl. to 60 in. excl.		60 in. incl. to 72 in. excl.		72 in. incl. to 84 in. excl.		84 in. incl. to 96 in. excl.	
			Over	Under	Over	Under	Over	Under	Over	Under

Under 5.....	6	4	6.5	4	7	4	8	4	...	...
5 incl. to 7.5 excl.....	5.5	4	6	4	6.5	4	7.5	4	...	...
7.5 incl. to 10 excl.....	5	4	5.5	4	6	4	7	4	8	4
10 incl. to 12.5 excl.....	4.5	3	5	3	5.5	4	6	4	7	4
12.5 incl. to 15 excl.....	4	3	4.5	3	4.5	4	5	4	5.5	4
15 incl. to 17.5 excl.....	3.5	2.5	4	2.5	4	3	4.5	3	4.5	3.5
17.5 incl. to 20 excl.....	3	2.5	3.5	2.5	3.5	3	4	3	4.5	3
20 incl. to 25 excl.....	2.5	2.5	3	2.5	3.5	2.5	3.5	3	4	3
25 incl. to 30 excl.....	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	3.5	2.5
30 incl. to 40 excl.....	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5
40 and over.....	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5

Ordered Weight Pounds per Square Foot	Permissible Variations in Weight of Plate for Width Given Expressed in Percentage of Ordered Weight									
	96 in. incl. to 108 in. excl.		108 in. incl. to 120 in. excl.		120 in. incl. to 132 in. excl.		132 in. and over			
			Over	Under	Over	Under	Over	Under	Over	Under

Under 5.....	...	...	...	...	...	...	...	...	...	...
5 incl. to 7.5 excl.....	...	...	...	...	...	...	...	...	...	...
7.5 incl. to 10 excl.....	10	4	11	5	...	...	...	...	...	...
10 incl. to 12.5 excl.....	7.5	4	9	4	10	4	12	5	...	...
12.5 incl. to 15 excl.....	6	4	7	4	9	4	11	4	...	...
15 incl. to 17.5 excl.....	5	4	6	4	8	4	10	4	...	...
17.5 incl. to 20 excl.....	5	3	6	4	7	4	9	4	...	...
20 incl. to 25 excl.....	4.5	3	5	4	6	4	8	4	...	...
25 incl. to 30 excl.....	4	3	4.5	4	5	4	7	4	...	...
30 incl. to 40 excl.....	3.5	2.5	4	3.5	4.5	4	6.5	4	...	...
40 and over.....	3.5	2.5	4	3	4.5	3.5	6	4	...	...

183. When Ordered to Gage.

Plates will be accepted if they measure not more than 0.01 inch below the ordered thickness.

An excess over the nominal weight, corresponding to the dimensions on the order, will be allowed for each plate, if not more than that shown in the following table, one cubic inch of rolled steel being assumed to weigh 0.2833 pounds:

Ordered Gage Inch	Permissible Excess in Weight of Plate for Width Given Expressed in Percentage of Nominal Weight			
	Under 48 in.	48 in. incl. to 60 in. excl.	60 in. incl. to 72 in. excl.	72 in. incl. to 84 in. excl.

Under 1/8.....	13	15	17	20
1/8 incl. to 3/16 excl.....	11	13	15	17
3/16 incl. to 1/4 excl.....	9	10	12	14
1/4 incl. to 5/16 excl.....	8	9	10	12
5/16 incl. to 3/8 excl.....	7	8	9	10
3/8 incl. to 7/16 excl.....	6	7	8	9
7/16 incl. to 1/2 excl.....	5	6	7	8
1/2 incl. to 5/8 excl.....	4	5	6	7
5/8 incl. to 3/4 excl.....	3.5	4	5	6
3/4 incl. to 7/8 excl.....	3	3.5	4	5
1 and over.....	3	3	3.5	4

Ordered Gage Inch	Permissible Excess in Weight of Plate for Width Given Expressed in Percentage of Nominal Weight				
	84 in. incl. to 96 in. excl.	96 in. incl. to 108 in. excl.	108 in. incl. to 120 in. excl.	120 in. incl. to 132 in. excl.	132 in. and over

Under 1/8.....	...	...	...	...	...
1/8 incl. to 3/16 excl.....	...	...	...	...	...
3/16 incl. to 1/4 excl.....	17	20	23	...	...
1/4 incl. to 5/16 excl.....	14	17	20	23	26
5/16 incl. to 3/8 excl.....	12	14	17	20	23
3/8 incl. to 7/16 excl.....	10	12	14	17	20
7/16 incl. to 1/2 excl.....	9	10	12	14	17
1/2 incl. to 5/8 excl.....	8	9	10	12	14
5/8 incl. to 3/4 excl.....	7	8	9	10	12
3/4 incl. to 7/8 excl.....	6	7	8	9	10
1 and over.....	5	6	7	8	9

SPECIAL METALS**184. Cast Iron.**

See paragraph 73.

185. Wrought Iron Bars.

Wrought iron shall conform to the requirements of the American Society for Testing Materials, Specifications for Refined Wrought-iron Bars, Serial Designation A41-13.

INSPECTION AND TESTING AT THE MILLS**186. Copies of Mill Orders.**

The purchaser shall be furnished complete copies of mill orders, and no material shall be rolled, nor work done, before the purchaser has been notified where the orders have been placed, so that he may arrange for the inspection.

187. Facilities for Inspection.

The manufacturer shall furnish all facilities for inspecting and testing the weight and quality of all material at the mill where it is manufactured. He shall furnish a suitable testing machine for testing the specimens, as well as prepare the pieces for the machine, free of cost.

188. Access to Mills.

When an inspector is furnished by the purchaser to inspect material at the mills, he shall have full access, at all times, to all parts of mills where material to be inspected by him is being manufactured.

QUALITY OF MATERIAL**189. Reinforcing Steel.**

See paragraph 95.

190. Proportion of Parts.

The concrete used for the counterweight may be composed of one part cement, three parts sand and six parts gravel or cinders. Concrete used for floor slabs for roadway and sidewalk on the fixed part of the structure shall be composed of one part cement to three parts sand and five parts gravel.

191. Mixing.

The mixing of materials for the concrete shall be done by a batch mixing machine of a type approved by the City Engineer. Each batch shall be mixed at least three minutes after all the materials are placed in the machine so that all particles of the aggregates are thoroughly covered with cement. Sufficient water shall be used to give the mixture a consistency required by the City Engineer.

192. Placing.

Care should be taken that the concrete fully and intimately surrounds all reinforcement, and for that purpose it must be thoroughly spaded and puddled with rods around the steel bars. All surfaces, especially those exposed to view, must have the concrete thoroughly spaded working the coarse particles back, and bringing the mortar to the face, so as to give an unbroken smooth surface finish. If there should be any small cavities or stone pockets after the removal of the forms, these must be immediately filled with mortar, after which the whole surface shall be rubbed down with a brick float and a thin grout of one to one mortar.

Concrete shall be deposited in such a way as to secure, as far as possible, a monolithic structure. The contractor will be permitted to stop concreting long enough for the concrete to set, only at points and on lines designated by the City Engineer.

Before placing fresh concrete on old concrete, the surface of the old concrete shall be thoroughly cleaned with wire brush and water, or with a high pressure water jet, all loose material brushed from the concrete or forms and the concrete surface thoroughly wetted and broomed with a thin grout of one to one cement mortar.

193. Forms.

Forms shall be well built, substantial and unyielding, of ample strength to withstand the pressure or carry the load imposed, and properly braced. Where the forms are held

together with bolts or wires, they shall be made so that no iron will be exposed on the surface of the finished work.

All forms for face work must be made of lumber surfaced on one side and both edges, free from all defects allowing leakage of cement, or affecting the strength of the forms or the finished appearance of the work. The forms must be made practically water tight to prevent leakage of cement through the joints.

Suitable mouldings shall be placed on the forms to round off or bevel all the sharp edges.

All forms must be built and placed so that the finished concrete structure will be of the correct dimensions, in the right locations, and at the elevation required.

Particular attention must be paid to the design of forms and their support so that there will be no perceptible deflections and no settlement of the supports.

Lumber for forms may be used over again when free from the defects mentioned above, but must be thoroughly cleaned between each time of using.

Forms must not be removed until the concrete has properly set.

Before depositing concrete in the forms they must be thoroughly cleaned from all rubbish, chips, dry mortar, or dirt, and must be well wetted if so required by the engineer.

TIMBER FLOORING**194. Quality.**

All timber used for the floor system on the bridge shall be of strong sound Douglas fir, cut from live trees, sawed true with square edges, out of wind and free from shakes, large or loose knots and other defects that materially impair its strength or durability. One inch sap only on either face or edge will be permitted on the planking used for sidewalk flooring which shall be cut edge grain and of a width of eight (8) inches.

The timber used for sidewalk stringers shall be of the same grade as specified for sidewalk flooring, but need not be edge grain.

In timber used for creosoted sub-floor for the roadway sapwood on the corners to the extent of one-third (1-3) the width and one-half ($\frac{1}{2}$) the thickness of the planks or its equivalent will be permitted.

195. Pavement Blocks.

The blocks must be cut from sound strong Douglas fir planks cut from live trees containing not less than six annular rings to the inch, sawed true, with square edges free from all loose knots, and shall contain no sound knots over one (1) inch in diameter and these must be confined to the lower half of the block when laid. The blocks shall be free from pitch pockets, shakes or other imperfection impairing their strength or durability.

The blocks shall be cut from three inch by six inch (3x6) stock surfaced one side to uniform thickness of two and seven-eighths ($2\frac{7}{8}$) inches; they shall be three and one-fourth ($3\frac{1}{4}$) inches in depth perfectly rectangular and shall not vary in depth or width more than one-sixteenth ($1/16$) inch.

196. Size.

All timber shall be surfaced one side and one edge to the net dimensions specified on the plan.

197. General Requirements.

During the progress of the manufacture and treatment of paving blocks under this contract, the City Engineer shall have a representative present who shall inspect the timber, materials, and methods used in the manufacture and treatment of the blocks and any or all timber, materials or blocks not strictly in accordance with requirements of these specifications will be rejected. All blocks shall again be thoroughly inspected after being delivered on the street and any blocks not up to the requirements of these specifications shall be rejected. The quantity of oil in the blocks after treatment shall be at least twelve (12) pounds per cubic foot of wood.

Blocks shall be seasoned by boiling in creosote oil in closed cylinder until the condenser gauge shows that there is no appreciable moisture remaining in the timber after which creosote oil shall be pumped into the cylinder under a pressure sufficient to force the oil entirely through and around every fibre of the block, completely filling every void and pore. The quantity of oil in the blocks after treatment shall be at least sixteen (16) to eighteen (18) pounds per cubic foot of wood, which amount shall be reduced by expansion and vacuum to twelve (12) pounds per cubic foot. The oil used must be pure coal tar creosote of a specific gravity of 1.065 to 1.125 at 60° F. It shall show upon distillation by the retort method:

	170° C. not more than	.5 of 1%
170° to 210° C.	" " "	3%
210° to 235° C.	" less "	1% nor more than 15%
235° to 270° C.	" " "	10% " " " 20%
270° to 315° C.	" " "	20% " " " 30%
315° to 360° C.	" " "	20%

The residue shall be soft and shall not be over 30% of original sample. Pressure on oil shall at no time rise higher than 100 pounds per square inch. Pressing shall be done while the temperature of the oil is approximately 180° Fahrenheit.

198. Treatment of Blocks.

The blocks shall be placed in a retort which shall then be filled with creosote oil and heated to a temperature of 215° Fahrenheit for one (1) hour at atmospheric pressure. The temperature shall then be reduced to 180° Fahrenheit, and pressure applied. This pressure shall equal seventy-five (75) pounds per square inch, but may be increased to 100 pounds if considered necessary by the City Engineer, and shall be continued until the blocks have received at the rate of sixteen (16) pounds of creosote oil per cubic foot of lumber. After the injection of oil has reached the required amount the temperature shall immediately be raised to 230° Fahrenheit and maintained for one (1) hour, then followed for one (1) hour in a vacuum, the purpose of which is to withdraw a portion of the injected oil, leaving the final amount twelve (12) pounds per cubic foot.

The process of preparing blocks shall be under the supervision of the City Engineer and be to his entire satisfaction. The blocks shall be delivered at the bridge and piled in close, compact piles, in such a manner that the end grain is not exposed. To prevent undue evaporation and exposure to moisture or dust, the blocks shall be kept covered with lumber or canvas.

WORKMANSHIP**199. General.**

All parts forming a structure shall be built in accordance with approved drawings. The workmanship and finish shall be equal to the best practice in modern bridge works.

200. Straightening Material.

Material shall be thoroughly straightened in the shop, by methods that will not injure it, before being laid off or worked in any way.

201. Finish.

Shearing shall be neatly and accurately done and all portions of the work exposed to view neatly finished.

202. Size of Rivets.

The size of rivets, called for on the plans, shall be understood to mean the actual size of the cold rivet before heating.

203. Reaming and Rivet Holes.

All the riveted work of the bridge shall be reamed with the exception of lattice bars, tie plates, buckle plates, trolley supports and lateral and sway braces. The sidewalk cantilevers need not be reamed except connection to supports. The holes in the main members to which these parts connect and connection holes to main members in the lateral and sway bracing and counterweight boxes, shall however be reamed. See also paragraph 222.

204. Rivet Holes.

For holes where reaming is not required the diameter of the punch shall not be more than one-sixteenth (1-16) inch greater than the diameter of the rivet; nor the diameter of the die more than one-eighth ($\frac{1}{8}$) inch greater than the diameter of the punch. Material more than three-fourths ($\frac{3}{4}$) inch thick shall be sub-punched and reamed or drilled from the solid.

205. Punching.

All punching shall be accurately done. Drifting to enlarge unfair holes will not be allowed. If the holes must be enlarged to admit the rivet, they shall be reamed. Poor matching of holes will be cause for rejection.

206. Sub-Punching and Reaming.

Where reaming is required, the punch used shall have a diameter not less than three-sixteenths (3-16) inch smaller than the nominal diameter of the rivet. Holes shall then be reamed to a diameter not more than one-sixteenth (1-16) inch larger than the nominal diameter of the rivet. All reaming shall be done with twist drills.

207. Reaming After Assembling.

General reaming shall be done after the pieces forming one built member are assembled and firmly bolted together. If necessary to take the pieces apart for shipping and handling the respective pieces reamed together shall be so marked

that they may be reassembled in the same position in the final setting up. No interchange of reamed parts will be allowed.

208. Edge Planing.

Sheared edges or ends shall, when required, be planed at least one-eighth ($\frac{1}{8}$) inch to a smooth surface. Lacing bars, fillers, lateral bracing connecting plates, framework for machinery houses will be exempt from this requirement.

The top edges of the webs of the main carrying girders shall be planed to a bearing fit against the cover plate.

209. Trunnion Holes.

Particular care shall be taken in boring true to gauge, smooth and straight, the holes for the trunnions. It is important, and special pains must be taken, to bore the holes exactly perpendicular to plane of trusses and in exact alignment, so that when the bridge leaves are erected a true alignment of the trusses can and will be obtained.

210. Burrs.

The outside burrs on reamed holes shall be removed.

211. Assembling.

Riveted members shall have all parts well pinned up and firmly drawn together with bolts, before riveting is commenced. Contact surfaces to be painted.

212. Lattice Bars.

Lattice bars shall have neatly rounded ends, unless otherwise called for.

213. Web Stiffeners.

Stiffeners shall fit neatly between flanges of girders. Where tight fits are called for, the ends of the stiffeners shall be faced and shall be brought to a true contact bearing with the flange angles.

214. Splice Plates and Fillers.

Web splice plates and fillers under stiffeners shall be cut to fit within one-eighth ($\frac{1}{8}$) inch of flange angles.

215. Web Plates.

Web plates of girders, which have no cover plates, shall be flush with the backs of angles or project above the same not more than one-eighth ($\frac{1}{8}$) inch unless otherwise called for. When web plates are spliced, not more than one-fourth ($\frac{1}{4}$) inch clearance between ends of plates will be allowed.

216. Connection Angles.

Connection angles for floor beams and stringers shall be flush with each other and correct as to position and length of girders.

217. Rivets.

Rivets shall be driven by pressure tools wherever possible. Pneumatic hammers shall be used in preference to hand driving.

218.—Riveting.

Rivets shall look neat and finished, with heads of approved shape, full and of equal size. They shall be central on shank and grip the assembled pieces firmly. Recupping and calking shall not be allowed. Loose, burned or otherwise defective rivets shall be cut out and replaced. In cutting out rivets, great care shall be taken not to injure the adjacent metal. If necessary they shall be drilled out.

In heating rivets the entire rivet must be brought to a uniform heat. The heating of the points of rivets more than the remainder will not be allowed. Any rivets which throw off sparks when taken from the furnace or forge will not be used.

219. Turned Bolts.

Wherever bolts are used in place of rivets which transmit shear, the holes shall be reamed parallel and the bolts turned to a driving fit. A washer not less than one-fourth ($\frac{1}{4}$) inch thick shall be used under nut.

220. Members to Be Straight.

The several pieces forming one built member shall be straight and fit closely together, and finished members shall be free from twists, bends or open joints.

221. Abutting Joints.

Abutting joints shall be cut or dressed true and straight and fitted close together, especially where open to view. In compression joints, depending on contact bearing, the surfaces shall be truly faced, so as to have even bearings after they are riveted up complete and when perfectly aligned.

222. Field Connections.

Holes for floor beams and stringer connections and connection holes of lateral and sway bracing and counterweight boxes to main members shall be sub-punched and reamed to a steel template one (1) inch thick. Field con-

nections of parts of main trusses shall be reamed with the entire truss assembled and match marked before taking apart. See also Paragraph 203.

223. Screw Threads.

Screw threads shall make tight fits in the nuts and shall be United States standard, except above the diameter of one and three-eighths ($1\frac{3}{8}$) inches, when they shall be made with six (6) threads per inch.

224. Annealing.

Steel, except in minor details, which has been partially heated shall be properly annealed.

225. Welds.

Welds in steel will not be allowed.

226. Expansion Bed Plates.

Expansion bed plates shall be planed true and smooth. Cast wall plates shall be planed top and bottom. The cut of the planing tool shall correspond with the direction of expansion.

227. Bolsters.

All bearing surfaces of bolsters and shoes shall be planed true and smooth.

228. Shipping Details.

Pins, nuts, bolts, rivets and other small details shall be boxed or crated.

229. Weight.

The weight of every piece and box shall be marked on it in plain figures and a record kept of the weights.

230. Finished Weight.

Payment for pound price contracts shall be by scale weight. No allowance over two (2) per cent of the total weight of steel for the structure as computed from the plans will be allowed for excess weight.

231. Painting.

All metal work before leaving the shop shall be thoroughly cleaned from all loose scale, rust, and dirt, and shall be given one coat of paint, which shall consist of red lead thoroughly mixed with enough pure RAW linseed oil to insure smooth working and an even application. The use of driers or volatile thinners will not be allowed without special

permission. The red lead shall be manufactured by the basic oxide process; shall be free from metallic lead particles, vitrified particles, nitrates, nitrites and added foreign matter; shall weigh not more than 20 grams per cubic inch—loose measured (Scott Volumeter). Red lead and linseed oil used in the work must conform in composition and working qualities to samples approved by the City Engineer, and the mixture shall be satisfactory to the City Engineer. At least thirty (30) days before shop painting starts, the contractor shall submit samples, to the City Engineer, of the particular brand of red lead he proposes to use, who will then fix the proportions of lead and oil to be used in the mixture.

Pieces and parts which are not accessible after erection shall have one additional coat of paint before leaving the shop.

After the structure is erected, the metal work shall be thoroughly cleaned from mud, grease, etc., rivet heads and areas where paint has been damaged shall be painted over and the entire surface shall then be thoroughly and evenly painted with two coats of paint.

The paints for FIELD COATS shall conform in color and composition to samples approved by the City Engineer. These paints shall consist of the best grade of pigments mixed with pure RAW linseed oil and not to exceed an approved amount by weight of drier. The excessive use of driers, the use of volatile thinners, the use of pigments containing sulphides, sulphites, nitrites, free water, or soluble salts will not be permitted. Preference will be given to a paint composed essentially of pure raw linseed oil together with a carbon pigment containing not less than 50% ash or non-carbonaceous matter. The carbon pigment shall be in the form of amorphous graphite, lamp black or carbon black or mixtures of these. The use of powdered coke, charcoal or coal and of silica, clay or similar inert filler will not be allowed. A green shade for the final coat may be obtained by the addition of sufficient precipitated Chrome Green to give the desired shade.

At least sixty days before painting starts the contractor shall furnish the City Engineer with the oil, raw pigments and mixed paints he intends using, together with a statement of composition and limits. From time to time during the progress of the painting the City Engineer will draw samples of the materials being used on the work. A material difference in composition or working qualities of these samples as compared with the samples furnished by the contractor will

at the option of the City Engineer, be sufficient ground for cancellation of the contract and for the refusal of all payment for work done with the faulty materials.

Attention is called to the importance of a firm and sound shop coat. The life of the structure and the value of the subsequent coats depend largely on the thoroughness with which the shop coat is applied. Inspectors will insist that the utmost care be observed in this work, both as to manner of application of paint as well as to the thorough mixing and purity of the materials.

All three coats of paint given to the metal work are to be of distinctly different shades of colors. The second coat must be allowed to dry thoroughly before the third coat is applied.

No painting is to be done in wet or freezing weather unless it be done under cover where the temperature is above the freezing point.

All painting is to be done in a thorough and workmanlike manner, to the satisfaction of the City Engineer, and no paint whatever is to be used on the structure without first being approved by him.

All recesses which would retain water or through which water might enter must be filled with thick paint or some suitable waterproof material before receiving the final coat of paint. Any larger recesses shall be filled with concrete.

Machine finished surfaces shall be coated with white lead and tallow before shipment or before being put out into the open air.

232. Buffer Blocks.

The buffer blocks shall be made of well-seasoned white oak and must be carefully sized down to dimensions that will give a perfect alignment of the bridge, and they must be so adjusted that the whole bearing area of all the blocks will take bearing simultaneously on the tail-end contact-surfaces of the bridge leaf, when this leaf is in correct closed position.

The buffer blocks for stopping the bridge in open position shall be set, adjusted and bolted in place in the same careful manner as specified for the anchor buffers.

232. Erection.

As the structure is located across a navigable channel, an unobstructed channel of eighty (80) feet in width will have to be maintained.

It is expected that permission may be obtained to temporarily close the channel to shipping requiring more head room than afforded by the bridge in closed position for suf-

Remind must be obtained down 2/11/25 2/12/25
no assurance - Down 2/11/25

ficient length of time to lay the timber floor and pavement, and adjust the counterweight to this added dead load, but at this time no definite information can be given on this point. To shorten as much as possible the time of erection, both leaves or arms must be erected simultaneously. If the cantilever arms are erected on their respective piers in an upright position, only sufficient counterweight to properly balance the bridge without the floor shall be first placed in position. The two arms shall then be lowered to a horizontal position and the trusses shall be properly aligned and adjusted. While in a horizontal position, and properly adjusted and locked, the holes for field rivets in the lateral angles and struts shall, if necessary, be re-reamed at ends and thoroughly bolted; the arms can then be raised and the bolts removed and replaced by rivets, one by one, after which the floor and the additional counterweights can be placed in position care must be taken that always sufficient counterweight is put in place to properly balance the bridge with its floor during construction. During erection, the structure must be well braced. Enough of the permanent steel bracing must be put in as the work progresses to insure stability.

Before the construction of counterweights is begun the contractor shall make blocks of concrete, not less than eight (8) cubic feet in volume of the material to be used in the counterweights; these blocks when seasoned shall be accurately measured and weighed to determine as nearly as practicable the probable weight of concrete in the counterweight. These blocks shall be sufficient in number and shall be made far enough in advance of the construction of the counterweight to determine the proportions of the counterweight concrete necessary to secure the necessary weight per cubic foot. The contractor shall adjust and correct the entire counterweights to balance the span as required.

234. Bed Plates, Etc.

Portland cement mortar to be used under bed plates and bolsters shall be mixed in the proportion of one (1) part of cement to two (2) parts of sand. When mortar is used for grout, it shall be mixed one (1) part of cement to one (1) part of sand.

235. Counterweight Mortar.

Portland cement mortar, if used, for filling the interstices in the counterweight boxes, shall be mixed in the proportion of one (1) part of cement to three (3) parts of torpedo sand, and well rammed into place.

ROADWAY AND SIDEWALK FLOOR

236. Roadway Floor.

The planking for the sub-floor of the roadway shall be four (4) inch by twelve (12) inch stock dressed on one side and on edge to a net dimension of three and three-fourths ($3\frac{3}{4}$) inches by eleven and three-fourths ($11\frac{3}{4}$) inches. They shall be laid close, perpendicular to the axis of the bridge, and shall be fastened at each stringer and at the ends with two one-half ($\frac{1}{2}$) inch carriage bolts with heads set in flush with the upper surface.

On top of the subplanking shall be laid a decking of two (2) inch by twelve (12) inch planks dressed on one side and one edge to a net dimension of one and three-fourths ($1\frac{3}{4}$) inches by eleven and three-fourths ($11\frac{3}{4}$) inches. This decking shall be laid close, parallel to the axis of the bridge and nailed to the subplanking with 30d nails at intervals along each edge of not more than 18 inches.

Both subplanking and decking shall be creosoted with twelve (12) pounds of creosote per cubic foot in accordance with the specifications for creosoting treatment. (Paragraphs 40 to 55 inclusive.)

237. Angle Iron Stops.

At intervals of about eight (8) rows of blocks one and one-half ($1\frac{1}{2}$) inch by one and one-half ($1\frac{1}{2}$) inch by one-eighth ($\frac{1}{8}$) inch galvanized steel angles shall be laid transverse to the axis of the bridge and securely fastened to the deck with No. 15 three (3) inch wood screws countersunk in the angles and spaced at intervals of not over eighteen (18) inches.

238. Laying and Fastening of Paving Blocks.

The blocks shall be laid close in rows at right angles to the axis of the bridge. The blocks resting on the transverse angles shall have a dap of one and three-eighths ($1\frac{3}{8}$) inches by one-eighth ($\frac{1}{8}$) inch cut out to receive the angle. It is essential that these daps be of the exact size, as the blocks must bear on the angle as well as the floor to prevent splitting. Each block shall be toe nailed to the floor with one ten-penny (10d) cut flooring nail, except where the angle iron interferes. Joints shall be broken by a lap not less than one-half ($\frac{1}{2}$) block. Split blocks shall be laid only to break joint in starting courses, using not less than one-half ($\frac{1}{2}$) blocks. The contractor is warned that the tendency to split under the nailing process is greater with blocks that have lain

exposed than freshly treated blocks and that split blocks must be replaced.

239. Dipping and Preparing Base.

Immediately before laying, each block shall be dipped for the lower half of its depth in hot paving pitch of approved composition. Blocks shall be laid by shoving into place against the adjacent blocks similar to laying shoved joint brickwork.

Before laying blocks two layers of one (1) ply roofing felt shall be placed on the floor and turned up at the sides and ends. These layers of felt shall be covered with a coating of hot asphalt between the layers and on top of the upper layer, but no coating shall be placed on the surface of the floor.

240. Expansion Joints.

An expansion joint one (1) inch in thickness shall be laid between the blocks and the curbing by laying temporarily a dressed one (1) inch board against the curb before laying the pavement. After the blocks are thoroughly rolled and the joints filled the expansion strip shall be removed and the joints poured with hot expansion joint material of approved composition.

241. Filler.

After the wood blocks are laid they shall be rolled with a roller weighing fourteen (14) tons. After they have been thoroughly rolled an asphaltic filler of approved composition and consistency shall be spread over the surface hot and well squeegeed into the joints.

Immediately following the brushing of the tar or pitch, fine beach sand, which has been artificially heated, shall be thoroughly brushed into the joints, filling them completely.

242. Pea Gravel.

Immediately after the joints are filled, pea gravel ranging in size between forty-four hundredths (.44) inches and twenty-five hundredths (.25) inches shall be scattered over the pavement so that the pebbles will be about four (4) inches apart and thoroughly rolled with a fourteen (14) ton roller until the pea gravel is embedded. This process shall be repeated until a result is obtained satisfactory to the City Engineer.

243. Pavement on Fixed Part.

The pavement on the fixed part shall conform in all respects to the requirements for the pavement on the movable leaves, except that the blocks will be laid on a concrete base on buckle plates and no fastenings for blocks or angle irons will be needed.

244. Concrete Base.

The concrete base shall be laid according to the requirements for concrete in paragraphs 190 and 193 inclusive, and shall be composed of one (1) part Portland cement, three (3) parts standard sand and five (5) parts gravel not larger than one and one-half ($1\frac{1}{2}$) inch in diameter, whose surface when finished shall be smooth and even and true to grade by striking with template. If it is necessary in order to accomplish this result the contractor shall use sufficient mortar to do the same, this mortar to be composed of one (1) part cement and three (3) parts sand. The final surface must be smooth and free from depressions, rolls or irregularities of any kind and fully equal to good sidewalk work.

245. Expanded Metal Reinforcement.

In the top of the concrete base shall be laid three-quarters ($\frac{3}{4}$) of an inch below the surface a layer of style L sixteen (16) gauge Corr-X metal or equivalent. All laps shall be at least one full diamond on sides and ends.

246. Other Operations.

Other operations are the same as specified for the pavement on movable leaves.

247. Sidewalk on Movable Leaves.

The sidewalk flooring on the movable part of the bridge shall be two (2) inch by eight (8) inch stock planed on one side and one edge to a net dimension of one and three-fourths ($1\frac{3}{4}$) by seven and three-fourths ($7\frac{3}{4}$) inches laid with one-half ($\frac{1}{2}$) inch openings between planks and nailed to each stringer and to the guard rail support with two (2) twenty-penny (20d) nails. The stringers shall be three (3) inch by twelve (12) inch planks of the length shown on the plans sized at each bearing to a depth of eleven and three-fourths ($11\frac{3}{4}$) inches and bolted in place as shown on the plan. The floor planks must be properly fitted around structural members and all hanging ends of planks supported in an approved manner.

All spikes and nails required and specified for the floor construction shall be included in the price bid.

The guard rail shall be of creosoted timber of the dimensions shown by the plan, and shall be laid with overlapping joints in lengths of not less than twelve (12) feet. It shall be bolted to the sub-floor with five-eighths ($\frac{5}{8}$) inch bolts spaced three (3) feet C to C and a guard angle fastened on the corner. This guard angle shall be fastened to the timber with three-eighths ($\frac{3}{8}$) inch by three (3) inch screws with countersunk heads spaced twelve (12) inches C to C.

248. Toilet Facilities.

In the designated places below the deck of the bridge shall be furnished and installed (2) porcelain enameled wash down closets with all necessary fittings and two (2) oval bowl, solid back, roll rim wash basins about eighteen (18) inches long diameter. The wash basins shall be equipped with faucet on one side and sanitary drinking fountain on the other. All fittings shall be nickel plated and all fixtures connected to the fire protection system on the timber approaches with three-fourths ($\frac{3}{4}$) inch galvanized pipe. The soil pipe shall be carried down to elevation plus six and five-tenths (6.5) and shall be securely fastened in place. All plumbing shall conform to city ordinances in quality and workmanship.

INSPECTION AND TESTING SHOP INSPECTION

249. Facilities for Inspection.

The manufacturer shall furnish all facilities for inspecting and testing the weight and quality of workmanship at the shop where material is manufactured. He shall furnish a suitable testing machine for testing full sized members, if required.

250. Starting Work in Shop.

The purchaser shall be notified well in advance of the start of the work in the shop, in order that he may have an inspector on hand to inspect material and workmanship.

251. Access to Shop.

When an inspector is furnished by the purchaser, he shall have full access, at all times, to all parts of the shop where material under his inspection is being manufactured.

252. Accepting Material or Work.

The inspector shall stamp each piece accepted with a private mark. Any piece not so marked may be rejected at any time and at any stage of the work. If the inspector, through an oversight or otherwise, has accepted material or work which is defective or contrary to the specifications this material no matter in what state of completion may be rejected by the purchaser.

253. Shipping Invoices.

Complete copies of shipping invoices shall be furnished to the purchaser with each shipment.

254. Field Inspection.

Inspection at the mills or shop by the City is intended as a means of facilitating the work and avoiding errors. It is expressly understood that it will not relieve the contractor of the responsibility of imperfect material or work of any nature and the replacing of the same.

255. Field Inspector.

Material or workmanship not inspected at the mill or shop will be inspected on delivery at the bridge.

All work of erection will also be done under the inspection of the City Engineer or his representative who must be given all the facilities required for a thorough inspection of workmanship.

256. Method of Payments.

Monthly estimates will be made by the City Engineer of the value of the work done, and material delivered, erected and accepted, and each month payment for seventy (70) per cent of the value of the work done, erected and accepted the previous month will be made. The remaining thirty (30) per cent will be retained until thirty days after the completion of the work and its final acceptance. (See also Proposal and Contract.)

257. Maintenance.

The contractor will be required to maintain the structure for a period of twelve (12) months after its completion and acceptance and shall repair and make good any damage that may be caused by faulty material or workmanship. He will be required to execute a bond in the sum of \$5,000.00 to insure the faithful performance of this maintenance.

258. Time of Completion.

The columns for the anchorage that will be placed by the contractor for the substructure and encased in the concrete of the piers shall be delivered at the bridge within one hundred (180) days from the date of the order to proceed with the contract.

The trunnion support girders with their holsters and anchors shall be delivered at the bridge site within two hundred ten (210) days of the above date; the delivery of all material for the superstructure must be completed within three hundred (300) days of above date. The contractor will be given written notice by the City Engineer to proceed with the erection as soon after the expiration of the time limit for delivery of the material for the superstructure as possible. The erection shall be carried on regularly and uninterruptedly thereafter (unless the City Engineer or Board of Public Works shall otherwise, in writing, specially direct), with such force as to secure its completion prior to one hundred fifty-five (155) days after such notice; the time of beginning, rate of progress and time of completion being essential conditions of the contract.

259. Meaning of Terms.

Wherever the term "City Engineer" is used in this specification it means the City Engineer of the City of Seattle or his authorized representative. The term "Board of Public Works" means the Board of Public Works of the City of Seattle. The term "Contractor" shall be assumed to mean the person, company or corporation that has entered into contract with the City of Seattle for the performance of the work covered by these specifications and plans.

260. Balancing of Structure.

The contractor shall check the location of the center of gravity of the moving leaf, including all parts attached thereto and also the center of gravity of the counterweight including counterweight box and trusses by computations based on accurate weights figured from the shop plans and he shall submit duplicate copies of these computations accompanied by weight bills to the City Engineer of Seattle for examination and checking.

261. Estimated Quantities.

It shall be fully understood that the estimate of quantities given below are approximate only, and are to be used merely for the comparison of bids.

**SPECIFICATIONS
FOR THE
MECHANICAL AND ELECTRICAL EQUIPMENT**

262. General.

These specifications constitute a part of the General Specifications, and points not mentioned herein will be governed by that part of the General Specifications covering them.

MATERIALS**263. Machinery Steel.**

All machinery steel shall be manufactured by the open hearth process and shall conform to the following requirements:

Maximum phosphorus basic.....	.04%
Maximum phosphorus acid .....	.07%
Maximum sulphur .....	.05%
Ultimate tension in pounds per square inch	70000 to 80000lb
Minimum elastic limit.....	40000lb
Minimum elongation in 8 inch.....	20%
Minimum reduction in area.....	35%

264. Forgings.

Steel for forgings shall conform to the Standard Specifications of the American Society of Testing Materials for Carbon-Steel Forgings for Locomotives, Serial Designation A20-14.

All forgings shall be annealed.

265. Steel Castings.

See Paragraph 170.

266. Bronze Bushings.

Bearings shall have bronze bushings of the following composition:

Copper	79.7%
Tin	10.0%
Lead	9.5%
Phosphor	0.8%

The amount of tin shall not be less than 9% nor more than 11%; the amount of lead shall not be less than 8% nor more than 11%; the amount of phosphor shall not be less than 0.7% nor more than 1.0%. The amount of ingredients

other than copper, tin, lead and phosphor shall not exceed one-half ($\frac{1}{2}$) of 1%.

Compression tests shall show not more than one-thousandth (0.001) inch permanent set under a load of 13,000 to 15,000 pounds per square inch and a permanent set of not more than twenty-seven hundredths (0.27) of an inch under a load of 100,000 pounds per square inch.

Special phosphor bronze shall be used for bushings of main trunnion bearings. It shall show an elastic limit in compression of from 19,000 pounds to 23,000 pounds per square inch as determined by a permanent set of one-thousandth (0.001) of an inch, and a permanent set of twelve hundredths (0.12) to sixteen hundredths (0.16) of an inch from a load of 100,000 pounds per square inch.

Phosphor bronze shall be made entirely of new materials.

Test cubes shall be cast from the same melt as the bushings in such manner as to fairly represent the material and shall receive no subsequent treatment to alter its physical characteristics.

Test cubes shall be machined to exactly one (1) inch on edge. One test for each melt shall be made. The contractor shall bear the expense of the tests.

267. Pins and Shafts.

Pins and shafts under four (4) inches in diameter, unless otherwise specified, may be rolled; those four (4) inches in diameter or greater shall be forged.

The rounds from which the pins and shafts are to be turned must be true, straight and free from all injurious flaws or cracks. All forged parts shall be reduced to size from a single bloom or ingot until perfect homogeneity is secured throughout the whole mass. The blooms or ingots shall have at least three times the cross sectional area of the finished product made from them. All shafting shall be turned to a gauge and shall be finished perfectly round, smooth and straight.

268. Rack.

The main operating rack shall have molded teeth; the patterns for the rack sections shall have the teeth made to the correct outline and location on the circular pitch line, with not more than 1-32 inch variation of pitch. The entire rack shall be assembled at the shops with its supporting steel work, and holes connecting the rack to the steel work shall be drilled for turned bolts driving fit. The rack sections shall preferably be shipped bolted in place; if they are taken

apart for shipment, each section of the rack shall be match marked with each other and the supporting steel work, so that they may be readily erected in the field in the same position as when assembled at the shop.

WORKMANSHIP

269. Machinery.

Unless otherwise indicated on the drawings, all cast portions of the machinery shall be made of cast steel, all rolled shafts and pins of machinery steel and all forgings according to these specifications for forgings. The machinery shall be furnished and machined according to good machine shop practice, and to the satisfaction of the City Engineer, and the limits of accuracy which the contractor desires to observe in machining the work, and the allowances for shrinkage or pressed fits shall be noted on the contractor's shop drawings, but the approval of the contractor's shop drawings by the City Engineer shall not relieve the contractor from full responsibility for the satisfactory construction and operation of the machinery.

The contractor shall furnish the City Engineer a guarantee to replace any and all parts which may fail or otherwise prove to be defective within one year of the date in which the bridge is put in service.

If the contractor has any objections to any features of the machinery as designed, he must state his objection immediately in writing to the City Engineer before any parts are manufactured, otherwise the objections shall be ignored if offered as excuse for defective or broken machinery.

All parts of the machinery in contact with other parts or with its supports shall be machined so as to provide true bearings; all surfaces in rotating or sliding contact with other surfaces shall be finished true to dimensions.

All journals shall be polished.

All bushings shall be oil grooved and scraped to a true fit on the journals. Other surfaces shall be left in a neat and workmanlike condition, but need not be machined for the sake of appearance.

All castings shall be properly cleaned, and all fins, seams and other irregularities shall be removed so that the castings shall have clean, smooth surfaces.

Drain holes shall be drilled in all places where water is likely to collect.

All hubs of gears, pinions, couplings, etc., shall be bored for forced fit on the shaft unless otherwise shown. If the

hub performs the functions of a collar, the end next to the bearing shall be faced.

Holes in the hubs of gears and pinions shall be bored concentric with the pitch circle.

The pitch circle shall be scribed on both sides of all gears and pinions.

The principal parts of the machinery shall be assembled at the shops with their structural steel supports, and all holes drilled while the machinery is thus assembled. Holes that cannot be so drilled shall be drilled from steel templates unless otherwise noted.

270. Trunnion Bearings and Connections.

The holes in the trunnion girders for the bolts connecting the main bearings to the steel shall be drilled with the bearings assembled on the steel work at the shop, after the bearings have been set and accurately lined.

271. Turned Bolts.

All machinery parts that are connected to the steel work where shearing action exists during operation, shall be bolted with turned bolts. The threaded portion of the bolt shall be 1-16 inch less in diameter than the shank of the bolt.

272. Grease Cups.

All bearings shall have Lunkenheimer's "Atlas" screw feed grease cups, of the size and capacity as indicated on the drawings.

ELECTRICAL EQUIPMENT

273. Hoisting Motors:—(Direct Current).

Each leaf will be raised and lowered by two (2) No. 80 type M. C. Westinghouse Electric & Manufacturing Company, five hundred fifty (550) volts direct current, inter pole series motors, or equivalent motors acceptable to the City Engineer.

Each motor shall have a normal torque or eight hundred (800) foot-pounds, an overload running torque of twenty-eight hundred forty (2840) foot-pounds and a maximum starting torque of thirty-seven hundred fifty (3750) foot-pounds at the armature shafts.

Each motor shall have a capacity of 100 H. P. on one-half ($\frac{1}{2}$) hour rating when subjected to the standard tests of the A. I. E. E.

The motors shall operate at substantially the same speed under the same load and voltage. They shall be tested at

the manufacturer's before shipment at contractor's expense and shall demonstrate their ability to meet the above requirements.

The contractors shall furnish the following additional parts, viz.:

One (1) armature.

One (1) set of field windings.

Two (2) complete sets of carbon brushes.

All of these parts shall be fitted and furnished in such a manner that they may be installed in their place without further fitting or adjustment.

273a. Hoisting Motors:—(Alternate in Case Alternating Current is Used).

Each leaf shall be raised and lowered by two (2) Frame No. 354 type M. W. two-phase four hundred forty (440) volt sixty (60) cycle sixteen (16) pole Westinghouse Electric & Manufacturing Co. alternating current motors, or equivalent motors acceptable to the City Engineer.

Each motor shall have a maximum starting torque of thirty-six hundred (3,600) foot-pounds at the armature shaft.

Each motor shall have a rating of one hundred forty (140) horse power on one-half ($\frac{1}{2}$) hour rating when subjected to the standard tests of the A. I. E. E.

The motors shall be tested at contractor's expense at the manufacturer's before shipment and shall demonstrate their ability to meet the above requirements.

The contractor shall furnish the following additional parts, viz.:

One (1) rotor complete.

One (1) set of stator windings.

Two (2) complete sets of brushes.

All of these parts shall be fitted and furnished in such a manner that they may be installed in their place without further fitting or adjustment.

274. Solenoid Brakes.

Standard solenoid brakes of the same manufacture as the motors shall be placed on each motor shaft and so arranged and wired that the brakes shall be applied automatically when the current is cut off from the motors. These solenoid brakes shall be so wired in connection with the plunger type short circuit switches that they can be released by the short circuit switches. The following additional parts shall be furnished:

One (1) Solenoid Spool and Winding.

Two (2) Brake Shoes.

Six (6) Brake Springs.

These parts shall be furnished and fitted in such a manner as to admit of being installed in their respective places without further fitting or adjustment.

275. Center Lock Motor:—(Direct Current).

The center lock and rail locks at the center of the bridge on the south leaf shall be operated by a No. 2 Type K. Westinghouse Electric and Manufacturing Company series wound five hundred fifty (550) volts direct current motor or equivalent motor acceptable to the City Engineer. The motor shall be equipped with an adequate electric brake.

Each motor shall have a normal torque of 19 foot-pounds, an overload running torque of 35.4 foot-pounds and a maximum starting torque of 62 foot-pounds at the armature shafts.

Each motor shall have a capacity of $3\frac{1}{4}$ H. P. with temperature rise of 75° C. on one-half hour rating, when subjected to the Standard tests of the A. I. E. E.

The motors and brakes shall be tested at contractor's expense at the manufacturer's before shipment and shall demonstrate their ability to meet the above requirements.

The contractor shall furnish the following additional parts:

- One (1) Armature.
- One (1) Set Field Windings.
- One (1) Set Carbon Brushes.
- One (1) Electric Brake Complete.

All of these parts shall be furnished and fitted in such a manner as to admit of being installed in their respective places without further adjustment.

275a. Center Lock Motor:—(Alternate in case Alternating Current is Used).

The center lock and rail locks at the center of the bridge on the south leaf shall be operated by a 5 H. P. type M. W. two phase sixty (60) cycle four hundred forty (440) volt A. C. Westinghouse motor or equivalent acceptable to the City Engineer. The motor shall be equipped with adequate electric brake.

Each motor shall have a capacity of 5 H. P. with temperature rise of 75° C. on one-half hour rating when subjected to the standard tests of the A. I. E. E.

The motors and brakes shall be tested at contractor's expense at the manufacturer's before shipment and shall demonstrate their ability to meet the above requirements.

The contractor shall furnish the following additional parts, viz.:

One (1) Rotor (complete).

One (1) Set of Stator Windings.

One (1) Set of Brushes.

One (1) Electric Brake (complete).

All of these parts shall be furnished and fitted in such a manner as to admit of being installed in their respective places without further adjustment.

276. Controllers and Resistances.

Controllers capable of governing one or both motors shall be furnished and installed. They shall be of the Cutler-Hammer Manufacturing Company magnet control type, or equivalent acceptable to the City Engineer.

Master switches shall be placed in the operators' houses and wired to their respective controllers as follows:

In the south operators' house, one master switch to govern the hoisting motors of the south leaf, one master switch to govern the hoisting motors of the north leaf.

In the north operator's house, one master switch to govern the hoisting motors for the north leaf.

All controllers and master switches shall be wired so that the solenoid brakes on the armature shaft of each motor will be set when the motor is not taking current and will be released on the first point of the master switch and the motors start on the second point.

Suitable resistance shall be furnished and installed so that the motors can be started and operated from standstill to full speed without causing injurious sparking at the commutators of the motors and without shock or jar to the bridge. A drum type controller and resistance for the center lock motor shall be furnished and installed in the south operator's house.

277. Electric Wiring.

All wiring from the source of supply shall be Okonite double braided, rubber covered, stranded, copper wire, and must be drawn into place, free from mechanical injury, in approved Sherardized steel conduits, so located and arranged as to be easily accessible and repaired. All feed wires shall be of ample capacity to carry the necessary current required by the motors when exerting their maximum torque with a drop in potential not to exceed 5%. All wiring, when possible, shall be carried in Sherardized steel conduits. No wire smaller than No. 12 B. & S. gauge stranded wire shall be used.

278. Switchboards and Appurtenances:—(Direct Current).

A single pole automatic no voltage release circuit breaker

of the I. T. E. laminated type or acceptable equivalent of 600 ampere rating shall be placed between the supply and the bridge apparatus.

All circuits shall be protected by enclosed fuses and shall have quick break switches.

Switches shall be designed not to exceed 800 amperes per square inch cross section. The switchboard shall be two (2) inch best quality enameled black slate, free from flaws, cracks, seams or metallic veins, mounted on steel supports and securely braced in position. It shall be large enough to provide for all necessary meters, switches, circuit breakers, cutouts, fuses, and other apparatus to be mounted thereon, so that each device may be quickly and safely reached and operated by the bridge tender. All switches, cutouts and signal lamps shall be suitably named and labeled in accordance with their purpose and use.

A 750 volt voltmeter and a 100 ampere shunt ammeter of the Weston type or equivalent, acceptable to the City Engineer shall be mounted on each switchboard.

The contractor shall furnish a descriptive list of the switchboard equipment he proposes to use.

278a. Switchboards and Appurtenances:—(Alternate in Case Alternating Current is Used).

A four pole automatic, no voltage release circuit breaker of the I. T. E. laminated type or acceptable equivalent of 600 ampere rating shall be placed between the supply and the bridge apparatus.

There shall be furnished and installed two (2) switchboards, one in each operator's house. The switchboard shall be of two (2) inch best quality enameled black slate, free from flaws, cracks, seams or metallic veins, mounted on steel supports and securely braced in position. It shall be large enough to provide for all necessary meters, switches, circuit breakers, cutouts, fuses and other apparatus to be mounted thereon, so that each device may be quickly and safely reached and operated by the bridge tender. All switches, cutouts and signal lamps shall be suitably named and labeled in accordance with their purpose and use.

A 600 volt voltmeter and two (2) 600 ampere ammeters of the Weston quality or equivalent shall be mounted on each switchboard.

All circuits shall be protected by enclosed fuses and shall have quick break switches. Switches shall be designed not to exceed 800 amperes per square inch cross section.

279. Limit Switches.

Limit switches shall be furnished and so connected that the current shall be cut off from the motors and the brakes applied at any predetermined position in the movement of the leaf.

Plunger type short circuit switches shall be furnished and so connected that current may be supplied to the motors after the limit switches have operated. These plunger type switches shall be of spring construction so that unless they are held closed by the operator they shall remain in open position. A limit switch shall be provided in connection with the lock motor such that current may be cut off and brakes set at any position of the travel of the center lock.

280. Signal Lights.

There shall be furnished and placed in each operator's house signal lamps to show the following positions:

Closed and locked position of leaf.

Closed but unlocked position of leaf.

1° to 7° open.

7° to 30° "

30° to 50° "

50° to 70° "

70° to 76° "

76° to full open.

Full opening of leaf.

Roadway gates closed.

Roadway gates opened.

In addition there shall be installed in the south leaf operator's house a duplicate set of lamps to indicate the position of the north leaf, and the navigation signals at center of span.

281. Service Lights.

There shall be furnished and placed as directed, in the operator's house, around the machinery and in the toilet house thirty-two (32) 60 W. tungsten lamps. Lights placed outside shall have weatherproof lock sockets. Each set of lights shall be controlled from the operator's house (for their respective side) by a switch located on the switchboard.

All lamps, globes, sockets, wires, conduits, fuses, cutouts and other appurtenances necessary for the complete operation of all service and signal lights shall be provided. All wiring shall be run in approved conduits and the conduits shall be securely fastened to the structure.

All wires between the fixed and movable portions of the bridge shall be run through flexible steel armored cable.

282. Navigation Signals.

Navigation signals, as required by the U. S. War Department, shall be furnished and placed as follows:

At the up and down stream ends of each trunnion pier shall be one red light, placed at or near the top of the pier.

At the end of each leaf near the center of the canal and attached to the lower chords, both up and down stream, shall be placed double electric lanterns colored red and green.

All lights, both red and green, shall be visible on a dark night with a clear atmosphere not less than 2,000 yards.

The lights are to be shown from 180° (half round) pressed Fresnel lenses 8 inches in diameter, are of illumination to be 180°. They shall be so wired that the red light will glow until the span is fully open, at which point in the movement of the leaves the red light will be cut out and the green light will glow. This changing of lights shall be done automatically, and signal lights will be located in the operator's house for its respective leaf showing which color of light is glowing.

283. Roadway Signals.

An eighteen (18) inch electric gong shall be furnished on each end of the bridge and attached to the operators' houses. Gongs shall be controlled from the operators' houses on each end, and in addition both shall be controlled from the south operator's house.

284. Telephone and Signal Bell.

There shall be furnished and installed in each operator's house one wall type telephone, push button and bell for signaling between the two operators' houses. Telephones shall be of the Stromberg-Carlson make, or equivalent.

285. Submarine Cables (Direct Current).

There shall be furnished and installed between the two operators' houses two submarine cables as follows: one power cable to consist of two (2) 400,000 C. M. conductors, each conductor insulated with seven-sixty-fourths ($7/64$) inch, thirty (30%) per cent para rubber, taped, jute fillers to make round, core taped one-eighth ($1/8$) inch plain lead sheath, jute bedding, galvanized steel wire armor with jute serving

over all; one control cable to consist of the control, signal and telephone wires, each wire insulated with three-sixty-fourths ($3/64$) inch, thirty (30%) per cent para rubber, taped, core taped, one-eighth ($1/8$) inch plain lead sheath, jute bedding, galvanized steel wire armor with jute serving over all.

Davis Open Air, or equivalent, terminals shall be provided for each end, and cables shall be securely fastened to the bridge piers.

Each cable shall be given a factory test at contractor's expense as follows: for the power cable, 7,000 volts for five (5) minutes conductor to ground; for the control cable, 3,000 volts for five (5) minutes conductor to ground.

285a. Submarine Cables (Alternate in Case Alternating Current is Used).

There shall be furnished and installed between the two operators' houses two submarine cables as follows: One power cable to consist of four (4) 400,000 C. M. conductors, each conductor insulated with seven sixty-fourths ($7/64$) inch, thirty per cent (30%) para rubber, taped, jute fillers to make round, core taped one-eighth ($1/8$) inch plain lead sheath, jute bedding, galvanized steel wire armor with jute serving over all; one control cable to consist of the control signal and telephone wires, each wire insulated with three sixty-fourths ($3/64$) inch, thirty per cent (30%) para rubber, taped, core taped, one-eighth ($1/8$) inch plain lead sheath, jute bedding, galvanized steel wire armor with jute serving over all.

Davis Open Air, or equivalent, terminals shall be provided for each end, and cables shall be securely fastened to the bridge piers.

Each cable shall be given a factory test as follows: for the power cable, 7,000 volts for five (5) minutes conductor to ground; for the control cable, 3,000 volts for five (5) minutes conductor to ground.

286. Roadway Gates.

There shall be furnished and installed complete, four Buda Foundry electric operated gates, for roadway and sidewalks. All gates shall be controlled from the south operator's house, and the north gate shall have an auxiliary control in the north operator's house.

Each arm shall have a 16 c. p. red globe electric lamp with a wire guard protection.

287. Installation of Machinery.

All machinery and machinery parts shall be prepared,

erected, adjusted, painted, oiled and put into perfect operating condition. The contractor shall furnish grease and oil for mechanical parts, and shall thoroughly clean all mechanical parts during erection. The contractor shall also maintain all machinery in adjustment and shall perform all labor and operate the bridge for the city's service for a period of thirty days after it has been accepted by the City Engineer in writing. The City Engineer will furnish the necessary electric current for such operation.

288. Painting.

Before shipment all machinery shall be thoroughly cleaned and have applied to it one coat of D. P. W. iron filler well brushed in and rubbed down, and be given one coat of approved graphite paint on unfinished surfaces. Finished surfaces shall have one coat of white lead. After erection all machinery shall be given two coats of machinery paint of colors selected by the City Engineer. Care shall be taken in painting the machinery after erection so that oil holes or finished parts will not be filled or covered with paint.

289. Vessel Signals.

On the right hand operator's house on each end of the bridge shall be provided a vessel signal to indicate to navigators that their signals have been heard and whether the bridge will be opened. These vessel signals shall consist of a pole supporting a copper ball twenty-four (24) inches in diameter and made of twenty-two (22) gauge copper, painted signal red. The ball shall be raised and lowered by a bronze tiller rope extending to the operator's stand and the signals shall be so situated that when the ball is raised they shall be visible to navigators approaching the bridge from either up or down stream.

290. Fog Bell.

There shall be furnished and erected on the right hand operator's house on the south side of the bridge a 110-pound Meneely bronze bell or equivalent. The bell shall have a bronze tiller line from the bell to the operator's stand.

Examined and approved by the Board of Public Works

Attest:Chairman.
L.B. YOUNGS,

.....Secretary.
C.B. BAGLEY,

THE CITY OF SEATTLE—DEPARTMENT OF PUBLIC WORKS

PROPOSALS AND CONTRACT

**FOR PROPOSITIONS NUMBERS 2 TO 4 INCLUSIVE AS
PROVIDED BY ORDINANCE NO. 34220 AND RATI-
FIED AT THE ELECTION HELD MARCH 2, 1915.**

PAYMENTS MADE IN CASH BY WARRANTS payable from the Proceeds of the sale of general bonds authorized by Ordinance No. 34220 of the City of Seattle, approved January 26, 1915, and ratified by the vote of the people thereon at the election held March 2, 1915.

Examined and Approved by the BOARD OF PUBLIC WORKS and the CITY ENGINEER.

INSTRUCTIONS TO BIDDERS

**APPLYING TO PROPOSALS AND CONTRACTS FOR ALL
PROPOSITIONS**

No bid can be withdrawn, after having been opened by the Board of Public Works, on account of alleged error, or from any other cause whatever. A certified check or surety bond for not less than five per cent. of the total amount of the bid payable to the order of the City Comptroller must accompany each bid.

Any bidder who fails to enter into a contract within ten days after it has been awarded to him will be declared irresponsible and his check will be forfeited, as provided by the City Charter. The approximate quantities are for the purpose of comparing bids only. Payment for work will be based upon the actual quantities measured in the finished work.

Proposals must be made on forms provided by the City Engineer without interlineation or amendment, but may be accompanied by communications to the Board at the pleasure of the bidder.

Proposals must be signed, sealed and in the hands of the Secretary of the Board of Public Works before ten o'clock A. M. of the day specified for receiving bids.

DO NOT BID BEFORE YOU FULLY UNDERSTAND

the manner in which payment is proposed to be made for the cost of the improvement bid for.

Bidders may make proposals for any one or more of the following propositions:

Proposition No. 1

The construction of the Timber Approaches and Appurtenant Works at both ends of the bascule bridge over the Lake Washington Canal in the City of Seattle at Eastlake Avenue produced. Note Proposition No. 1 has been taken out of competition.

Proposition No. 2

The construction of the Substructure of the bascule bridge over the Lake Washington Canal in the City of Seattle at Eastlake Avenue produced.

Proposition No. 3

The construction and erection of the Superstructure of the bascule bridge over the Lake Washington Canal in the City of Seattle at Eastlake Avenue produced.

Proposition No. 4

The construction of the Substructure, and the construction and erection of the Superstructure of the bascule bridge over the Lake Washington Canal in the City of Seattle at Eastlake Avenue produced.

NOTICE TO CONTRACTORS**Proposition No. 2****SUBSTRUCTURE OF EASTLAKE AVENUE BRIDGE**

Ordinance No. 34220.

Warrants on Seattle Bridge Bonds,
Series "B" 1915 Construction Fund

The following approximate quantities are for the purpose of comparing bids only. Payment for the same will be based upon the actual quantities as measured in the finished work:

1. Excavation	9,012 Cu. Yds.
2. Class "A" concrete deposited under water by tremie, 1:2:4 mixture.....	4,624 " "
3. Class "C" concrete in piers above water, 1:3:5 mixture	5,425 " "
4. Alternate to Items 2 and 3, concrete placed in unwatered foundations and piers, Class "C" concrete, 1:3:5 mixture.....	10,049 " "
5. Class "B" concrete, 1:2:4 mixture.....	1,560 " "
6. Reinforcing Steel	269,000 Pounds
7. Placing and painting structural steel, grillages and anchor bolts, including grouting	270,000 "
8. Fir bumping logs.....	2'
9. Peeled piles in protection works.....	6,600 Lin. Ft.
10. Timber in protection works.....	14 M. Ft. B. M.
11. Chains on dolphins.....	560 Lin. Ft.
12. Surface treatment of operators' houses, etc.....	1,390 Sq. Ft.
13. Test piles	4
14. Cast iron manhole covers, etc.....	4
15. Ladder rungs	108
16. Steel ladders, 4 mark L. 1, 4 mark L. 2.....	Lump Sum
17. Vitrified pipe for openings in masonry.....	6 Lin. Ft.
18. Eye bolts in shafts of anchor piers.....	8
19. Checkered plates in sidewalk.....	4
20. Expanded metal under bearings.....	270 Sq. Ft.
21. Woven wire gates and window guards.....	180 " "
22. Galvanized iron pipe hand railings.....	340 Lin. Ft.
23. Wood partitions	Lump Sum
24. Doors, windows, hardware, etc., operators' houses, towers, etc.....	" "
25. Reinforced concrete partitions.....	80 Sq. Yds.
26. Walls and roof of machinery houses.....	152 " "
27. Extra excavation below elevation -36.....	300 Cu. Yds.
28. Extra Class "A" concrete below elevation -36..	300 " "
29. Alternate to Item 28 in case foundations are unwatered. Extra Class "C" concrete below elevation -36.....	300 " "

Proposition No. 2

PROPOSAL

Seattle, Washington, MAR 3 1916

To the Board of Public Works of the City of Seattle:

The undersigned hereby certify that they have personally and carefully examined the plans, specifications and stipulations and the form of contract for the construction of the substructure of the bascule bridge over the Lake Washington Canal, in the City of Seattle, at Eastlake Avenue produced; that they fully understand the manner in which payment is proposed to be made for the cost of said construction, and they hereby expressly agree that they will pay into the City Treasury the amounts required by law to be paid to the State of Washington by Chapter 74 of the Laws of 1911 of the State of Washington (Workmen's Compensation Act), and that the City of Seattle shall not be liable to said contractor for making such payment, and, having made the necessary examinations, hereby propose to furnish all material and to perform all labor which may be required to complete said work within the time fixed, in accordance with said plans and specifications, and upon the terms and conditions provided in said specifications and form of contract, at the following prices, to-wit:

Certified Check or Surety Bond enclosed \$ 9000.00

Proposition No. 2 SUBSTRUCTURE OF EASTLAKE AVENUE BRIDGE

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		Dollars	Cents
1. Excavation.....	Per cubic yard.....	Three dollars twenty five cents	3	25
2. Class "A" concrete deposited under water by tremie, 1:2:4 mixture.....	Per cubic yard.....	Six dollars fifty cents	6	50
3. Class "C" concrete in piers above water, 1:3:5 mixture.....	Per cubic yard.....	Six dollars fifty cents	6	50
4. Alternate to items 2 and 3, concrete placed in underwater foundations and piers, Class "C" concrete, 1:3:5 mixture.....	Per cubic yard.....	Six dollars fifty cents	6	50
5. Class "B" concrete, 1:2:4 mixture.....	Per cubic yard.....	Eight dollars	8	00
6. Reinforcing steel.....	Per pound.....	Three and one quarter cents		03 1/4
7. Placing and painting structural steel, grillages and anchor bolts, including grouting.....	Per pound.....	Six tenths of one cent		006
8. Fir bumping logs.....	Each.....	Thirty dollars	30	00
9. Peeled piles in protection works.....	Per lineal foot.....	Fifteen cents		15
10. Timber in protection works.....	Per M. ft. B. M.....	Thirty two dollars	32	00

Proposition No. 2—Continued

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
	Per lineal foot.	Dollars	Cents
11. Chains on dolphins.....	Per lineal foot.....	Sixty five cents	65
12. Surface treatment of operators' houses, etc.....	Per square foot.....	Three cents	03
13. Test piles.....	Each.....	Five Dollars	500
14. Cast iron manhole covers, etc.....	Each.....	Eleven Dollars	1100
15. Ladder rungs.....	Each.....	Thirty cents	30
16. Steel ladders.....	Lump sum.....	Fifty Dollars	5000
17. Vitrified pipe for openings in masonry.....	Per lineal foot.....	One Dollar	100
18. Eye bolts in shafts of anchor piers.....	Lump sum each.....	Two Dollars	200
19. Checkered plates in sidewalk.....	Lump sum each.....	Fourteen Dollars	1400
20. Expanded metal under bearings.....	Per square foot.....	Ten cents	10
21. Woven wire gates and window guards.....	Per square foot.....	Twenty five cents	25

Proposition No. 2—Continued

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
	Per lineal foot.	Dollars	Cents
22. Galvanized iron pipe hand railings.....	Per lineal foot.....	One dollar fifty cents	150
23. Wood partitions.....	Lump sum.....	One hundred dollars	10000
24. Doors, windows, hardware, etc., operators' houses, towers, etc.....	Lump sum.....	Five hundred thirty dollars	53000
25. Reinforced concrete partitions.....	Per square yard.....	Two dollars	200
26. Walls and roof of machinery houses.....	Per square yard.....	Three dollars	300
27. Extra excavation below elevation —36.....	Per cubic yard.....	Three dollars twenty five cents	325
28. Extra Class "A" concrete below elevation —36.....	Per cubic yard.....	Six dollars fifty cents	650
29. Alternate to item No. 28 in case foundations are unwatered. Extra Class "C" concrete below elevation —36.....	Per cubic yard.....	Six dollars fifty cents	650

Address 1625 Smith Bldg.

Beers Bldg. Co.

Contractor

Tel. No. Elliott 5248

By W. M. Beers, Pres.

NOTICE TO CONTRACTORS

Proposition No. 3

SUPERSTRUCTURE OF EASTLAKE AVENUE BRIDGE

Ordinance No. 34220.

Warrants on Seattle Bridge Bonds,
Series "B" 1915 Construction Fund.

The following approximate quantities are for the purpose of comparing bids only. Payment for the same will be based upon the actual quantities as measured in the finished work:

1. Furnishing and erecting machinery.....	243,000 Pounds
2. Furnishing and erecting structural steel.....	1,830,000 "
3. Furnishing structural steel, erected by contractor for substructure	270,000 "
4. Furnishing, placing and adjusting gravel, concrete counterweight	500 Cu. Yds.
6. Furnishing, placing and adjusting cinder concrete counterweight	100 " "
6. Furnishing and weighing gravel concrete test blocks	1 " "
7. Furnishing and weighing cinder concrete test blocks	1 " "
8. Roadway floor on movable leaves.....	900 Sq. Yds.
9. Roadway floor including reinforcement on fixed portion	410 " "
10. Sidewalk floor on movable leaves.....	450 " "
11. Reinforcing bars in concrete counterweight....	12,500 Pounds
12. Electric equipment complete in place (Direct Current)	Lump Sum
13. Alternate to Item 12—Electric equipment complete in place (Alternating Current)...	" "
14. Fixtures, etc., in two toilet rooms, complete in place	" "
15. Meneely fog bell in place.....	" "
16. Copper ball vessel signals in place.....	2
17. Double arm roadway gates complete in place..	4
18. Oak buffer blocks.....	14

Proposition No. 3

PROPOSAL

Seattle, Washington. MAR 3 1916.

To the Board of Public Works of the City of Seattle:

The undersigned hereby certify that they have personally and carefully examined the plans, specifications and stipulations and the form of contract for the construction and erection of the superstructure of the bascule bridge over the Lake Washington Canal in the City of Seattle at Eastlake Avenue produced; that they fully understand the manner in which payment is proposed to be made for the cost of said construction, and they hereby expressly agree that they will pay into the City Treasury the amounts required by law to be paid to the State of Washington by Chapter 74 of the Laws of 1911 of the State of Washington (Workmen's Compensation Act), and that the City of Seattle shall not be liable to said contractor for making such payment, and, having made the necessary examinations, hereby propose to furnish all material and to perform all labor which may be required to complete said work within the time fixed, in accordance with said plans and specifications, and upon the terms and conditions provided in said specifications and form of contract, at the following prices, to-wit:

Certified Check or Surety Bond enclosed \$ 10,000.00

Proposition No. 3
SUPERSTRUCTURE OF EASTLAKE AVENUE BRIDGE

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars", and "Cents"		
	Per pound	Per cubic yard	Per square yard
1. Furnishing and erecting machinery.....	Twelve and seven tenths cents		
2. Furnishing and erecting structural steel.....	Five and seven tenths cents		
3. Furnishing structural steel erected by contractor for substructure.....	Five Cents		
4. Furnishing, placing and adjusting gravel concrete counterweight.....	Six dollars fifty cents	6 50	
5. Furnishing, placing and adjusting cinder concrete counterweight.....	Six dollars fifty cents	6 50	
6. Furnishing and weighing gravel concrete test blocks	Twenty dollars	20 00	
7. Furnishing and weighing cinder concrete test blocks	Twenty dollars	20 00	
8. Roadway floor on movable leaves.....	Five dollars	5 00	
9. Roadway floor, including reinforcement, on fixed portion.....	Three dollars seventy five cents	3 75	
10. Sidewalk floor on movable leaves.....	One dollar ten cents	1 10	

Proposition No. 3—Continued

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
	Per pound	Per cubic yard	Per square yard
11. Reinforcing bars in concrete counterweight.....	Three and one quarter cents	0 03 1/4	
12. Electric equipment complete in place (direct current).....	Seventeen thousand four hundred dollars	17400 00	
13. Alternate to item 12, electric equipment complete in place (alternating current).....	Twenty four thousand five hundred dollars	24500 00	
14. Fixtures, etc., in two toilet rooms, complete in place.....	Two hundred dollars	200 00	
15. Meneely fog bell in place.....	One hundred seven dols.	107 00	
16. Copper ball vessel signals in place.....	Sixty two dollars	62 00	
17. Double arm roadway gates complete in place.....	Three hundred ten dollars	310 00	
18. Oak buffer blocks.....	Two dollars	2 00	

Address..... 1625 Smith Bldg.....

Tel. No. Elliott 5248

By..... Beers Bldg. Co. Contractor

By..... W. M. Beers, Pres.

NOTICE TO CONTRACTORS

Proposition No. 4

CONSTRUCTION OF CONCRETE SUBSTRUCTURE AND
STEEL SUPERSTRUCTURE OF EASTLAKE
AVENUE BRIDGE

Ordinance No. 34220.

Warrants on Seattle Bridge Bonds,
Series "B" 1915 Construction Fund.

The following approximate quantities are for the purpose of comparing bids only. Payment for the same will be based upon the actual quantities as measured in the finished work:

1. Excavation	9,012 Cu. Yds.
2. Class "A" concrete deposited under water by tremie, 1:2:4 mixture.....	4,624 " "
3. Class "C" concrete in piers above water, 1:3:5 mixture	5,425 " "
4. Alternate to Items 2 and 3, concrete placed in unwatered foundations and piers, Class "C" concrete, 1:3:5 mixture.....	10,049 " "
5. Class "B" concrete, 1:2:4 mixture.....	1,560 " "
6. Reinforcing steel	269,000 Pounds
7. Furnishing, placing and painting structural steel, grillages and anchor bolts, in substructure, including grouting.....	270,000 "
8. Fir bumping logs.....	2
9. Peeled piles in protection works.....	6,600 Lin. Ft.
10. Timber in protection works.....	14 M. Ft. B. M.
11. Chains on dolphins.....	560 Lin. Ft.
12. Surface treatment of operators' houses, etc.	1,390 Sq. Ft.
13. Test piles	4
14. Cast iron manhole covers, etc.....	4
15. Ladder rungs	108
16. Steel ladders, 4 mark L. 1, 4 mark L. 2.....	Lump Sum
17. Vitrified pipe for openings in masonry.....	6 Lin. Ft.
18. Eye bolts in shafts of anchor piers.....	8
19. Checkered plates in sidewalk.....	4
20. Expanded metal under bearings.....	270 Sq. Ft.
21. Woven wire gates and window guards.....	180 " "
22. Galvanized iron pipe hand railings.....	340 Lin. Ft.
23. Wood partitions	Lump Sum
24. Doors, windows, hardware, etc., operators' houses, towers, etc.....	" "
25. Reinforced concrete partitions.....	80 Sq. Yds.
26. Walls and roof of machinery houses.....	152 " "
27. Extra excavation below elevation -36.....	300 Cu. Yds.
28. Extra Class "A" concrete below elevation -36	300 " "

29. Alternate to Item 28 in case foundations are unwatered. Extra Class "C" concrete below elevation -36.....	300 " "
30. Furnishing and erecting machinery.....	243,000 Pounds
31. Furnishing and erecting structural steel....	1,830,000 "
32. Furnishing, placing and adjusting gravel concrete counterweight	500 Cu. Yds.
33. Furnishing, placing and adjusting cinder concrete counterweight	100 " "
34. Furnishing and weighing gravel concrete test blocks	1 " "
35. Furnishing and weighing cinder concrete test blocks	1 " "
36. Roadway floor on movable leaves.....	900 Sq. Yds.
37. Roadway floor including reinforcement on fixed portion	410 " "
38. Sidewalk floor on movable leaves.....	450 " "
39. Reinforcing bars in concrete counterweight	12,500 Pounds
40. Electric equipment complete in place (Direct Current).....	Lump Sum
41. Alternate to Item 40—Electric Equipment complete in place (Alternating Current)	" "
42. Fixtures, etc., in two toilet rooms complete in place.....	Lump Sum
43. Meneely fog bell in place.....	" "
44. Copper ball vessel signals in place.....	2
45. Double arm roadway gates complete in place	4
46. Oak buffer blocks	14

Proposition No. 4
PROPOSAL

Seattle, Washington.....

To the Board of Public Works of the City of Seattle:

The undersigned hereby certif..... that..... ha..... personally and carefully examined the plans, specifications and stipulations and the form of contract for the construction of the Substructure, and the construction and erection of the Superstructure of the bascule bridge over the Lake Washington Canal in the City of Seattle at Eastlake Avenue produced; that..... fully understand.... the manner in which payment is proposed to be made for the cost of said construction, and hereby expressly agree..... that will pay into the City Treasury the amounts required by law to be paid to the State of Washington by Chapter 74 of the Laws of 1911 of the State of Washington (Workmen's Compensation Act), and that the City of Seattle shall not be liable to said contractor for making such payment, and, having made the necessary examinations, hereby propose..... to furnish all material and to perform all labor which may be required to complete said work within the time fixed, in accordance with said plans and specifications, and upon the terms and conditions provided in said specifications and form of contract, at the following prices, to-wit:

Certified Check or Surety Bond enclosed \$.....

Proposition No. 4
CONSTRUCTION OF CONCRETE SUBSTRUCTURE AND STEEL SUPERSTRUCTURE OF
EASTLAKE AVENUE BRIDGE

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
	Dollars	Cents	
1. Excavation.....			Per cubic yard.....
2. Class "A" concrete deposited under water by tremie, 1:2:4 mixture.....			Per cubic yard.....
3. Class "C" concrete in piers above water, 1:3:5 mixture.....			Per cubic yard.....
4. Alternate to items 2 and 3, concrete placed in underwater foundations and piers, Class "C" concrete, 1:3:5 mixture.....			Per cubic yard.....
5. Class "B" concrete, 1:2:4 mixture.....			Per cubic yard.....
6. Reinforcing steel.....			Per pound.....
7. Furnishing, placing and painting structural steel, grillages and anchor bolts in substructure, including grouting.....			Per pound.....
8. Fir bumping logs.....			Each.....
9. Peeled piles in protection works.....			Per lineal foot.....
10. Timber in protection works.....			Per M. ft. B. M.....
11. Chains on dolphins.....			Per lineal foot.....

Proposition No. 4 Continued

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars," and "Cents"		
	Dollars	Cents	
12. Surface treatment of operator's houses, etc.....	Per square foot.....		
13. Test piles.....	Each.....		
14. Cast iron manhole covers, etc.....	Each.....		
15. Ladder rungs.....	Each.....		
16. Steel ladders.....	Lump sum.....		
17. Vitrified pipe for openings in masonry.....	Per lineal foot.....		
18. Eye bolts in shafts of anchor piers.....	Lump sum each.....		
19. Checkered plates in sidewalk.....	Lump sum each.....		
20. Expanded metal under bearings.....	Per square foot.....		
21. Woven wire gates and window guards.....	Per square foot.....		
22. Galvanized iron pipe hand railings.....	Per lineal foot.....		
23. Wood partitions.....	Lump sum.....		

Proposition No. 4 Continued

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars," and "Cents"		
	Dollars	Cents	
24. Doors, windows, hardware, etc., operators' houses, towers, etc.....	Lump sum.....		
25. Reinforced concrete partitions.....	Per square yard.....		
26. Walls and roof of machinery houses.....	Per square yard.....		
27. Extra excavation below elevation —36.....	Per cubic yard.....		
28. Extra Class "A" concrete below elevation —36.....	Per cubic yard.....		
29. Alternate to item 28 in case foundations are unwaters. Extra Class "C" concrete below elevation —36.....	Per cubic yard.....		
30. Furnishing and erecting machinery.....	Per pound.....		
31. Furnishing and erecting structural steel.....	Per pound.....		
32. Furnishing, placing and adjusting gravel concrete counterweight.....	Per cubic yard.....		
33. Furnishing, placing and adjusting cinder concrete counterweight.....	Per cubic yard.....		
34. Furnishing and weighing gravel concrete test blocks.....	Per cubic yard.....		
35. Furnishing and weighing cinder concrete test blocks.....	Per cubic yard.....		

Proposition No. 4 Continued

ITEMS	Per square yard Per square yard Per square yard Per pound Lump sum Lump sum Lump sum Lump sum Each Each Each	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"	
		Dollars	Cents
36. Roadway floor on movable leaves.....	Per square yard.....		
37. Roadway floor, including reinforcement, on fixed portion.....	Per square yard.....		
38. Sidewalk floor on movable leaves.....	Per square yard.....		
39. Reinforcing bars in concrete counterweight.....	Per pound.....		
40. Electric equipment complete in place (direct current).....	Lump sum.....		
41. Alternate to item 40. Electric equipment complete in place (alternating current).....	Lump sum.....		
42. Fixture etc., in two toilet rooms complete in place.....	Lump sum.....		
43. Meneely fog bell in place.....	Lump sum.....		
44. Copper ball vessel signals in place.....	Each.....		
45. Double arm roadway gates complete in place.....	Each.....		
46. Oak buffer blocks.....	Each.....		

Address.....

Tel. No.....

By.....

Contractor.....

CONTRACT

TO BE USED FOR EACH PROPOSITION WITH THE
CORRESPONDING CONDITIONS.
PROPOSITION NO. 2

THIS CONTRACT, made this 25th day of March.

A. D. 1916....., by and between the City of Seattle, a Municipal Corporation of the State of Washington, party of the first part, and Beer's Building Company..... parties.....of the second part.

WITNESSETH:

Section 1. That the said parties.....of the second part agree..... to construct.....the Substructure.....of the Eastlake Avenue Bridge.....over the Lake Washington Canal.....

as authorized by Ordinance No. 34220 of the City of Seattle, approved January 26, 1915, and ratified by the vote of the people thereon at the election held March 2, 1915, in all respects in accordance with the plans, specifications and stipulations relating thereto, now on file in the office of the City Engineer of said City, which, by express reference thereto, are hereby made a part hereof. Said construction shall be done under the superintendence of the Board of Public Works of said City and subject to its acceptance and approval, and the same shall be completed within the time fixed in said specifications and stipulations. Said party of the second part shall furnish all skill, labor and material required for the complete performance of this contract and shall produce a completed improvement.

Section 2. That said party of the first part shall pay to said parties of the second part for said construction at the following rates, to-wit:

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
		Dollars	Cents
1. Excavation.....	Per cubic yard.....	Three dollars twenty five cents	3 25
2. Class "A" concrete deposited under water by tremie, 1:2:4 mixture.....	Per cubic yard.....		
3. Class "C" concrete in piers above water, 1:3:5 mixture.....	Per cubic yard.....	Six dollars fifty cents	6 50
4. Alternate to items 2 and 3, concrete placed in unwatered foundations and piers, Class "C" concrete, 1:3:5 mixture.....	Per cubic yard.....	Eight dollars	8 00
5. Class "B" concrete, 1:2:4 mixture.....	Per cubic yard.....	Three and one quarter cents	0 3 1/4
6. Reinforcing steel.....	Per pound.....	Six tenths of one cent	0 06
7. Placing and painting structural steel, grillages and anchor bolts, including grouting.....	Per pound.....	Thirty dollars	30 00
8. Fir bumping logs.....	Each.....	Fifteen cents	15
9. Peeled piles in protection works.....	Per lineal foot.....	Thirty two dollars	32 00
10. Timber in protection works.....	Per M. ft. B. M.	Sixty five cents	65
11. Chains on dolphins.....	Per lineal foot.....	Three cents	03
12. Surface treatment of operator's houses, etc.....	Per square foot.....	Five dollars	5 00
13. Test piles.....	Each.....		

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
		Dollars	Cents
14. Cast iron manhole covers, etc.....	Each.....	Eleven dollars	11 00
15. Ladder rungs.....	Each.....	Thirty cents	30
16. Steel ladders.....	Lump sum.....	Fifty dollars	50 00
17. Vitrified pipe for openings in masonry.....	Per lineal foot.....	One dollar	1 00
18. Eye bolts in shafts of anchor piers.....	Lump sum each.....	Two dollars	2 00
19. Checkered plates in sidewalk.....	Lump sum each.....	Fourteen dollars	14 00
20. Expanded metal under bearings.....	Per square foot.....	Ten cents	10
21. Woven wire gates and window guards.....	Per square foot.....	Twenty five cents	25
22. Galvanized iron pipe hand railings.....	Per lineal foot.....	One dollar fifty cents	1 50
23. Wood partitions.....	Lump sum.....	One hundred dollars	100 00
24. Doors, windows, hardware, etc., operators' houses, towers, etc.....	Lump sum.....	Five hundred thirty dollars	530 00
25. Reinforced concrete partitions.....	Per square yard.....	Two dollars	2 00
26. Walls and roof of machinery houses.....	Per square yard.....	Three dollars	3 00

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
		Dollars	Cents
27. Extra excavation below elevation -36.....	Per cubic yard.....	Three dollars twenty five cents	325
28. Extra Class "A" concrete below elevation -36.....	Per cubic yard.....		
29. Alternate to item 28 in case foundations are unwatered. Extra Class "C" concrete below elevation -36.....	Per cubic yard.....	Six dollars fifty cents	650
30. Furnishing and erecting machinery.....	Per pound.....	/	
31. Furnishing and erecting structural steel.....	Per pound.....		
32. Furnishing structural steel erected by contractor for substructure.....	Per pound.....		
33. Furnishing, placing and painting structural steel, grillages and anchor bolts in substructure, includ- ing grouting.....	Per pound.....		
34. Furnishing, placing and adjusting gravel concrete counterweight.....	Per cubic yard.....		
35. Furnishing, placing and adjusting cinder concrete counterweight.....	Per cubic yard.....		
36. Furnishing and weighing gravel concrete test blocks.....	Per cubic yard.....		
37. Furnishing and weighing cinder concrete test blocks.....	Per cubic yard.....		
38. Roadway floor on movable leaves.....	Per square yard.....		
39. Roadway floor, including reinforcement, on fixed portion.....	Per square yard.....		

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
		Dollars	Cents
40. Sidewalk floor on movable leaves.....	Per square yard.....	/	
41. Reinforcing bars in concrete counterweight.....	Per pound.....		
42. Electric equipment complete in place (direct current)	Lump sum.....		
43. Alternate to item 42. Electric equipment com- plete in place (alternating current).....	Lump sum.....		
44. Fixtures, etc., in two toilet rooms, complete in place.....	Lump sum.....		
45. Meneely fog bell in place.....	Lump sum.....		
46. Copper ball vessel signals in place.....	Each.....		
47. Double arm roadway gates complete in place.....	Each.....		
48. Oak buffer blocks.....	Each.....		

Address 1625 Smith Bldg.

Beers Bldg. Co. - Contractor
W. H. Beers, Pres.

Tel. No. Elliott 5248

Section 3. That all payments shall be made in cash by warrants payable from the proceeds of the sale of general bonds authorized by Ordinance No. 34220 of the City of Seattle, approved January 26, 1915, and ratified by the vote of the people thereon at the election held March 2, 1915.

Section 4. That the City Engineer or Board of Public Works shall have the right to diminish, increase or eliminate any of the items given in the approximate list of quantities furnished by the City Engineer either before or after commencement of the work, and such changes shall not constitute a claim for loss of anticipated profits.

Section 5. That during the time allowed in the contract for the completion of the work and on or about the 25th day of the month following the issuance of the estimate by the City Engineer, the Comptroller shall issue and deliver to the contractor a warrant in an amount equal to seven (70) per cent of such estimate, and the balance of said contract price, being thirty (30) per cent of such estimate, shall be retained for a period of thirty (30) days after the final completion of the construction, and no construction shall be deemed completed until the Board of Public Works shall have filed with the City Comptroller a statement signed by a majority of them, declaring the same to have been completed. But neither said statement nor any acceptance of said work by the Board of Public Works shall prevent the City from thereafter making claim for uncompleted or defective work if the same is discovered within two years from the completion and acceptance of the work. No payment shall be issued to the contractor in any event for any part of said thirty (30) per cent reserve until the City Engineer shall certify to the City Comptroller that the thirty (30) days since the completion of the work have elapsed, and that no uncompleted or defective work has been discovered for which the City makes claim.

In case notice of any lien against said thirty per cent (30%) is given the City during said thirty (30) days, by or on behalf of any person claiming such lien, or in case the City Engineer shall report any claim of the City by reason of uncompleted or defective work, the amount of all liens so claimed shall be reserved by the City until final determination of such lien claims, and the cost of perfecting such uncompleted or defective work shall be retained until such uncompleted or defective work shall have been perfected or arranged to the satisfaction of the Board of Public Works. No payment shall be made for any portion of said thirty per cent (30%) reserve, until the contractor shall have deposited cash

with the City Treasurer to cover any proper charges against the contractor, as shown by the final estimate. Subject to the provisions contained in this section, the thirty per cent (30%) reserve above mentioned shall, at the expiration of the said thirty (30) days, be paid to the contractor.

Whenever any claim for damages, not exceeding One Hundred Dollars (\$100.00) is filed with the City Comptroller, for which the contractor is liable under this contract, the City Comptroller shall retain, in addition to the percentage reserved as otherwise herein provided, the amount of such claim from the first moneys due and payable to said contractor under this contract until such claim or any suit thereon is determined and satisfied; provided, however, that this provision shall be held and construed to be concurrent and additional to and not a limitation upon any and all other provisions of this contract and the specifications and stipulations thereof.

Section 6. That all engineering expenses incurred after the expiration of the time allowed by the Board of Public Works for the completion of the contract shall be borne by the contractor as a penalty for failure to complete the work within the specified time.

Section 7. That no estimate will be issued after the time allowed by the Board of Public Works for the completion of the contract except the final estimate.

Section 8. That no extension of time for the completion of this contract shall be considered or allowed by the Board of Public Works unless a written application therefor is filed with said Board at least thirty (30) days prior to the time fixed for the completion of the contract. For each day that work shall remain uncompleted after the time herein provided for completion, the sum of Two Hundred Dollars (\$200.00) per day shall be deducted from the moneys due the contractor as and for liquidated damages.

Section 9. That all warrants issued in payment of estimates provided for in Section 5 hereof shall be drawn against the fund known as the Seattle Bridge Bonds, Series "B" 1915 Construction Fund. All such warrants issued to the contractor and by him sold or hypothecated for a valuable consideration, shall be claims and liens against the particular fund against which they are drawn, prior and superior to any right, lien or claim of any surety upon any bond or bonds given to such city by or for the contractor to secure the performance of his contract or to secure the payment of persons

who have performed work thereon, or furnished materials therefor or provisions and supplies for the carrying on of the work.

Section 10. That the contractor expressly agrees to pay into the City Treasury in cash the amounts required to be paid to the State of Washington by Chapter 74 of the Laws of 1911 of the State of Washington (Workmen's Compensation Act) on account of this contract, before payment is made to him by the City on any estimate, and final payment shall not be made until the contractor shall have complied with the provisions of this section. For the purpose of estimating the amounts of said payments the contractor shall file with the City Engineer on or before the 25th day of each month a certified statement of the total pay-roll chargeable against this improvement for the monthly period prior to and including the 20th day of such month.

Failure on the contractor's part voluntarily to file monthly statements shall hereby expressly authorize the City Engineer to make an estimate of the contractor's pay-roll and deduct and withhold from any unpaid balance owing to the contractor the amounts due to the State of Washington in accordance with said Act. But the final acceptance of said improvement by the Board of Public Works shall not prevent the City from thereafter making claim for any additional amount or compensation required to be paid to the State of Washington in pursuance of said act on account of said work if the same is discovered and demand therefor is made upon the contractor within three (3) years from the date of said final acceptance of said improvement.

Section 11. The said contractor hereby expressly authorizes the City of Seattle to pay to the State of Washington the amounts required to be paid in accordance with said Act and said contractor hereby expressly releases the City of Seattle from all liability on account of making any and all such payments to the State of Washington.

Section 12. Final payment shall not be made to the contractor until he shall have deposited the cash with the City Treasurer to cover all amounts required to be paid to the State of Washington in accordance with said Act on account of said contract.

Section 13. The contractor expressly agrees to pay or cause to be paid to his employees within the State of Washington on this contract not less than the current rate of wages paid by the City of Seattle for work of like character,

and in any event not less than Two and Seventy-five One-hundredths (\$2.75) Dollars per day, and on such work to give preference to citizens of the United States who are heads of families. The contractor hereby agrees to be bound to all things, matters, promises, stipulations, and consequences set forth and provided for in Ordinance No. 34605 of the City of Seattle, passed April 5, 1915, as fully and with like effect as if all said things, matters, promises, stipulations, and consequences were set forth herein, and to that end said ordinance is made a part hereof.

Section 14. That this contract is made and entered into with reference to the Charter and Ordinances of the City of Seattle as amended and now in force and the laws of the State of Washington; and the provisions of said Charter and Ordinances relating to the subject matter of this contract are hereby made a part hereof; with the same effect as if said provisions were herein incorporated and expressly set forth.

IN WITNESS WHEREOF, Said party of the first part has caused these presents to be signed by the Chairman of the Board of Public Works, and to be attested by the Secretary of said Board, and said parties of the second part have hereunto set their hands the day and year first above written.

THE CITY OF SEATTLE,

Attest:

By L. B. Young
Chairman Board of Public Works.

C. D. Bagley
Secretary Board of Public Works.

.....(Seal)

Beers Bldg Co (Seal)

W. A. Beers Pres (Seal)

CONTRACT

TO BE USED FOR EACH PROPOSITION WITH THE
CORRESPONDING CONDITIONS.
PROPOSITION NO. 3

THIS CONTRACT, made this 25th day of March

A. D. 1916, by and between the City of Seattle, a Municipal
Corporation of the State of Washington, party of the first
part, and Beer's Building Company
parties of the second part.

WITNESSETH:

Section 1. That the said parties of the second part
agree to construct the Superstructure
of the Eastlake Avenue Bridge
over the Lake Washington Canal,
as authorized by Ordinance No. 34220 of the City of Seattle,
approved January 26, 1915, and ratified by the vote of the
people thereon at the election held March 2, 1915, in all re-
spects in accordance with the plans, specifications and stipu-
lations relating thereto, now on file in the office of the City
Engineer of said City, which, by express reference thereto, are
hereby made a part hereof. Said construction shall be done
under the superintendence of the Board of Public Works of
said City and subject to its acceptance and approval, and the
same shall be completed within the time fixed in said specifi-
cations and stipulations. Said party of the second part shall
furnish all skill, labor and material required for the complete
performance of this contract and shall produce a completed
improvement.

Section 2. That said party of the first part shall pay to
said parties of the second part for said construction at the
following rates, to-wit:

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
	Dollars	Cents	
1. Excavation.....			Per cubic yard
2. Class "A" concrete deposited under water by tremie, 1:2:4 mixture.....			Per cubic yard
3. Class "C" concrete in piers above water, 1:3:5 mixture.....			Per cubic yard
4. Alternate to items 2 and 3, concrete placed in unwatered foundations and piers, Class "C" concrete, 1:3:5 mixture.....			Per cubic yard
5. Class "B" concrete, 1:2:4 mixture.....			Per cubic yard
6. Reinforcing steel.....			Per pound
7. Placing and painting structural steel, grillages and anchor bolts, including grouting.....			Per pound
8. Fir bumping logs.....			Each
9. Peeled piles in protection works.....			Per lineal foot
10. Timber in protection works.....			Per M. ft. B. M.
11. Chains on dolphins.....			Per lineal foot
12. Surface treatment of operator's houses, etc.....			Per square foot
13. Test piles.....			Each

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
	Dollars	Cents	
14. Cast iron manhole covers, etc.....			Each
15. Ladder rungs.....			Each
16. Steel ladders.....			Lump sum
17. Vitrified pipe for openings in masonry.....			Per lineal foot
18. Eye bolts in shafts of anchor piers.....			Lump sum each
19. Checkered plates in sidewalk.....			Lump sum each
20. Expanded metal under bearings.....			Per square foot
21. Woven wire gates and window guards.....			Per square foot
22. Galvanized iron pipe hand railings.....			Per lineal foot
23. Wood partitions.....			Lump sum
24. Doors, windows, hardware, etc., operators' houses, towers, etc.....			Lump sum
25. Reinforced concrete partitions.....			Per square yard
26. Walls and roof of machinery houses.....			Per square yard

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
		Dollars	Cents
27. Extra excavation below elevation —36.....	Per cubic yard.....		
28. Extra Class "A" concrete below elevation —36.....	Per cubic yard.....		
29. Alternate to item 28 in case foundations are unwatered. Extra Class "C" concrete below elevation —36.....	Per cubic yard.....		
30. Furnishing and erecting machinery.....	Per pound.....		12.7
31. Furnishing and erecting structural steel.....	Per pound.....		0.57
32. Furnishing structural steel erected by contractor for substructure.....	Per pound.....		0.5
33. Furnishing, placing and painting structural steel, grillages and anchor bolts in substructure, includ- ing grouting.....	Per pound.....		
34. Furnishing, placing and adjusting gravel concrete counterweight.....	Per cubic yard.....	6.50	
35. Furnishing, placing and adjusting cinder concrete counterweight.....	Per cubic yard.....	6.50	
36. Furnishing and weighing gravel concrete test blocks.....	Per cubic yard.....	20.00	
37. Furnishing and weighing cinder concrete test blocks.....	Per cubic yard.....	20.00	
38. Roadway floor on movable leaves.....	Per square yard.....	5.00	
39. Roadway floor, including reinforcement, on fixed portion.....	Per square yard.....	37.5	

ITEMS	WRITTEN AMOUNT Bidder must write in the words "Dollars" and "Cents"		
		Dollars	Cents
40. Sidewalk floor on movable leaves.....	Per square yard.....	1.10	
41. Reinforcing bars in concrete counterweight.....	Per pound.....		0.34
42. Electric equipment complete in place (direct current)	Lump sum.....	17400	00
43. Alternate to item 42. Electric equipment com- plete in place (alternating current).....	Lump sum.....		
44. Fixtures, etc., in two toilet rooms, complete in place.....	Lump sum.....	20000	
45. Meneely fog bell in place.....	Lump sum.....	10700	
46. Copper ball vessel signals in place.....	Each.....	62	00
47. Double arm roadway gates complete in place.....	Each.....	310	00
48. Oak buffer blocks.....	Each.....	2	00

Address..... 1625 Smith Bldg.

Tel. No. Elliott 5248

Beers Bldg. Co. Contractor

By W. W. Beers Pres.

Section 3. That all payments shall be made in cash by warrants payable from the proceeds of the sale of general bonds authorized by Ordinance No. 34220 of the City of Seattle, approved January 26, 1915, and ratified by the vote of the people thereon at the election held March 2, 1915.

Section 4. That the City Engineer or Board of Public Works shall have the right to diminish, increase or eliminate any of the items given in the approximate list of quantities furnished by the City Engineer either before or after commencement of the work, and such changes shall not constitute a claim for loss of anticipated profits.

Section 5. That during the time allowed in the contract for the completion of the work and on or about the 25th day of the month following the issuance of the estimate by the City Engineer, the Comptroller shall issue and deliver to the contractor a warrant in an amount equal to seven (70) per cent of such estimate, and the balance of said contract price, being thirty (30) per cent of such estimate, shall be retained for a period of thirty (30) days after the final completion of the construction, and no construction shall be deemed completed until the Board of Public Works shall have filed with the City Comptroller a statement signed by a majority of them, declaring the same to have been completed. But neither said statement nor any acceptance of said work by the Board of Public Works shall prevent the City from thereafter making claim for uncompleted or defective work if the same is discovered within two years from the completion and acceptance of the work. No payment shall be issued to the contractor in any event for any part of said thirty (30) per cent reserve until the City Engineer shall certify to the City Comptroller that the thirty (30) days since the completion of the work have elapsed, and that no uncompleted or defective work has been discovered for which the City makes claim.

In case notice of any lien against said thirty per cent (30%) is given the City during said thirty (30) days, by or on behalf of any person claiming such lien, or in case the City Engineer shall report any claim of the City by reason of uncompleted or defective work, the amount of all liens so claimed shall be reserved by the City until final determination of such lien claims, and the cost of perfecting such uncompleted or defective work shall be retained until such uncompleted or defective work shall have been perfected or arranged to the satisfaction of the Board of Public Works. No payment shall be made for any portion of said thirty per cent (30%) reserve, until the contractor shall have deposited cash

with the City Treasurer to cover any proper charges against the contractor, as shown by the final estimate. Subject to the provisions contained in this section, the thirty per cent (30%) reserve above mentioned shall, at the expiration of the said thirty (30) days, be paid to the contractor.

Whenever any claim for damages, not exceeding One Hundred Dollars (\$100.00) is filed with the City Comptroller, for which the contractor is liable under this contract, the City Comptroller shall retain, in addition to the percentage reserved as otherwise herein provided, the amount of such claim from the first moneys due and payable to said contractor under this contract until such claim or any suit thereon is determined and satisfied; provided, however, that this provision shall be held and construed to be concurrent and additional to and not a limitation upon any and all other provisions of this contract and the specifications and stipulations thereof.

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Section 8. That no extension of time for the completion of this contract shall be considered or allowed by the Board of Public Works unless a written application therefor is filed with said Board at least thirty (30) days prior to the time fixed for the completion of the contract. For each day that work shall remain uncompleted after the time herein provided for completion, the sum of Two Hundred Dollars (\$200.00) per day shall be deducted from the moneys due the contractor as and for liquidated damages.

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who have performed work thereon, or furnished materials therefor or provisions and supplies for the carrying on of the work.

Section 10. That the contractor expressly agrees to pay into the City Treasury in cash the amounts required to be paid to the State of Washington by Chapter 74 of the Laws of 1911 of the State of Washington (Workmen's Compensation Act) on account of this contract, before payment is made to him by the City on any estimate, and final payment shall not be made until the contractor shall have complied with the provisions of this section. For the purpose of estimating the amounts of said payments the contractor shall file with the City Engineer on or before the 25th day of each month a certified statement of the total pay-roll chargeable against this improvement for the monthly period prior to and including the 20th day of such month.

Failure on the contractor's part voluntarily to file monthly statements shall hereby expressly authorize the City Engineer to make an estimate of the contractor's pay-roll and deduct and withhold from any unpaid balance owing to the contractor the amounts due to the State of Washington in accordance with said Act. But the final acceptance of said improvement by the Board of Public Works shall not prevent the City from thereafter making claim for any additional amount or compensation required to be paid to the State of Washington in pursuance of said act on account of said work if the same is discovered and demand therefor is made upon the contractor within three (3) years from the date of said final acceptance of said improvement.

Section 11. The said contractor hereby expressly authorizes the City of Seattle to pay to the State of Washington the amounts required to be paid in accordance with said Act and said contractor hereby expressly releases the City of Seattle from all liability on account of making any and all such payments to the State of Washington.

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and in any event not less than Two and Seventy-five One-hundredths (\$2.75) Dollars per day, and on such work to give preference to citizens of the United States who are heads of families. The contractor hereby agrees to be bound to all things, matters, promises, stipulations, and consequences set forth and provided for in Ordinance No. 34605 of the City of Seattle, passed April 5, 1915, as fully and with like effect as if all said things, matters, promises, stipulations, and consequences were set forth herein, and to that end said ordinance is made a part hereof.

Section 14. That this contract is made and entered into with reference to the Charter and Ordinances of the City of Seattle as amended and now in force and the laws of the State of Washington; and the provisions of said Charter and Ordinances relating to the subject matter of this contract are hereby made a part hereof; with the same effect as if said provisions were herein incorporated and expressly set forth.

IN WITNESS WHEREOF, Said party of the first part has caused these presents to be signed by the Chairman of the Board of Public Works, and to be attested by the Secretary of said Board, and said parties of the second part have... hereunto set... their... hands... the day and year first above written.

THE CITY OF SEATTLE,

Attest:

By

L. B. Bagley
Chairman Board of Public Works.

L. B. Bagley
Secretary Board of Public Works.

L. B. Bagley (Seal)

Boris Bledsoe (Seal)

L. M. Bear (Seal)

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10/1/1911

Sub structure 2.

Super structure

Eastlake Ave.

Bridge

Beer's Bldg. Co.

Prop. #2 and #3