

CITY OF NEWBERG, OREGON -- NORTH NEWBERG SEWER PROJECT

SANITARY SEWER CONSTRUCTION

SPECIFICATIONS, PROPOSAL AND CONTRACT DOCUMENTS

8/2/1966



CITY OFFICIALS

Roy M. Curtis, Mayor
Chet Windsor, Pres. of Council
Myrland C. Gilbert, City Recorder
Herbert Swift, City Attorney

G. Weller Probasco,
Superintendent of Public Works

CONSULTING ENGINEERS

Carl E. Green & Associates
510 Henry Building
Portland, Oregon 97204

PH: 227-2770

ADDENDUM #1

TO ALL PLANHOLDERS

CITY OF NEWBERG, OREGON - NORTH NEWBERG SEWER PROJECT

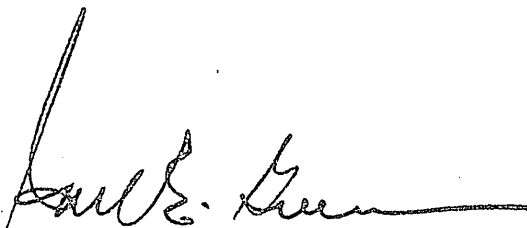
PROPOSAL SECTION - Pages P-4 and P-5

Bid Item 20 - Page P-4

Unit price per cubic yard

Bid Item 5 - Page P-5

Unit price per cubic yard



CARL E. GREEN & ASSOCIATES
Consulting Engineers
510 Henry Building
Portland, Oregon 97204

#24-66 - C.E.G.
July 13, 1966

CITY OF NEWBERG, OREGON -- NORTH NEWBERG SEWER PROJECT

SANITARY SEWER CONSTRUCTION

INDEX

NOTICE TO CONTRACTORS	NC - 1 - NC - 2
INSTRUCTIONS TO BIDDERS	IB - 1 - IB - 5
SPECIAL CONDITIONS AND REQUIREMENTS	SCR - 1
GENERAL CONDITIONS	GC - 1 - GC - 14
WORKMENS COMPENSATION	WC - 1 - WC - 3
SPECIFICATIONS FOR CONCRETE CONSTRUCTION	CC - 1 - CC - 13
MATERIALS SPECIFICATIONS	M - 1 - M - 4
SANITARY SEWERS - CONSTRUCTION SPECIFICATIONS	SS - 1 - SS - 11
BASIS OF PAYMENT	BP - 1 - BP - 2
PROPOSAL	P - 1 - P - 6
AGREEMENT	A - 1 - A - 4

NOTICE TO CONTRACTORS -- NORTH NEWBERG SEWER PROJECT

SANITARY SEWER CONSTRUCTION

CITY OF NEWBERG, OREGON

Sealed proposals addressed to the Mayor and City Council of Newberg, Oregon, and endorsed, "Proposal for Sanitary Sewer Construction -- North Newberg Sewer Project" will be received by the City Recorder, City Hall, Newberg, Oregon until 7:30 p.m., P.D.T., July 18, 1966, and thereafter will be publicly opened and read aloud at an adjourned meeting of said Council at the Council Chambers in the City Hall, Newberg, Oregon.

Bids are invited on the construction of gravity sanitary sewers and all appurtenances connected therewith. All materials and equipment shall be furnished by the Contractor. The principal items and quantities upon which bids are requested are as follows:

<u>Item</u>	<u>Est. Qtys.</u>	<u>Item</u>	<u>Est. Qtys.</u>
Excavation & Backfill	6,150 cu.yds.	Cut & Restore Pavement	1,050 sq.yds.
12" Sewer Pipe	2,640 lin.ft.	Select Granular Backfill	500 cu.yds.
10" Sewer Pipe	1,850 lin.ft.	Crushed Rock & Gravel	390 cu.yds.
8" Sewer Pipe	3,740 lin.ft.	Manholes	29
4" Sewer Pipe	1,680 lin.ft.	Tees	137

Plans and specifications and contract documents may be seen at the office of the Consulting Engineers, Carl E. Green and Associates, 510 Henry Building, Portland, Oregon 97204, or at the office of the City Recorder, City Hall, Newberg, Oregon. Copies may be obtained by bona fide bidders upon receipt of deposit check in the amount of Forty Dollars (\$40.00).

Deposit checks of bidders will be returned provided a bid is submitted and the plans and specifications are returned promptly in good condition. The plans and specifications are the property of the Consulting Engineers, shall not be used by others, and shall be returned in their entirety. If no bid is submitted by a planholder, one-half of the amount of the deposit check will be refunded upon prompt return of the plans and specifications in good condition.

Bidders shall prequalify in accordance with Oregon Public Works laws. All proposals shall be made on the regular blank forms furnished with the specifications, and shall be accompanied by a certified check, cashier's check or bid bond in the amount of five percent (5%) of the total bid. The bid security shall be forfeited as liquidated damages by the successful bidder if he should fail or refuse to enter into a contract and furnish a one hundred percent (100%) performance bond. The successful bidder shall furnish security for faithful performance of the Contract in the full amount of the work bid.

The City reserves the right to reject any and/or all bids, to waive informalities, and to accept the proposal deemed by the City Council to be in the best interest of the City considering prices bid, experience of the bidders, financial condition, record of performance on similar projects, and the litigation records of the bidders and the principals thereof. The City shall have the right to postpone making awards of contract for a period of thirty (30) calendar days after opening of bids.

By order of the City Council of Newberg, Oregon

ROY M. CURTIS, Mayor

MYRLAND C. GILBERT, City Recorder

First publication: June 23, 1966

Second publication: June 30, 1966

Last publication: July 7, 1966

INSTRUCTIONS TO BIDDERS

1. General

The work encompassed by these specifications consists of:

Section A - Construction of sanitary sewers and appurtenances

Section B - Side Sewers - Hillsboro Highway

Bidders are notified that they must examine carefully the plans, specifications and contract documents for the proposed work and become thoroughly familiar with all laws, rules and regulations which apply.

The work shall be completed in the shortest possible time consistent with good workmanship.

2. Local Conditions

Bidders shall examine carefully and judge for themselves the character of the work, local conditions of topography, weather, the kind and quality of the materials to be used, the quality of the work to be done, the classifications and kinds of materials to be encountered in excavation, the probability of adverse weather conditions, ground water, etc.

Some of the work will be done on private property within easements obtained by the Owner. Stipulations re. construction included in the easements shall be met by the Contractor.

3. Qualifications for the Work

Bidders shall be experienced in the type of work being bid and shall have adequate equipment to carry on the work in an expeditious and workmanlike manner. Bidders shall pre-qualify under O. R. S., Chapter 279.

4. Bidder's Checks or Bid Bonds

Bids shall be accompanied by either a certified check, cashier's check or bid bond drawn in favor of the Owner in an amount equal to or exceeding five percent (5%) of the total amount bid. Such check shall be considered liquidated damages and shall become the property of the Owner if the Bidder fails or refuses to enter into a contract for the work and furnish satisfactory performance bond within ten (10) days after notification that his bid has been accepted.

The check or bid bond accompanying the accepted bid will be retained until the contract is signed and performance bond furnished. All other checks and bonds will be returned promptly to the Bidders.

5. Public Works Performance Bond

A one hundred percent (100%) public works performance bond approved by the Owner's attorney shall be required of the successful bidder.

6. Payments

Payments shall be made from funds to be raised by the sale of Bancroft Improvement Bonds on monthly estimates prepared by the Engineer, less ten percent (10%) which will be retained until all work is completed, approved in writing by the Engineer, accepted by the Owner, and evidence presented by the Contractor that he has paid all bills and claims, withholding taxes, contributions to both state and federal governments for payroll withholding, workmen's compensation, F.I.C.A., income taxes and any other payments required by law. The Contractor shall also furnish a release from all further claims against the Owner at the time of final payment.

7. Estimate of Quantities and Balanced Bids

The estimate of quantities of work to be done and materials to be furnished under the specifications is approximate only and is given only as a basis of calculation upon which the award of the Contract shall be made. The Owner reserves the right to increase or diminish without restriction the amount of any class of materials or work that may be deemed necessary, and bidders shall submit balanced bids in order that they may not be affected adversely by increase or decreases of quantities.

8. Interpretation of Plans, Specifications, and Contract Documents; Conflicts, Ambiguities, Inconsistencies and Obscurities

The Engineers have endeavored to prepare plans, maps, drawings, specifications and contract documents in a manner which clearly sets forth the work to be done, the manner in which the construction is to be accomplished and the basis of payment for the various units of the work. Extreme accuracy and absence of conflict is not guaranteed. Should the Bidder or Contractor discover any apparent error or conflict in the plans, drawings, specifications, or quantities upon which bids are requested, or should there be any ambiguity or doubt regarding any of the same or the interpretation thereof, such matters shall be brought to the attention of the Engineers at once for clarification or correction.

The Owner presumes that all bidders shall have read the specifications and thoroughly examined the plans and drawings before submitting a proposal to do the work; therefore, any discrepancies, omissions, conflicts and ambiguities shall be called to the attention of the Engineers before bids are submitted in order that any conflicts, misunderstandings, questions or doubts may be resolved before bids are opened.

In the event of a disagreement arising as to the true intent and meaning of the plans and specifications, the Engineer shall interpret the same and his interpretation shall be accepted by the Contractor as final.

9. Form of Proposal

All proposals shall be made on the forms furnished herewith, and the bidder shall fill in the Proposal completely and return the entire and complete set of specifications and proposal with his bid.

Proposals shall be sealed and plainly marked "Proposal for Sanitary Sewer and Pumping Station Construction" and addressed to the Owner, and the same shall be filed with the Owner prior to the hour and date set in the Notice to Contractors.

10. Completion Time

The work included in these specifications shall be completed in the shortest possible time commensurate with good workmanship. Bidders shall state completion time in their bids and take into consideration unfavorable weather and other possible adverse conditions. Extensions of time will be granted only under conditions for which the Owner is clearly responsible. Maximum completion time shall be as shown on Page P-1 of the Proposal Section.

11. Liquidated Damages

Because of the great need for the work contemplated, the work shall be completed in the earliest possible time after construction begins. To compensate the Owner for any delay in completion of the work and to cover additional cost of supervision beyond the completion time bid, the Owner shall deduct from payments otherwise due the Contractor, liquidated damages at the rate set forth hereunder for each calendar day the work is delayed beyond the completion time bid:

\$75.00 Per Calendar Day

The damages herein set forth shall not be considered in the nature of a penalty, but shall partially reimburse the Owner for expenses and losses due to delay.

12. Public Liability Insurance and Property Damage Insurance

The Contractor shall take out and maintain during the life of this contract such Public Liability and Property Damage Insurance as shall protect him, and any subcontractor performing work covered by this contract, from claims for damages which may arise from operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them.

The insurance coverage shall save harmless the Owner in accordance with the minimum coverages shown hereunder, and certificates of insurance shall be furnished to the Owner.

Insurance Coverage

Liability, one occurrence	\$100,000 - \$200,000
Property Damage, one occurrence	50,000

In addition to the foregoing coverage, the Contractor shall comply with the insurance and bond requirements of the State Highway Department and the Yamhill County Road Department.

13. Right of Entry to Work

Representatives of the Owner, the State and the Engineers shall have right of entry to any and all portions of the work at all times, and the Contractor shall provide proper facilities for access and inspection.

14. Quality of Materials and Equipment

Wherever in the specifications any materials, equipment, device, product, fixture, type of construction or type of process is specified by a manufacturer's name, proprietary name or catalog number it shall be understood that others of equal quality, workmanship and performance approved by the Owner will be acceptable. The Owner shall be the sole judge of equality of any material, equipment, device, product, fixture, type of construction or type of process which the Contractor may propose to substitute for that called for in the specifications.

15. Workmen's Compensation Insurance

The Contractor shall take out and maintain during the life of the contract workmen's compensation insurance for all employees who will work on the project, and if any work is sublet, the Contractor shall require the subcontractor similarly to provide such insurance for all of the latter's employees unless they are included under the protection by the Contractor.

If employees engaged in hazardous work are not protected under the workmen's compensation statute, the Contractor and any subcontractor who is affected shall provide compensation insurance with a private company in an amount which shall be equivalent to that provided by the workmen's compensation statute for the protection of employees who are not so insured.

16. Basis of Award

The Owner will take into consideration the balanced character of the

unit price and lump sum item bids submitted, the experience, ability and equipment of the Contractors, financial condition, records of performance on similar work, litigation records, and time for completion as well as extensions of estimated quantities and estimated totals under the unit prices bid.

The Owner reserves the right to award contract in accordance with what, in its considered judgment, is in the best interest of the Owner.

Contract will be awarded only to responsible bidder submitting the lowest acceptable bid. The Owner reserves the right to waive irregularities or technicalities not affecting substantial rights or in violation of law.

SPECIAL CONDITIONS AND REQUIREMENTS

1. Site and Rights-of-Way

The Contractor shall confine his operations within the lands and easements provided by the Owner for the work to be done under this contract, and he shall conduct his operations in compliance with the terms and conditions of the easements secured by the Owner.

2. Existing Underground Utilities, Facilities and Structures

The Contractor must expect to encounter underground facilities during the course of the work such as, but not limited to, storm sewers, drains, sanitary sewers, water mains, water services, telephone cables, underground power cables, gas mains and gas services, etc. Some information regarding some of the known underground facilities may be shown on the maps and plans, but the accuracy and completeness of such data is not guaranteed.

The Contractor shall conduct his own investigations by "pot holing" well in advance of excavation for his pipe laying operations, by contacting and obtaining data from the utilities, highway and road departments and other agencies which may be involved, and by the use of pipe finders and locators in order to locate and establish depth of possible obstructions and conflicts well in advance of trench excavation and pipe laying. Should conflict with construction of the proposed improvements be found, same shall immediately be called to the attention of the Engineers in order that changes in location, grades and depths may be made in the construction drawings to avoid conflict with other facilities.

The Contractor shall be held responsible for any damage to and the protection, replacement, maintenance and repair of any pipe lines, utilities or structures encountered during the course of the work. The Contractor shall also be responsible for any and all claims made against the Owner in connection with the Contractor's construction and operations.

3. Existing Sewerage Facilities

Connections are to be made to existing manholes and pipe lines of the presently operating sewer system. The Contractor shall so conduct his construction and operations as to maintain the service of the existing facilities.

4. Maintenance of Roadways and Highways

The Contractor shall conduct his work in a manner which causes the least obstruction, inconvenience and hinderance to the flow of traffic on City, County and State roads and highways. He shall comply with the permit, bond, barricade and flagman requirements of such agencies.

GENERAL CONDITIONS

1.0 DEFINITIONS

- 1.1 Work - Whenever the word "Work" occurs in these Specifications, the term shall signify all the Work contemplated by these Specifications, the Contract attached hereto, and the Plans prepared by the Engineer in connection herewith.
- 1.2 Owner - Whenever the word "Owner" occurs in these Specifications, the term shall signify the party to the Contract for whom the Work is being done.
- 1.3 Contractor - Whenever the word "Contractor" occurs in these Specifications, the term shall signify the party or parties contracting to perform the Work.
- 1.4 Engineer - Whenever the word "Engineer" occurs in these Specifications, the term shall signify the Engineer or the firm of engineers employed by the Owner to design and supervise the Work, said Engineer acting either directly or through an authorized assistant whose instructions and decisions shall be limited by the particular duties entrusted to him.
- 1.5 Contract Documents - Whenever the words "Contract Documents" occur in these Specifications, the term shall signify the Specification, the Plans prepared by the Engineer in connection herewith, and the Contract attached hereto, which latter two are incorporated herein by this reference.

2.0 ARBITRATION

- 2.1 The Engineer shall decide all questions which may arise between the parties relative to the true intent and meaning of any and all of the provisions or stipulations contained in the Specifications and/or shown on the Plans, or the amount, quality, acceptability, character, and classification of the several kinds of work performed or to be performed and the materials supplied or to be supplied by the Contractor under the Contract Documents. The Engineer's decision shall be final on all such matters and shall be binding upon both parties.

3.0 PERFORMANCE BOND

- 3.1 The Contractor shall furnish a public works faithful performance bond, meeting the requirements of ORS 279.510, in an amount equal to one hundred percent (100%) of the total contract price for the Work. The bond shall include and cover all guarantees required by the Contract Documents.

4.0 INSURANCE

The Contractor shall not begin the Work under the Contract until he has obtained all insurance required by these Documents in a company or companies acceptable to the Owner and certificates of such insurance have been presented to and approved by the Owner and its attorney. The Contractor shall not permit any Subcontractor to begin work until he has likewise complied with the foregoing insurance requirements.

4.1 Workmen's Compensation Insurance

The Contractor shall procure and maintain during the life of the Contract Workmen's Compensation Insurance as required by applicable state law for all of his employees to be engaged in work at the site of the Work under the Contract and in case any such Work is sublet, the Contractor shall require the Subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees to be engaged in such Work unless such employees are covered by the protection afforded by the Contractor's Workmen's Compensation Insurance. In case any class of employees engaged in hazardous work on the Work under the Contract is not protected under the Workmen's Compensation Statute, the Contractor shall provide for his own employees, and shall cause each Subcontractor to provide for his own employees, adequate employer's liability insurance for the protection of such of their respective employees as are not otherwise protected.

4.2 Contractor's Liability and Property Damage Insurance

The Contractor shall procure and maintain during the life of the Contract Public Liability Insurance in an amount not less than \$100,000 for injuries, including accidental death, to any one person, and subject to the same limit for each person, in an amount not less than \$200,000, for each occurrence, and Property Damage Insurance in an amount not less than \$50,000 for each occurrence.

4.3 Subcontractor's Liability and Property Damage Insurance

The Contractor shall either (1) require each of his Subcontractors to procure and maintain during the life of his subcontract, Public Liability and Property Damage insurance of the type specified in subparagraph 4.2 of this paragraph, in amounts approved by the Owner, or, (2) insure the activities of his subcontractors in his policy, to the extent specified in said subparagraph 4.2.

4.4 Scope of Insurance and Special Hazards

The insurance required under subparagraphs 4.2 and 4.3 of this paragraph shall provide adequate protection for the Contractor and his Subcontractor, respectively, against damage claims which may arise out of or in connection with the performance of the Work, whether such performance be by the insured or by anyone directly or indirectly employed by him and, also, against any special hazards which may be encountered in the performance of the Work, such as blasting.

4.0 INSURANCE (Continued)

4.5 Fire Insurance

The Contractor shall procure and maintain at all times during the performance of the Work, and until its acceptance, fire and related insurance adequate to cover the full value of all structures, facilities, equipment, materials and supplies which might be damaged by fire or related hazards during said period. The policy shall be endorsed to name the Owner as an insured, as well as the Contractor, and the Owner shall be furnished with a copy thereof.

4.6 Insurance Certificates

All certificates of insurance shall include a statement by the surety to the effect that no insurance shall be canceled or materially altered except after ten (10) days written notice has been received by the Owner.

5.0 BONDS, INSURANCE, LICENSES AND PERMITS REQUIRED BY PUBLIC AGENCIES, RAILROADS, ETC.

- 5.1 In addition to the specific performance bond and insurance requirements set forth above, the Contractor shall also furnish any and all bonds, insurance certificates, licenses and permits required by federal, state, county or municipal bodies, as well as railroads and public utilities, should any be required as a result of any part or all of the Work called for in these specifications.

6.0 CONTRACTOR'S OBLIGATIONS

- 6.1 The Contractor shall and will, in good workmanlike manner, do and perform all Work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the Work required by these Specifications and other Contract Documents, within the time herein specified, in accordance with the provisions of the Contract Documents and any and all supplemental Plans made a part hereof, and in accordance with the directions of the Engineer as given from time to time during the progress of the Work. He shall furnish, erect, maintain, and remove such construction plant and such temporary works as may be required. He alone shall be responsible for the safety, proper construction of the Work, the method employed in performing the Work, and for any damage which may result from such methods, or the failure of the Work, its improper construction, or prior to final acceptance its maintenance or operation. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the Specifications and other Contract Documents, and shall do, carry on, and complete the entire Work to the satisfaction of the Engineer and the Owner.

7.0 LAYING OUT OF WORK

- 7.1 The Contractor shall give forty-eight (48) hours notice when he shall require the services of the Engineer for laying out any portion of the Work.

7. LAYING OUT OF WORK (Continued)

7.1 (continued)

He shall furnish a man to assist in giving lines and levels under the direction of the Engineer. He shall carefully preserve all stakes when set, together with all bench marks or monuments existing along the lines of the Work. In the event any of them have to be replaced unnecessarily by the Engineer, the Contractor shall be charged with the expense thereof, and the same may be deducted from his estimate.

8.0 OBLIGATION TO FURNISH HIGH QUALITY MATERIALS, EQUIPMENT AND WORKMANSHIP

8.1 The Contractor will be expected and required to furnish high quality equipment, supplies and materials, and perform good work, and no Inspector or Engineer shall have the power to waive such obligations. Any failure or omission of an Inspector or Engineer to condemn any defective equipment, supplies, materials, or Work shall not be construed as an acceptance thereof nor release the Contractor of his obligations with respect thereto, and the Contractor shall at once tear out, remove, and properly reconstruct or replace any such defective equipment, supplies, materials, or work at his own cost at any time upon discovery of the defect or upon receipt of a notice to do so during the period of construction and for the full guarantee period following acceptance of the Work.

9.0 INSPECTION

9.1 The Contractor shall not undertake any part of the Work without notifying the Engineer of his intention to do so. If an Inspector or Field Engineer is employed on the project, it is understood that he is the representative of the Owner or Engineer, and it shall be his duty to check materials, equipment and the construction of the Work and the manner of carrying on the same within the limits of these Specifications. Rejected materials of any kind shall be removed from the job site by the Contractor immediately after its rejection, and shall not be used on the project. Instructions given by the Inspector or Field Engineer shall be respected and executed by the Contractor, but as stated in paragraph 8.1 of these General Conditions, no Inspector or Field Engineer shall have the power to waive the obligations of the Contractor to furnish high quality equipment, supplies and materials or perform good work.

10.0 ORDERS GIVEN CONTRACTOR

10.1 The Contractor shall have an authorized representative on the ground and in charge of the Work, and whenever the Contractor himself is not present, orders will be given to such representative, superintendent, or foreman in immediate charge, and shall be received and obeyed by him. If any person employed on the Work shall refuse or neglect to obey the instructions of the Engineer in any way relating to the Work, or shall appear to the Engineer to be incompetent, unreliable, negligent, disorderly, or unfaithful, he shall, upon written request of the Engineer, be at once discharged and not again employed upon any part of the Work.

11.0 SUBCONTRACTORS

- 11.1 No part of the Work to be performed shall be sublet or transferred without prior written consent of the Engineer, and no such consent shall release the Contractor from any obligation either to the Owner or to persons employed by the Subcontractors.
- 11.2 The Contractor may utilize the services of specialty Subcontractors on those parts of the Work which, under normal contracting practices, are performed by specialty Subcontractors; however, he shall first obtain the Owner's written approval of all such specialty Subcontractors.
- 11.3 The Contractor shall be as fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- 11.4 The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Specifications and other Contract Documents insofar as applicable to the work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Specifications or other Contract Documents.
- 11.5 Nothing contained in the Contract shall create or be construed to create any contractual relation between any Subcontractor and the Owner.

12.0 ASSIGNMENTS

- 12.1 The Contractor shall not assign the whole or any part of the Contract or any moneys due or to become due thereunder without the written consent of the Owner, and any assignment without such consent shall be void and of no effect. In the event the Contractor is permitted to and does assign all or any part of any moneys due or to become due under the Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for in the Contract and all set offs and defenses of the Owner.

13.0 PROSECUTION OF WORK

- 13.1 The Work shall be begun within the shortest possible and reasonable time after the execution of the Contract attached to these Specifications and shall, unless the Owner in writing specifically directs otherwise, be prosecuted with such force and vigor as to secure its completion by the time bid.
- 13.2 If the Contractor shall fail to complete the Work within the time specified, the Contractor shall reimburse the Owner for additional expense

13. PROSECUTION OF WORK

(Continued)

13.2 (continued)

and damage incurred by reason of the extended time and cost of engineering and other services due to such delay, interest on invested capital, and inability to use the facilities being constructed under the Contract. The amount of reimbursement to the Owner by the Contractor shall be as set forth on page 1 of the Proposal Section and in the Agreement Section.

14.0 COMPLETION TIME AND LIQUIDATED DAMAGES

Because of the need for the Work, the date of beginning, rate of progress, and the time for completion of the Work are and shall be essential conditions of these Specifications and the Contract to be executed between the Owner and the successful bidder.

14.2 The Contractor must prosecute the Work regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. In submitting his Proposal, each bidder represents that the time set forth in his Proposal for the completion of the Work described herein is a reasonable time for the completion of same, taking into consideration the average climatic range and usual industrial and construction conditions prevailing in this locality.

14.3 If the successful Contractor shall neglect, fail, or refuse to complete the Work within the time herein specified, then the Contractor will be required to pay to the Owner, or the Owner shall deduct from payments otherwise due the Contractor, liquidated damages at a rate as specified on Page 1 of the Proposal Section and in Form of Agreement Section for each calendar day the Work is delayed beyond the completion time so specified. Said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain for each day's delay.

14.4 Time shall be of the essence of each and every portion of these specifications and other Contract Documents wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract additional time is allowed for the completion of any Work, the new time limit fixed by such extension shall be of the essence of the Contract. The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to:

14.4.1 Unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and unusually severe weather; and

14. COMPLETION TIME AND LIQUIDATED DAMAGES

(Continued)

14.4 (continued)

14.4.2 Any delays of subcontractors or supplier occasioned by any of the causes specified in subparagraph 14.4.1.

15.0 STOPPING WORK, TAKING OVER WORK, AND TERMINATION OF CONTRACT

15.1 If, in the opinion of the Engineer, the Contractor or any of his Subcontractors is using defective material or improperly performing the Work and neglects or refuses to take up or reconstruct, at his own expense, such Work as shall have been rejected by the Engineer as defective, or in conflict with the Plans or other Contract Documents, or unsuitable, then the Engineer may give written notice to the Contractor and his surety that all Work be stopped and any Work performed after such notice shall not be accepted.

15.2 If the Contractor shall fail to commence the Work within the time specified or to prosecute said Work continuously with sufficient workmen and equipment to insure its completion within the time specified in the Contract documents for completion, or if he should fail to make prompt payment to Subcontractors or for material or labor, or otherwise be guilty of a violation of this Contract, the Owner may serve notice upon the Contractor and his surety of the Owner's intention to terminate the Contract. Such notice shall state the reasons for such intention to terminate the Contract and, unless within five (5) days after serving of such notice upon the Contractor, the violations or delays shall cease and be corrected or arrangements acceptable to the Owner are made for correction, the Contract shall cease and terminate. The Contract shall also cease and terminate automatically without any notice if the Contractor should file a petition in bankruptcy, should be adjudged a bankrupt, should he make a general assignment for the benefit of his creditors, should a receiver be appointed on account of his insolvency, or if arrangement proceedings are instigated under the provisions of the laws governing bankruptcy.

15.3 In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the Contractor and the surety shall have the right to take over and perform the Contract; provided, however, that if the surety does not commence performance thereof within five (5) days from the date the notice of such termination is mailed to such surety, the Owner may, without process of law, take over the Work and prosecute same to completion by Contract or otherwise and in so doing, the Owner may take possession of and utilize in completing the Work, such materials, supplies, and equipment as may be on the site of the Work and necessary therefor. Neither by the taking over of the Work nor by its completion in accordance with the terms of this provision shall the Owner forfeit its right to recover damages from the Contractor or from the Contractor's surety for the former's breach of this Contract. Should the expense incurred by the Owner in taking over and completing the Work be less than the sum that would have become payable under the Contract

15. STOPPING WORK, TAKING OVER WORK, AND TERMINATION OF CONTRACT (Cont'd)

15.3 (continued)

if said work had been completed by the Contractor, then such savings shall accrue solely to the Owner, and the Contractor shall have no claim thereto. Should such expense exceed said sum, then the Contractor and the Contractor's surety shall be liable to the Owner for the amount of such excess. Upon the taking over the Work by the Owner as herein provided, no further payment shall be made to the Contractor until the Work is completed and accepted and any moneys due or that become due the Contractor under the Contract for work, materials and equipment furnished prior to its termination will be withheld and may be applied by the Owner in payment therefor, in payment of any damages sustained by the Contractor's breach, and to the payment of any excess cost to the Owner of completing said Work. After completion and acceptance of the Work any balance remaining due Contractor, after the payments above described, shall be paid to the Contractor.

16.0 TEMPORARY SUSPENSION OF WORK

16.1 The Owner reserves the right to suspend operation on the Work or any parts thereof, temporarily. In the event of such temporary suspension, the Owner shall give the Contractor five (5) days written notice thereof, and the date of completion of the Contract shall be extended for a period of time equal to said temporary suspension period, but the Contractor shall have no claim for damage or anticipated profits on said Work from or by reason of said temporary suspension.

17.0 DAMAGE CLAIMS

17.1 The Contractor shall indemnify and hold the Owner harmless from any and all claims for damages of every nature and description arising from or through the operation of the Contractor or those in his employ, including all Subcontractors, including all claims for death or injury to persons, and for injury or damages to the property or right of any person, persons, or corporations, either public or private, and including any fine or penalties that may result or be imposed by any public authority as a result of the prosecution of the Work, and the Contractor further agrees to accept and comply with the requirements of the State Industrial Accident Commission or similar state agency and to indemnify and save the Owner harmless from any claim of the State or other authority for fees, compensation, or industrial insurance for workmen injured or killed in connection with the prosecution of the Work called for by the Contract.

17.2 In the event of the failure of the Contractor to secure a valid release of any and all such claims before the final acceptance of the Work, then the Owner may settle or compromise such claims as best it can and charge the cost thereof to the Contractor; provided, however that if upon completion of the Work called for by the Contract, any such claims are pending and unsettled, irrespective of whether they are in litigation

17. DAMAGE CLAIMS

(continued)

17.2 (continued)

or not, the Contractor shall be privileged to furnish the Owner a surety bond covering the full amount of said claims, executed by a responsible surety company authorized to transact a general surety business in the State, for the purpose of indemnifying the Owner from such claims, and thereupon the Owner shall release and pay to the Contractor all moneys withheld as a protection against such claims, but such bond shall not operate to release the Contractor from his primary obligation to the Owner as outlined in this paragraph.

18.0 FEES, ROYALTIES AND PATENTS

18.1 The Contractor shall indemnify and hold the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses, for or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance or construction of the Work, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

18.2 License and/or royalty fees for the use of any process which is authorized by the Owner shall be paid to the holder of the patent or his authorized agent or licensee directly by the Contractor.

18.3 If the Contractor uses any design, device, or materials covered by letters patent or copyright, he shall provide for such use by suitable agreement with the owner of such patented or copyrighted design, device or material. It shall be mutually agreed and understood that, without exception, the contract price for the Work shall include all royalties and costs arising from the use of such design, device, or materials in any way involved in or connected with the Work. The Contractor and/or his sureties shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of such patented or copyrighted design, device, or materials or any trademark or copyright in connection with work agreed to be performed under the Contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the Work or after completion of the Work.

19.0 ENGINEER'S AUTHORITY

19.1 The Engineer shall give all orders and directions contemplated under these Specifications and other Contract Documents relative to the execution of the Work. As stated in paragraph 2.1 of these General Conditions, the Engineer shall determinethe amount, quality, acceptability, character, and classification of the several kinds of Work and materials which are to be paid for under the Contract and shall decide all questions which may arise in relation to said Work and the construction thereof. The Engineer's estimates and decisions shall be final and conclusive,

19. ENGINEER'S AUTHORITY (Continued)

19.1 (Continued)

except as herein otherwise expressly provided. In the event any question shall arise between the parties hereto relative to said Specifications or Plans, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for Work under the Contract affected in any manner or to any extent by such question.

20.0 CONTRACTOR'S RISK

20.1 It is understood that the whole of the Work to be performed under the Contract for this Work is to be done at the Contractor's risk, that he has familiarized himself with the local conditions, weather and other conditions and contingencies likely to be encountered, and has bid accordingly and that he is to assume the responsibility and risk of all loss or damage to materials or Work which may arise from any cause whatsoever prior to final completion.

21.0 RIGHTS-OF-WAY

21.1 The Owner shall furnish all land and rights-of-way necessary for the carrying out of the Contract and the completion of the Work and will use due diligence in acquiring said land and rights-of-way as speedily as possible. It is possible that all lands and rights-of-way may not be obtained as herein contemplated before construction begins. In such event the Contractor shall begin work upon such land and rights-of-way as the Owner may have previously acquired, and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the Work, or from authorizing its prosecution, either before or after its commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for the said Work, the Contractor shall not be entitled to make or assert any claim for damage by reason of said delay, or to withdraw from the Contract except by consent of the Owner; but the time for completion of the Work will be extended to such time as the Owner fairly determines will compensate for the time lost by such delay, such determination to be set forth in writing.

22.0 PERMITS

22.1 The Contractor shall obtain and pay for any and all municipal, county, and state permits incidental to or necessary in the actual performance of the Work and shall, during its progress, comply with all laws, statutes, and governmental regulations pertaining to or necessary to the carrying out of the Work. As stated in paragraph 21.1 of these General Conditions, however, the Owner shall obtain rights-of-way. All highway crossings, restoration of pavement, blockading of roads and highways, and railroads, erection and maintenance of barricades, etc. shall be done by the Contractor in accordance with the requirements of the officials having jurisdiction over such matters.

23.0 SAFETY REQUIREMENTS

- 23.1 The Contractor shall at all times conduct his Work in such a manner as to comply with all requirements of the State Industrial Accident Commission or any other agency having authority over such matters and minimize the possibility of accident or injury to any of his workmen or the general public, and he shall so conduct his Work, maintain his operations, and provide all reasonable safeguards so as to protect public and private property as well as to protect persons from injury.

24.0 CONSTRUCTION PROCEDURES

- 24.1 The Contractor shall at all times during the performance of the Work and until its acceptance keep the site of the Work safe and in as neat order and repair as feasible, store and cover equipment, materials and supplies so as to keep them from weather and other damage, and otherwise maintain and operate the Work and the site thereof in an efficient and workman-like manner. At the conclusion of the Work, Contractor shall remove from the site of the Work all rubbish and leave the worksite in an orderly and clean condition.

25.0 STATUTORY REQUIREMENTS, TAXES AND CONTRIBUTIONS

- 25.1 The Contractor shall comply with all federal and state laws pertaining to the employment of labor, including Workmen's Compensation laws. Typical forms for reporting Workmen's Compensation are included in these documents.
- 25.2 The Contractor shall make prompt payment to the Internal Revenue Service for Federal income taxes withheld from payroll, as well as F.I.C.A. payments covering both employees' amounts withheld and taxes required of employers.
- 25.3 The Contractor shall make prompt payment to appropriate departments of the state to cover all applicable payroll withholding taxes, employer taxes and contributions, and other taxes imposed by the State of Oregon with respect to or in connection with the Work contemplated by these Specifications and other Contract Documents.

26.0 CONTRACTOR'S BILLS

- 26.1 The Contractor shall promptly pay all payrolls and all bills for materials, supplies, outfits, equipment, machinery, appliances and expenses incurred upon or in connection with the Work. Prior to final settlement, the Contractor shall furnish the Owner a statement and satisfactory evidence that he has paid all bills and claims for labor and materials, withholding taxes, contributions, to both state and federal governments for payroll withholding, Workmen's Compensation, F.I.C.A., and income taxes, and made all other payments required by law, and, if required, shall give access to books and records in substantiation of such payments. Before making said final or any other payment, the Owner may pay for and charge the Contractor any unpaid bills or accounts, and sums so paid shall be deducted from amounts earned by the Contractor on the Work, and if such payments exceed the earnings of the Contractor on the Work, the Owner shall recover such excess from the Contractor or his Surety.

27.0 PAYMENTS

- 27.1 Payments for the Work shall be in accordance with the schedule of prices submitted by the Contractor to, and accepted by, the Owner. Such payments shall be based upon monthly estimates prepared by the Engineer at the end of each calendar month. The Owner will retain 10% of each payment to insure faithful completion of the Work and payment of all claims, in accordance with the Contract Documents. Should any state or federal agency exercising control over the project require a retainage of 15% of each payment, then such amount will be retained. In the absence of legal or other requirements to the contrary, the Owner may, in its sole discretion, reduce the amount of the retained percentage to five percent (5%) for that part of the Work which is in excess of \$250,000. The established retainage shall apply in any case for work done up to the \$250,000 amount.
- 27.2 Within thirty (30) days after the Work is fully completed, the Owner has been furnished with satisfactory evidence that all payrolls and bills have been paid as provided for in paragraph 26.1 of these General Conditions, a certificate to that effect is given by the Engineer to the Owner, and upon the execution of the release hereinafter mentioned, the retained percentage shall be paid to the Contractor, unless the Contractor has failed to complete the Contract within the time specified, or has been deficient or defaulted in the completion or full performance of the Contract.

28.0 REVISIONS OF ESTIMATES

- 28.1 No estimate made under this Contract, except the final estimate, shall be construed or considered as final or conclusive against the Owner in respect to the amount of work done or material furnished, or compensation to be allowed therefor or payments made, but all such estimates made before the final payment shall be considered only as being altogether approximate and provisional, the same shall be subject to revision and adjustments, readjustments, and correction by the Engineer for errors or omissions as to the determination of the amount of Work done or material furnished under the Contract, or the amounts paid, or the amounts of Work unfinished, or the amounts of material unfurnished, or as to any other matter or thing connected therewith, and the values thereof, respectively, as well as the amount of compensation therefor, having reference to the uncompleted part of said work and material as well as the work done and the material furnished.
- 28.2 Any omission to disapprove of Work at the time of making any monthly estimate or other estimate shall not be construed as an acceptance of any defective Work, materials, or equipment, and as stated in paragraph 8.1 of these General Conditions the Contractor, at his own cost, shall remove and rebuild or make good any work, materials, or equipment which the Engineer may find defective in any way.

29.0 CHANGE IN PLANS

- 29.1 It is understood and agreed that the Owner shall have the right to make such changes in the amount, dimensions, or character of the Work to be done as may be deemed necessary, if, in the opinion of the Engineer, the interest of the Owner and the available funds so require. If any such changes or alterations should diminish the quantity of the Work to be done, they shall not constitute a claim for damages for anticipated profits on the Work that may be dispensed with or reduced. If the amount of Work to be done is increased, payment shall be made according to the quantity actually done and at prices established for similar work under the Contract.

30.0 EXTRA WORK

- 30.1 Any work necessary or incident to the carrying out of the Work herein contracted, but which is not clearly indicated on the Plans and Specifications, nor covered by the intent and meaning of this agreement and which cannot be classified and paid for under the prices agreed to, and which may be advantageously furnished or performed by the Contractor, may be designated as "extra work" and shall be paid for at the actual cost of the material, labor and large equipment necessary to perform said work, if and as approved by the Engineer, plus fifteen percent (15%) thereof for the Contractor's overhead and supervision, use of tools and small equipment, bond premiums and profit, etc.
- 30.2 Extra work shall be performed or supplied by the Contractor only upon written order of the Engineer and all claims and demands for extra work must be made out in itemized and detailed bill form and furnished to the Engineer by the Contractor for settlement at least three (3) days before the day upon which the monthly estimates are to be prepared by the Engineer.

31.0 FEDERAL ANTI-KICKBACK REGULATIONS

- 31.1 The Contractor shall agree to and there shall be included in the signed Contract for construction a provision that he shall comply with all of the stipulations pertaining to "anti-kickback" as set forth in the Regulations of the U.S. Secretary of Labor, (29 CFR, Part 3), all in accordance with the Copeland Act, as amended (40 U.S.C. 276c) and to aid in the enforcement of the Anti-Kick-back Act (18 U.S.C. 874).

32.0 RIGHT OF ENTRY TO WORK

- 32.1 Representatives of the Owner and any state, county, municipal or federal agencies having jurisdiction over the Work shall have right of entry to any and all portions of the Work at all times, and the Contractor shall provide proper facilities for access and inspection.

33.0 RELEASE

- 33.1 As a condition of final payment to the Contractor and payment of retained percentage, the Contractor shall execute and deliver to the Owner in substance and form as required by the Owner, a release and waiver of all claims against the Owner arising out of or in any way connected with the Contract or the Work performed thereunder.

34.0 GUARANTEES AND ACCEPTANCE OF WORK

- 34.1 Except as specifically provided in these Specifications and other Contract Documents, all materials, equipment, workmanship, and completed project shall be guaranteed against any and all defects for a period of not less than one year following acceptance of the Work. This guarantee shall include restoration of settled fills, trenches, pavement and surfaces. Detailed specifications elsewhere in these Contract Documents may impose additional guarantees.
- 34.2 Painting work and painted finishes shall be guaranteed for a period of two (2) years after acceptance of the complete project.
- 34.3 Plastic pipe, coated steel pipe, and insulation on motor windings shall be guaranteed for a minimum period of two (2) years.
- 34.4 Neither the final estimate for payment nor any provisions in the Contract Documents nor partial or entire occupancy or use of the premises or facilities by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express or implied warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the Work and pay for any damage to other work, materials or equipment resulting therefrom, which shall appear prior to the termination of the appropriate guarantee period. The Owner will give notice of observed defects with reasonable promptness.

WORKMEN'S COMPENSATION

The Contractor shall comply with the Oregon State Laws pertaining to wage rates on public works. Wages shall not be less than the prevailing wages in the territory in which the work is done and for comparable trades or occupations. The Contractor, or his surety, shall furnish to the Owner wage certification forms and affidavits as required by the Oregon State Bureau of Labor and comply with the applicable provisions of Chapter 279, ORS, as amended.

The forms and affidavits shall conform to those designated as Form W-1 and Form W-2 on the following pages.

Oregon Revised Statutes, 279-354 states as follows:

"Before payment is made of any sum due on account of a contract for a public work, the state treasurer or the treasurer of the county, city, district, authority, public corporation or entity or of any of their instrumentalities organized and existing under charter or law, or other officer charged with the disbursement of funds applicable to the contract under and pursuant to which payment is made, shall require the contractor or his surety and every subcontractor or his surety to file a statement in writing in form prescribed by the State Labor Commissioner, certifying the hourly rate of wage paid each classification of workmen employed by him upon such public work, and further certifying that no workman employed by him upon such public work has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the contract, which certificate and statement shall be verified by the oath of the contractor or his surety or subcontractor or his surety that he has read such statement and certificate and knows the contents thereof and that the same is true to his knowledge."

OREGON PUBLIC WORKS CONTRACTOR WAGE CERTIFICATION FORM
(Form W-1)

<u>Contractor or Subcontractor:</u> Name: _____ Address: _____ Name & Title of Responsible Official: _____	<u>Project Owner or Governmental Agency:</u> Name: _____ Address: _____ Name & Title of Responsible Official: _____
Description of work:	Location of work:

Instructions:

1. Oregon Law (Chapter 627, O.L. 1959) specifies that no payment may be made on public work contracts unless the contractor or subcontractor, or surety, provides a certificate stating the hourly rate of wages paid to the workmen; and also certifying that such rate is not below the prevailing rates for the locality. This form is required in making such certification.

2. Submit this completed form in duplicate with each request for payment.

3. List below each craft employed by you and the hourly rate paid. It is not necessary to list each employee. Supervisory and office personnel or other workmen on regular monthly or per diem salary need not be listed.

4. Complete the affidavit on this form and have it notarized.

Craft Classification	Min. Rate	Apprentice Classification	Inter- val	Period	Min. Rate
		Overtime Provisions:			

AFFIDAVIT TO ACCOMPANY WAGE CERTIFICATION FORM

(Form W-2)

State of Oregon)

County of _____)

I, _____,

() Contractor () Subcontractor () Surety for Contractor () Surety for Subcontractor, being first duly sworn, certify that the hourly rate of wages shown on this form was paid each classification of workmen employed by me (my principal) upon the public work project specified above, and

I further certify that no workmen employed by me (my principal) upon said public work has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the contract for said public work.

I have read this statement and certificate and know the contents thereof and the same is true to my knowledge.

Signature

(Title)

Subscribed and sworn to before me this

_____ day of _____, 196____

Notary Public of Oregon

My Commission expires _____

SPECIFICATIONS FOR CONCRETE CONSTRUCTION - GENERAL

1. General

These specifications shall apply to plain and reinforced concrete throughout the work. They shall be superseded only by applicable special clauses written into the detailed construction specifications, or by special notation on the plans.

Additional specifications relative to order of placement, type of forms, finish, etc. will be found in the detailed construction specifications elsewhere in the complete set of job specifications.

The proportioning, mixing, placing and finishing of concrete shall be done under the direction of the Engineer and in conformance with the best practice required to secure the objectives of strength, density, watertightness and good surface appearance.

2. Cement

All cement shall be of standard and accepted brand and shall conform to the Standard Specifications for Type I Portland Cement of the American Society for Testing Materials, Serial Designation C-150-49 and subsequent revisions thereof. The cement shall be delivered in sacks and marked with the brand unless specific approval is given for bulk shipments. A sack of cement shall contain not less than ninety-four (94) pounds of cement net and shall be deemed equivalent to one (1) cubic foot in volume.

3. High Early Strength Portland Cement

High early strength cement shall be used only where expressly called for in the specifications or approved by the Engineer, and shall conform to the Standard Specifications for Portland Cement, Type III, of the American Society for Testing Materials, C-150-49 and revisions thereof.

4. Admixtures

Admixtures shall be used only by special permission of the Engineer and for particular locations. They shall be considered only as a means of improving the workability of the concrete and facilitating its placement, and in no case shall be a reason for reducing the cement content below the amount specified.

5. Air Entrainment

In order to obtain concrete which will adequately withstand weathering and exposure to extremes of freezing and thawing, the Engineer may require the use of an air entraining agent having a record of satisfactory use. Such materials shall be (1) sulphonated Hydrocarbon, (2) resin from distillation of wood, or (3) grease especially manufactured for the purpose.

Air entraining agents when used shall be sufficient to keep the air content between three and five percent (3% - 5%).

6. Water

Water for concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

7. Fine Aggregate

Fine aggregate shall consist of natural sand, sand prepared from the product obtained by crushing stone, rock or gravel, or other approved inert materials with similar characteristics, or a combination thereof, having clean, hard, strong, durable, uncoated grains and free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam or other deleterious substances.

Fine aggregate shall be uniform in fineness and quality and shall not show a variation in fineness modulus greater than 0.20 plus or minus.

Fine aggregate shall conform to the pertinent sections in the Standard Specifications for Concrete Aggregates of the American Society for Testing Materials, C-33-49 and revisions thereof.

8. Coarse Aggregate

Coarse aggregate shall consist of crushed stone, gravel, or other approved inert materials with similar characteristics or combinations thereof, having clean, hard, strong, durable, uncoated particles free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter. The maximum size of aggregate for general concrete work, such as reinforced walls, beams, columns, slabs, etc. shall be a size which will pass a $1\frac{1}{2}$ " square opening.

Coarse aggregates shall conform to the pertinent sections in the Standard Specifications for Concrete Aggregates of the American Society for Testing Materials, C-33-49 and revisions thereof.

9. Reinforcing Steel

Steel for concrete reinforcement shall be intermediate grade deformed (not twisted) bars, conforming to the Standard Specifications for Billet Steel Bars for Concrete Reinforcement of the American Society for Testing Materials, A-305-50T and A.S.T.M. A-15-50T and all latest revisions thereof. Bars shall be new stock, free from dirt, excessive scale, rust, paint, oil or other foreign substances.

10. Wire Fabric

Steel wire fabric or mesh used for reinforcement shall conform to the Standard Specifications for Welded Steel Wire Fabric of the American Society for Testing Materials A-185-37, and to the Standard Specifications for Cold Drawn Steel Wire, A-82-34, and the latest revisions thereof. Any make or style of mesh conforming to the Specifications and giving equal or greater sectional areas may be substituted for the one on the plans if approved by the Engineer.

11. Form Lumber

Form lumber shall be straight, well manufactured shiplap, boards or plywood, surfaced at least on one side and two edges and free from loose knots, cracks or roughness which will show on the surface of the finished concrete. Lumber which is cupped or twisted shall not be used. Form lumber may be re-used provided that it has been thoroughly oiled, cleaned, all nails withdrawn, and is the equivalent in usefulness of new lumber. Framing lumber for forms shall be true and straight and free from defects that will reduce the strength for the purpose intended. Studs shall be surfaced on one edge. Wherever the forms may stand for some time before use, the lumber shall be sufficiently dry to avoid shrinkage or warping after erection.

Undressed lumber may be used for unexposed surfaces and rough work if approved by the Engineer.

Forms for exposed surfaces shall be of new material or the equivalent thereof approved by the Engineer.

12. Forms for Special Finishes

For exposed surfaces requiring a special finish the Engineer may specify the use of matched lumber or form lining. Forms for special finishes shall be matched lumber which is straight, well manufactured flooring, grade "C" under the rules of the West Coast Lumbermen's Association, free from warping or cupping; or full thickness concrete form plywood conforming to the specifications of the Douglas Fir Plywood Association; or regular board forms lined with $\frac{1}{4}$ " plywood or hard pressed board suitable for the purpose and which will not warp or buckle.

Plywood shall be true and free from defects on the side next to the concrete and shall be used in as large sheets as practical unless otherwise specified. Lining material may be re-used provided that it is in good condition and thoroughly cleaned between pours.

13. Form Construction

Forms shall conform to the shape, lines, grades and dimensions of the concrete, as called for on the drawings. Joints shall be horizontal or vertical, and adjacent surfaces shall be in substantially true planes to permit the concrete to be finished with a minimum of grinding. Forms shall be sufficiently tight to prevent leakage of mortar and formation of fins.

Forms shall be adequately supported by studding and walling to carry the maximum concrete pressures and shall be braced against distortion from any cause during or after the placing of concrete.

Form ties shall generally be bolts or rods with spacers, so arranged that when the forms are removed no metal will be within one inch (1") of any surface. Wire ties shall not be used unless specifically approved by the Engineer.

Floor slabs and horizontal members shall be adequately supported, allowing not only sufficient strength but also rigidity to prevent deflection when the forms are loaded, and where necessary the forms shall be cambered so that the finished members shall conform accurately to the desired line and grade. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

Shores supporting successive stories or pours shall be placed over those below, or so designed and placed that the load will be transmitted directly to them.

Chamfers - Unless otherwise specified, outside or inside corners which are for convenience shown square on the drawings shall be chamfered by the use of suitable moldings or bevels placed in the angles of forms. The tops of exposed walls shall generally be finished to a molding inside the forms which shall be accurately leveled and lined.

Temporary openings shall be provided at the base of columns and wall forms, and otherwise where necessary to facilitate cleaning and inspection immediately before depositing concrete, and other openings shall be placed where necessary for spading or vibrating.

Pipes passing through walls shall be placed in walls before concrete is poured, or block-outs shall be provided through which pipes may later be installed and grouted in place.

The inside of forms shall be coated with an approved non-staining mineral oil or other material, or wooden forms not to be re-used shall be thoroughly wetted. Form oil shall be applied before steel reinforcement is placed.

Removal of forms shall be subject to the approval of the Engineer, and shall not be started until the concrete has attained the necessary strength to support its own weight and any construction live loads.

14. Bending and Placing Reinforcement

Metal reinforcement, before being positioned, shall be thoroughly cleaned of mill and rust scale and of coatings that will destroy or reduce bond with concrete. Reinforcement appreciably reduced in section shall be rejected. Where there is delay in depositing concrete, reinforcement shall be re-inspected, and, when necessary, cleaned. Reinforcement shall be carefully formed to the dimensions indicated on the plans.

Bend in bars shall be made around pins having diameters not less than the following:

For stirrups and tie bars	2 bar diameters
Bars 1" or less	6 bar diameters
Bars exceeding 1"	8 bar diameters

Metal reinforcement shall not be straightened or rebent in a manner which will injure the metal, and bars with kinks or bends not called for on the drawings shall not be used. All bars shall be bent cold except in special cases where the entire operation of heating and bending is specifically approved by the Engineer.

Metal reinforcement shall be accurately positioned, and secured against displacement by using annealed iron wire of not less than No. 18 gauge, or suitable clips, at intersections, and shall be supported by concrete or metal chairs or spacers, or metal hangers. The minimum clear center-to-center

distance between parallel bars shall be $2\frac{1}{2}$ times the bar diameter, but in no case shall the clear spacing between the bars be less than $1\frac{1}{2}$ times the maximum size of the coarse aggregate, nor less than 1 inch in beams and girders, nor less than $1\frac{1}{2}$ inches in columns. Bars parallel to the exterior face of any member not exposed to water or weather shall be embedded at least one bar diameter for round bars or diagonal dimension for square bars, but in no case less than $\frac{3}{4}$ inch from the exterior surface. In walls exposed to water pressure, the embedment shall be not less than $1\frac{1}{2}$ inches and in footings in contact with the ground not less than 3 inches.

Splices in steel reinforcement bars shall be lapped not less than 30 diameters for top bars or 25 diameters for other bars. The use of splices shall at all times be subject to the approval of the Engineer. Splices shall not be made at points of maximum stress, except in the case of hoops, and splices in adjacent bars shall be well staggered. Splices in hoop steel bars shall be welded if called for on the plans or in the detailed specifications.

15. Storage of Materials

Cement to be used for on-the-job concrete mixing shall be delivered on the work a sufficient length of time in advance of use to permit sampling and testing. It shall be stored in a dry shed or a platform elevated above the ground and covered with a tent, tarp, or canvas in such a manner that the canvas does not come in contact with the sacks. Cement must come up to the specification requirements at the time of use, and shall not be released from storage without the express permission of the Engineer. Sacks shall be tiered up in such a manner as to facilitate counting and shall be hauled away only with the knowledge and approval of the Engineer.

Fine and coarse aggregate shall be kept in separate piles and in such a manner as to avoid the inclusion of dirt or foreign materials. Frozen aggregate shall be thawed by the use of steam.

16. Quality of Concrete

Concrete shall be homogeneous in the structures, and upon having set and hardened, shall have the strength required, and shall be resistant to weathering under the conditions of its intended use.

The quantity of cement used per cubic yard shall be specified, and that quantity shall not be reduced even though tests of concrete indicate a higher strength than may have been specified or required for the work.

17. Sampling and Testing

The Contractor shall cooperate with the Engineer in furnishing typical samples of aggregate and cement for testing purposes. He shall also facilitate the collection of samples of mixed concrete for testing purposes.

All sample collecting and testing procedures shall comply with the latest A.S.T.M. specifications pertinent to the particular tests being made.

Actual sampling and testing shall be at the expense of the Owner unless otherwise specifically stated in the detailed specifications of construction.

18. Proportioning Concrete

The classification of concrete used in different parts of the work shall be indicated on the plans or covered by the detailed specifications for construction. It shall be based upon 3 factors, namely:

1. The minimum number of 94 pound sacks of cement per cubic yard of finished concrete, which number shall be the class designation
2. The maximum permissible water-cement ratio
3. The maximum size of coarse aggregate, referring to square opening test screens

For general work and unless modified by the detailed plans and/or specifications, the following proportions shall be used:

Maximum size of coarse aggregate: $1\frac{1}{2}$ "

<u>Class of Concrete</u>	<u>Sacks of Cement Per Cu. Yd. Concrete</u>	<u>Maximum Water Cement Ratio</u>	<u>Maximum Permissible Water in Gallons Per Cu.Yd. of Concrete</u>
4	4	8	32
5	5	7	35
6	6	6	36
7	7	5	35

Note: Above water amounts based upon dry aggregate

Subject to these fixed factors, the proportions of fine and coarse aggregates and the water content shall be subject to the control and approval of the Engineer, with the objectives of securing the maximum strength, durability, density, and watertightness reasonably practicable for the location and conditions of placement. The fact that concrete has more than adequate strength for the design requirements shall not be a reason for increasing the water-cement ratio, and if the Contractor desires added workability to suit the particular equipment and methods placement that he uses, this shall be attained by increasing the cement content or the addition of an admix, provided the proposed change in mix is first approved by the Engineer. Any such increase in cement per yard or the addition of an admix shall be at the Contractor's expense.

For small jobs, requiring less than 100 cubic yards at a given plant setup, the fixed proportions of aggregates may be controlled by volumetric measurements, and a measuring box of exactly one cubic foot volume shall be provided for checking the contents of wheelbarrows or buggies. For larger jobs, materials shall be measured by weighing, using approved apparatus especially designed and constructed for the purpose. The mixing water shall in all cases be measured by volume or by weight. The tolerance of uniformity in aggregate weights shall be plus or minus one percent (1%) from the desired amount and the tolerance of accuracy for water measurement shall be plus or minus one-half of one percent ($\frac{1}{2}\%$).

19. Consistency of Concrete

The consistency of concrete to be used in different sections of the work shall be determined by the Engineer and shall in all cases have the lowest water-cement ratio which can reasonably be placed, using the best available equipment together with mechanical vibration as hereinafter specified. As a guide in the field, standard slump cones shall be provided and used by the Contractor and generally the following slumps will be required:

<u>Type of Concrete Placement</u>	<u>Slump in Inches</u>	
	<u>Maximum</u>	<u>Minimum</u>
Reinforced foundation walls & footings	3½	2
Plain footings and substructure walls	3	1
Slabs, beams and reinforced walls	4	2
Building columns	4	2
Pavement	2	1½
Heavy mass construction	2	1

20. Mixing Concrete

Unless otherwise specifically authorized by the Engineer, the mixing of concrete shall be done in a batch mixer of approved type which will insure a uniform distribution of the material through the mass. Hand mixing shall be permitted only for very small and isolated structures and under approved methods. The equipment at the mixing plant shall be so constructed that all materials entering the drum, including the water, can be accurately proportioned within the tolerances heretofore provided. The entire batch shall be discharged before recharging and the mixer shall be cleaned at frequent intervals during use. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity.

The mixing period shall be not less than one and one-half (1½) minutes for mixers having a rated capacity of one (1) cubic yard or less, and two (2) minutes for larger mixers, the mixing periods being measured from the time when all solid materials are in the mixer drum, provided that all of the water shall be added before one-fourth of the mixing time has elapsed.

Retempering of concrete or mortar which has partially set, that is, remixing with or without additional cement, aggregate or water shall not be permitted.

21. Truck Mixing

Truck mixers may be used in connection with batching plants which will insure proportioning of materials within the tolerances stated above. Truck mixers shall be provided with a tank for carrying mixing water, and only the prescribed amount of water shall be placed in the tank. Mixers shall be of the revolving drum type, watertight, and so constructed that the concrete can be mixed to insure a uniform distribution of materials throughout the mass. The maximum batch shall not exceed the manufacturer's rating. The Engineer may require that truck mixers be provided with a timing device. Mixing shall continue for not less than fifty revolutions at a speed of not less than 4 rpm after all

ingredients, including the water, are added. Mixing shall begin within 30 minutes after the cement has been added to the batch, and the batch shall be discharged within one and one-half (1½) hours after the cement has been added to the batch.

During hot weather and for rich mixes or mixing using high early strength cement, the time between addition of cement and placement in forms shall not exceed one (1) hour or less if required by the Engineer.

22. Ready Mixed Concrete

If ready mixed concrete is used, it shall conform in all respects to the standard specifications of the American Society for Testing Materials designated C-94-4B and all latest revisions thereof.

23. Hauling Ready Mixed Concrete

Concrete may be hauled from a central mixing plant only for distances and under conditions which will insure that there be no segregation of materials, and strictly subject to the approval of the Engineer. The use of a truck mixer or a truck equipped with agitating blades may be required. The volume of mixed concrete transported in an agitator shall be in accordance with the manufacturer's rating. Concrete shall be discharged from the agitator or other transportation device within one and one-half (1½) hours after the cement has been added to aggregates at the batching point, or in one hour or less if required by the Engineer for special mixes or during hot weather.

24. Depositing Concrete

Under these specifications concrete shall be placed only in the dry. Underwater work requiring special methods shall be covered by detailed specifications therefor. Any water flowing into the excavation shall be diverted to a sump or removed by other approved methods which will prevent it from coming in contact with the freshly deposited concrete.

Before beginning the placement of any run of concrete, surfaces of contact at construction joints shall be thoroughly cleaned and prepared, as hereinafter specified. Forms shall be cleaned and wetted or oiled. All debris and foreign materials shall be removed from the space to be occupied by the concrete. Placement and tying of reinforcement shall be finally checked. Mixing and conveying equipment shall be clean. Concreting shall begin only after all conditions have been inspected and final approval given by the Engineer.

Concrete shall be handled from the mixer to the place of final deposit as rapidly as practical by methods which prevent the separation or loss of the ingredients. It shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling. It shall be so deposited as to maintain, until the completion of the unit, a plastic surface approximately horizontal. Forms for walls or other thin sections of considerable height shall be provided with openings, or other devices, that will permit the concrete to be placed in a manner that will prevent segregation or accumulations of hardened concrete on the forms or metal reinforcement. If required by the Engineer, trunks shall be used for placing concrete in deep walls.

Under no circumstances shall concrete which has partially hardened be deposited in the work.

For ordinary structures, the preferred method of placing concrete shall be by the use of buggies or other approved containers or bottom dump buckets. Chuting shall be done only after the plant set-up has received specific approval of the Engineer, and with equipment of such size and design as will insure a continuous flow in the chute. Chutes shall be metal or metal lined, with a uniform slope of not less than one vertical to two horizontal. The discharge end of the chute shall be provided with a baffle plate, and if the height of the discharge end above the surface of the concrete is more than three (3) times the thickness of the layer being deposited, a spout or trunk shall be used and the lower end shall be kept close to the surface. When the operation is intermittent, the chute shall discharge into a hopper. It is the intent of these specifications that no segregation of concrete shall take place between the mixing plant and the point of final placement in the forms, and the methods of handling shall be strictly under the control of the Engineer.

Placement of concrete in wall forms in a manner dependent upon horizontal flow shall not be permitted.

25. Special Methods of Placing

Concrete may be placed by pumping with equipment which is suitable in construction and adequate in capacity for the work. An agitating hopper shall be provided immediately ahead of the pump. The operation shall be such that a continuous flow of concrete without air pockets is produced. The length of discharge lines shall be limited to 1,000 feet with a minimum number of bends. Special pipe with detachable couplings shall be used. All precautions shall be taken to avoid segregation at the point of discharge, and an air booster at the end of the line shall be used only with great care and subject to the approval of the Engineer. When pumping is completed, the concrete remaining in the line shall be ejected by methods which will avoid addition of water to the concrete or separation of its ingredients. After this operation and before re-use, the entire equipment shall be thoroughly cleaned.

26. Depositing Concrete in Cold Weather

Concrete when deposited shall have a temperature of not less than 50 degrees nor more than 120 degrees F. When the air temperature is below 40 degrees at any time during the day or night, concreting shall be carried on only under special precautions which shall meet the approval of the Engineer, and the concrete in place shall receive special protection. For moderate cold weather conditions, the mixing water shall be heated, but not to a higher temperature than 140 degrees F. When necessary the aggregates shall also be heated by the use of steam. Forms shall be free from frost or ice, and after the concrete is placed, it shall be protected on all exposed sides by the use of straw, sawdust, tarpaulins or other means, and heat shall be provided if necessary during the entire curing period, as hereinafter specified. Salts, chemicals, or other foreign materials shall not be mixed with the concrete for the purpose of preventing freezing.

27. Depositing Concrete Under Water

Concrete deposited under water shall be done in strict compliance with the Engineer's requirements. It shall not be placed in water having a temperature below 35 degrees F. Concrete temperature shall be not less than 60 degrees F. nor more than 120 degrees F.

Underwater concrete shall contain seven (7) sacks of cement per cubic yard, and the volume or weight of coarse aggregate shall be not less than one and one-half, nor more than twice the volume or weight of the fine aggregate. Slump shall be not less than four (4) nor more than seven (7) inches.

In so far as it is possible to accomplish, no flow of water shall pass over the concrete during deposition and until hardening takes place. If this cannot be prevented, the current shall in no case exceed ten (10) feet per minute in the space occupied by the concrete.

Concrete shall be deposited continuously until all is brought to the required height.

28. Compacting Concrete

As concrete is placed, it shall be thoroughly compacted by means of mechanical vibrators to secure a dense structure without voids, close bond with reinforcement, and smooth exposed surfaces. The use of hand tools for spading or roding the concrete shall not be permitted except in locations where the use of mechanical equipment may prove impractical and the Engineer gives specific approval.

Methods, and the extent of compaction, shall be subject to the control of the Engineer. Any tendency to accumulate water or fines at the surface shall be offset by adjustment in the mix.

29. Construction Joints

Concrete shall generally be deposited continuously, or in layers of such thickness that no concrete which has hardened sufficiently to prevent bond or create planes of weakness shall come in contact with fresh concrete.

Construction joints shall be used wherever it is neither feasible nor desirable to place concrete in a continuous operation, or wherever it is necessary or desirable to provide for shrinkage. Construction joints shall be located as called for in the plans and construction specifications or as required and approved by the Engineer. Construction joints shall be keyed and provided with water stops if called for in the plans or required by the Engineer. Construction joints shall be so located and built as to prevent weakening of the structure and not interfere with the finished appearance.

Joints in columns shall be made at the underside of floor members and at floor levels. Haunches and column capitals shall be considered as part of and continuous with the floor or roof. At least two (2) hours must elapse after depositing concrete in the columns or walls before depositing in beams, girders,

or slabs. Construction joints in floors shall be located near the middle of span of slabs, beams or girders, unless a beam intersects a girder at this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. Adequate provisions shall be made for shear by use of inclined reinforcement.

Construction joints which do not serve as expansion joints shall be made so as to insure bonding of the new concrete to the old. The surface of the hardened concrete shall be roughened to expose the solidly embedded particles of aggregate. Loose or damaged concrete, foreign matter, and laitance shall be removed, and the surface thoroughly washed. Forms shall be tightened, and to insure an excess of mortar at the juncture of the old and new concrete, the cleaned surfaces, including vertical and inclined surfaces, shall be coated with a layer of mortar or neat cement grout against which the new concrete shall be placed before it has attained its initial set. If additional strength of resistance to shear is required at construction joints, it shall be provided through the use of concrete keys or additional dowel bars, or both.

30. Watertight Structures

Walls or floors in structures to contain water shall be given special care in the location and workmanship of construction joints. Generally a keyway will be required to increase the length of the leakage path, and a continuous metal plate or water stop will be placed in the middle of the keyway. Joints not shown on the plans and placed to suit the operations of the contractor shall be in every way equal to those definitely shown, and it shall be the responsibility of the Contractor to secure complete watertightness in the finished structure. Otherwise, methods used shall correspond to those specified for other construction joints.

31. Removal of Forms

Forms shall not be removed until the concrete has attained a strength fully adequate to support itself and carry any superimposed loads, and also to permit the removal of forms without breaking corners or defacing the surface. Subject to these limitations, and the seven (7) day curing period specified hereinafter, the forms for exposed surfaces shall be removed as early as possible, to permit repair of defects and surface grinding while the concrete is still green. The time for form removal shall be subject to the approval of the Engineer, and shall take into account the location and character of the concrete, weather and curing conditions. Beams, elevated slabs, domes, etc. shall be supported for at least 14 days. Where local codes require a longer period, they shall apply. Such support may be provided by reshoring the structure after the removal of the forms.

32. Curing Concrete

All concrete shall be protected so that there will be no loss of moisture from the surface for at least seven (7) days when normal cement is used. When high, early strength cement is used, the minimum period shall be three (3) days. Protection of loss of moisture from the surface of concrete shall be accomplished by keeping the surface continuously wet.

On vertical and bottom faces the forms generally shall be kept in place and kept wet. If the forms are to be removed earlier, the method of curing shall be approved by the Engineer. The upper surfaces of slabs or floors shall be protected from evaporation by the use of burlap or other absorbent material which shall be kept by spraying. The surfaces of walls shall be cured in the same manner as floors. Sealing compounds may be used if they do not discolor the concrete, and if the compound and its application are approved by the Engineer. The use of calcium chloride or other salts will not be permitted.

33. Surface Finish

Concrete that is to have a showing face, even though no particular finish is called for, shall be mixed, placed and compacted in a manner that will insure a uniform distribution of aggregates, freedom from void spaces, and a uniform texture. Existence of rock pockets, air or water bubbles, shall be evidence of improper mix or handling and shall be corrected. After forms are removed, all defects shall be repaired at once. The same cement shall be used as in the original work, and color shall be added if necessary for matching. Holes left by the rods shall be hammer-packed with stiff, dry mortar, and the surfaces shall be leveled. Rock pockets shall be similarly filled and finished. Honeycombed areas shall be cut out to a depth at which sound concrete is exposed and filled with concrete matching that of the structure. Offsets, fins and irregularities due to defective forms shall be filled and ground off to a reasonably true surface in keeping with the location in the structure and subject to the approval of the Engineer.

Exterior and interior walls and surfaces of structures, where matched flooring or plywood forms are called for, shall have a true alignment, free from streaks or discoloration and uniform finish with no form marks of any sort. This result shall be secured by special care in the construction of forms and placing the concrete. Only a minimum of pointing up will be permitted, and there shall be no plastering. Irregularities shall be removed by mechanical grinding or by hand rubbing with a carborundum brick.

Top surfaces of walls, etc. not subject to wear shall be struck off evenly to screeds which have been set with a level. Generally a beveled molding shall be used to finish top corners in preference to a curbing edger. Excess water shall be drained off and the surface finished with a wood float.

Floors and other wearing surfaces shall be finished as one coarse work to accurately set screeds or templates. The concrete proportions and consistency and the methods of compaction shall be such that only sufficient mortar is available for finishing and there is no excess water. During the preliminary finishing operation the surface shall be worked only as necessary to insure a layer of mortar at the surface. While the concrete is still soft, the surface shall be checked with a straight edge or template, and inaccuracies corrected. Final troweling shall be delayed until the surface can no longer be dented with the finger.

Floors of substantial area shall be finished by the use of a rotary finishing machine. Smaller areas shall be given a steel trowel finish by experienced cement finishers, to give a dense, hard surface meeting the approval of the Engineer. Joints and edges shall be finished with proper tools and sur-

plus mortar cleaned away. The finished surface shall be immediately covered and protected from sun and rain, and shall be cured under moist conditions as hereinbefore provided.

Floors to have a non-slip surface shall be broomed or otherwise finished as required by the Engineer.

MATERIALS SPECIFICATIONS

1. Vitrified Clay Sewer Pipe & Fittings

Vitrified sewer pipe and fittings shall be unglazed conforming to A.S.T.M. Specifications for Extra Strength Clay Pipe, designation C-200.

Pipe shall be furnished with rubber "O" ring gaskets.

2. Concrete Sewer Pipe & Fittings

Concrete sewer pipe shall conform to the Standard Specifications of the American Society for Testing Materials for Extra Strength Nonreinforced Concrete Sewer Pipe C-14 and shall conform to the minimum thickness and strength requirements set forth hereunder.

Pipe shall be smooth, dense, watertight and uniform.

<u>Size Pipe</u>	<u>Minimum Thickness</u>	<u>Minimum Crushing Strength Per Ft. 3 Point Bearing</u>
4"	3/4"	2,000 lbs.
6"	3/4"	2,000 "
8"	7/8"	2,000 "
10"	1"	2,000 "
12"	1 3/8"	2,250 "
15"	1 5/8"	2,750 "
18"	2"	3,300 "
21"	2 1/2"	3,850 "
24"	3"	4,000 "

Pipe shall be furnished with rubber "O" ring gaskets.

3. Asbestos Cement Sewer Pipe

Asbestos cement pipe shall comply with Federal Standard Stock Catalog Specifications SS-P-331-B, dated January 30, 1962, for all Class 1 and 2 sewer pipe. Pipe shall be type F having a crushing strength of Class 2,400.

4. Asbestos Cement Sewer Pipe Fittings

Fittings shall comply with the foregoing requirements for pipe and shall be Class 2,400.

5. Asbestos Cement Pressure Pipe and Fittings

Asbestos cement pressure pipe shall comply with Federal Stock catalog specifications SS-P-351; American Society for Testing Materials Specifications C-296 and American Water Works Association Specification C-400. Class 150 pipe shall be used. Fittings for asbestos cement pressure pipe shall be cast iron with cement mortar lining minimum thickness 1/16" and coal tar sealed. Ends of fittings shall be suitable for reception of rubber ring gaskets used with asbestos cement pipe.

6. Cast Iron Pipe and Fittings - Pressure Pipe

Cast iron pipe for pressure sewers shall be Class 150 "O" rubber ring joint pipe. Pipe and fittings shall be cement mortar lined, minimum thickness 1/16", mortar sealed with coal tar or comparable material.

Detailed specifications for cast iron pipe and fittings follow:

A. Rubber Ring Joint Pipe - Rubber ring joint pipe shall conform to American Standards Association Specifications A-21.6 or A-21.8 and shall in addition have hubs cast to receive Tyton or equal rubber ring gaskets. Gaskets shall be Tyton or equal.

B. Fittings, Mechanical Joint Cast Iron Pipe - Fittings for use with mechanical joint cast iron pipe shall conform to American Standards Association Specifications A-21.10 and A-21.11, Class 250 lbs. per square inch.

C. Cast Iron Pipe Flanges and Flanged Fittings - Cast iron pipe flanges and flanged fittings shall conform to American Standards Association Specifications B-16.1, Class 125.

7. Wrought Iron Pipe and Fittings

Wrought iron pipe shall conform to A.S.T.M. Standard Specifications A-72 for wrought iron pipe, shall be Byers or equal.

Fittings for wrought iron pipe shall be 150 lb. galvanized malleable iron banded fittings.

8. Copper Tubing

Copper tubing shall conform to the requirements of Federal Specifications No. WW-T-799, Type "K" soft annealed seamless copper tubing with either compression or soldered type fittings.

9. Manhole, Cleanout and Lamphole Frames and Covers

All castings shall conform to the Standard Specifications of the Ameri-

can Society for Testing Materials A-48 and all amendments and additions thereto.

All castings shall be true to pattern and shall be made of first quality, tough gray iron and shall exhibit a uniform and closely grained fracture, free from any white, mottled or vitreous appearance and free from cold shuts, cracks, sand holes, blotches, bubbles or other imperfections. The cast iron from which they are made shall have an ultimate tensile strength of not less than 17,000 lbs. per square inch.

Manhole covers shall be of the heavy type for use on paved streets carrying heavy traffic. The clear opening shall be approximately 2' 0", and the over-all depth approximately 10". Rings shall be of the flange and spigot type with a flange approximately 3" deep and a height from flange to top of approximately 7". The thickness of metal in the rings shall be 3/4". Covers shall have 7/8" metal, with transverse reinforcing ribs about 2" deep. They shall have an approved top design with ventilating holes, carrying either the letter "S" or the word "Sewer."

Manhole and lamphole rings and covers shall be machined or ground to give a true and uniform bearing. Castings shall be wire brushed, ground to remove fins and roughness, and dipped in a hot bath of coal tar pitch or air-blown asphalt immediately after casting.

10. Concrete Materials

All concrete ingredients shall conform in all respects to the detailed specifications for cement, aggregate and water as set forth in the General Specifications for Concrete Construction.

11. Reinforcing Steel

Steel for concrete reinforcement shall conform to the standard specifications for billet steel reinforcement of the American Society for Testing Materials, No. A-15, and the A.S.T.M. Specifications A-305 for new type reinforcement bars. All shall be of the new approved type, not twisted, and shall be new stock free from dirt, scale, rust, paint, oil or other foreign substances.

12. Structural Steel & Iron Work

Structural steel shall conform to the Specifications for Steel for Buildings of the American Society for Testing Materials (A.S.T.M.), designation A-7-42 or revisions thereof. Structural steel shall be fabricated and erected in general conformity to the Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings of the American Institute for Steel Construction, except that welded construction shall be used as hereinafter more particularly specified or indicated. All structural steel shall be given a shop coat of red lead or galvanized as required.

14. Precast Manholes

Precast manholes shall comply with A.S.T.M. specifications C478. Inside diameter shall be no less than 42". Design shall be eccentric top cone type and conform to standard manhole details of Oregon Concrete Pipe Manufacturers Association.

15. Manhole Steps

Manhole steps shall be safety type steps fabricated of 3/4" diameter genuine wrought iron, A.S.T.M. A-207 and having dimensions of 8 5/8" x 2 1/2" x 12" (all center to center).

16. Gate Valves

Valves three inches (3") and larger shall be iron body, brass mounted, conforming to the latest standard specifications adopted by the American Water Works Association.

Valves two and one-half inches (2½") and smaller unless otherwise particularly specified shall be brass bodied double disc gate valves with rising stem and shall have screwed ends with standard pipe threads.

Valves shall have hub, screw or flanged ends to fit pipe for which they are used as specified or indicated on the plans.

Valves shall open by turning to the left and shall have an arrow showing the direction of opening cast on the top of gland. All iron bodied valves shall be painted before shipment with a shop coat of coal tar pitch varnish. Operating wheels shall be furnished. Gate valve for underground installation shall be furnished with cast iron valve box.

17. Check Valves

Check valves three inches (3") and larger shall be iron body, brass mounted, conforming to the latest Standard Specifications adopted by the American Water Works Association, and shall be of the swing type with outside weight and lever.

Check valves two and one-half inches (2½") and smaller shall be of all brass or bronze construction and shall have screwed ends for standard pipe threads.

All check valves shall be non-slam type.

18. Plug Valves

Plug valves shall be easy operating, standard, regular pattern, lever operated, 100 pounds working pressure W.O.G. semi-steel construction, Rockwell, DeZurik or approved equal. Provide lever for each valve.

SANITARY SEWERS - CONSTRUCTION SPECIFICATIONS

1. General Data & Interpretation of Plans & Documents

The maps, plans and specifications are presumably correct, but extreme accuracy is not guaranteed. Notes, figures and writing on the plans must be strictly followed, as they constitute a part of the plans and specifications. Should any error, conflict, discrepancy, or omission or ambiguity be discovered in the plans or in the specifications, or if the Contractor is in any doubt as to the meaning of the plans or specifications, the Contractor shall report the same to the Engineer before submitting his bid and before starting on the work. In the event of a disagreement arising as to the true intent and meaning of the plans and specifications, the Engineer shall interpret the same and his interpretation shall be accepted by the Contractor as final.

In some locations records of existing sewers, manholes, water lines and other underground utilities, obstructions, facilities, and underground structures are insufficient to determine in advance the location, elevation and extent of such underground items. It shall be necessary in such locations for the Contractor to explore underground to determine such data in advance of actual construction in the particular area or areas in question. No extra compensation shall be given the Contractor for such exploratory work.

The Contractor shall take into account all probable and possible adverse conditions such as ground water, surface water, ditches, existing structures, existing utilities, pipe lines, conduits, etc. in planning and bidding his work.

Handling of water, sewage and drainage encountered during the work shall be the Contractor's responsibility and he shall make provision for the handling thereof or removal without damage to property or danger to safety, and without detriment to the quality of work in which he is engaged for the owner. No special payment shall be made for handling surface water, ground water or sewage encountered during the course of the work.

2. Obstructions and Existing Improvements

Attention is called to various obstructions which may be encountered in the course of the work. Maps and information regarding underground utilities should be obtained from the utility organization operating such facilities. The locations of underground utilities are not guaranteed. Fences, utilities, drainage lines, ditches, pipes, shrubs, trees, yards, etc. shall be restored to their original condition at the expense of the Contractor.

3. Grade Boards, Lines and Poles

The Engineer shall set grade hubs on an offset line for all main system lines and shall furnish the Contractor with the elevation of the same. The Contractor shall furnish materials and erect grade, batter boards or targets of a substantial character and meeting the approval of the Engineer. To permit checking grades, not less than four grade boards shall be in place at any one time. The Contractor shall provide lines, plumb bobs and straight, well-made and properly marked measuring poles. The measuring poles and plumb bobs shall be used in placing and lining each and every length of pipe, except at tunnels where adequate precautions shall be taken for maintaining the grade and alignment.

4. Pavement, Sidewalks, Curbs and Gravel Surfaces

Wherever sewers cross or follow paved or oiled streets, or cross driveways, sidewalks, curbs or other improvements, the Contractor shall, subject to approval of the Engineer, have the option of making continuous cuts or using the cut and tunnel method. Preference shall be given to the plan involving the least obstruction to traffic and general convenience, and likely to result in the most satisfactory permanent installation. Pavement or oiled surfaces shall be cut in advance of excavation and only to the minimum width which will allow for excavation, bracing of the trench and pipe laying, and the method of sheeting or bracing shall be one which will prevent any possibility of loss of ground or undermining the pavement or surfacing. Lumber shall be removed after the pipe is in place, and the trench shall be backfilled under methods which will prevent later settlement after the surface has been replaced. Settlement, loss of ground, earth movement and any damages which may result from such ground movement shall be the responsibility of the Contractor.

If the Contractor uses the cut and tunnel method, he shall provide proper tools and tampers, and shall completely fill the tunnel and tamp it thoroughly to the satisfaction of the Engineer. If the natural material does not permit proper compaction, the Contractor shall use approved sand, gravel, or crushed rock for tunnel backfilling. After the trench is backfilled and settled, the sub-base and surfacing material shall be replaced, using the same or greater thicknesses as required by the road or highway department having jurisdiction. All driveways, curbs, walks and other improvements shall be replaced in kind.

The Contractor shall be allowed for replacing pavement at the bid prices, based upon the total length under pavement and a width as shown in Item 8. Wherever the Contractor uses cut and tunnel or boring methods, he shall be allowed for replacing the pavement for the full distance the pavement is traversed, even where not actually cut. If select backfill material is required under pavement, it shall be pit run granular material approved by the Engineer.

After backfilling has been done and prior to the completion of paving, the Contractor shall put the surface in good usable condition. Base rock for paving shall be 2" minus crushed rock 10" thick. Leveling course shall be 3/4" minus crushed rock 2" thick. The type of such material used shall be approved by the Engineer. No additional payment other than that for paving shall be made for any temporary surface material.

5. Trench Excavation

The Contractor shall not cut, break, or remove pavement or begin excavation for sewers until all necessary equipment and material are on hand to insure rapid completion of the work. Extensive open, uncompleted trenches will not be permitted. The Contractor may operate more than one excavating and pipe laying crew provided sufficient equipment, material and labor is available and used to carry on the work expeditiously, and provided further that such an operation is approved by the Engineer. Pavement shall be cut prior to removal to prevent overbreak during excavation.

Excavation shall be made to line and grade as staked. The Contractor shall be held to fixed maximum width of trench from bottom of trench to an elevation

six inches (6") above the top of the sewer pipe to be laid, as set forth in the table which follows:

Maximum Width of Trench, Bottom to 6" Above Top of Pipe

<u>Pipe Size</u>	<u>Maximum Trench Width</u>	<u>Pipe Size</u>	<u>Maximum Trench Width</u>
4"	2' 0"	20"	3' 6"
6"	2' 0"	21"	3' 6"
8"	2' 0"	24"	3' 10"
10"	2' 2"	27"	4' 2"
12"	2' 5"	30"	4' 6"
14"	2' 8"	33"	4' 10"
15"	2' 9"	36"	5' 0"
16"	2' 10"	42"	5' 6"
18"	3' 1"	48"	6' 0"

From a point 6" above top of pipe, trench width may be any reasonable width provided there is sufficient room for pipe laying, ready inspection and the trench is safe for men working therein. Bracing shall be used where reasonably necessary to protect the safety of workmen in the trench and to prevent sloughing of material. In sections wherein bracing is used it shall be cut off at top of pipe level and the portion below top of pipe left in place. Pay widths for calculating quantities of trench excavation shall be as set forth under Item 7.

Excavation done by back hoe, clam shell, drag line, trenching machine or other mechanical equipment shall not be carried lower than three inches (3") above grade. The remainder of the excavation shall be done by hand. The bottom of the trench, hand excavated, shall conform to the curvature of the pipe and support the same. Bell holes shall be excavated at the proper intervals, and they shall be of sufficient depth to permit the proper completion of all pipe joints and prevent the pipe resting on bells in beam action. Bell holes shall be no larger than needed for making tight joints and preventing bells resting on trench bottom.

As an alternate to the foregoing hand excavation requirement, the Contractor may elect to over excavate with mechanical equipment so far as depth is concerned but shall be required to place at his expense sufficient granular material as approved by the Engineers to adequately support the lower 3" of the pipe.

No pipe shall be laid on blocking of wood or other material.

The contractor shall at all times keep the trench free from water to permit fine grading and laying and jointing of pipe, and prevent damage to completed joints. He shall provide adequate pumping equipment and shall handle and dispose of the water without damage to adjacent property. Trench water shall be allowed to flow through the pipe during construction only by special permission of the Engineer. and then an adequate screen shall be provided to prevent foreign material from getting into the line. No extra payment will be allowed in any areas in which water may be encountered.

All underground piping, utilities, etc. encountered in trench excavation and pipe laying shall be left in or restored to original condition by the Contractor.

and pipe laying shall be left in or restored to original condition by the Contractor, and the cost of such work shall be absorbed in the other bid prices. Some information relative to existing utilities may be shown on the plans, but the data so given is general only, and the Contractor shall satisfy himself relative to the location of gas mains, water mains, telephone conduits, power conduits, drainage pipes, structures, etc. Neither the Engineer nor the Owner are responsible for the location of such underground structures or obstructions.

The Contractor shall use pipe and conduit locators ahead of excavation and dig exploratory holes in advance of machine excavations to determine position and depth of utilities. The Owner's representatives will cooperate with the Contractor and furnish such data and information as the Owner may have available.

In areas in which solid rock is encountered in the trench sub-grade, the pipe shall be supported and bedded with suitable sand or other material as directed and approved by the Engineer. In such areas, excavation shall be carried not less than two inches (2") nor more than six inches (6") below normal subgrade elevation and the cushion shall be placed in the trench before lowering pipe into place.

Trenches in soft, unstable bottom material shall be stabilized by the use of crushed rock, gravel or pit run granular material as directed and approved by the Engineer. If any areas in which sedimentary deposits containing coarse gravel are encountered, special care shall be taken to obtain suitable material for bedding the pipe and backfilling to a height of six inches (6") above the crown of the pipe.

6. Classification of Excavation Materials

Trench excavation materials shall be classified as follows:

- A. Solid Rock - all rock in ledges or masses that cannot be removed without blasting, or boulders containing more than 6 cubic feet in volume shall be classified as solid rock.
- B. Common - this classification shall include all other materials not described as solid rock, including hardpan, slate, shale, clay, sand, gravel, cemented gravel and loose rock.

7. Measurement of Trench Excavation

The complete cost of construction of sewers between manholes shall be covered by the unit prices bid for excavation and backfill, furnishing and laying sewer pipe, and furnishing and laying tees. All costs for bell hole excavation, manhole excavation, bracing, sheeting, pumping, maintenance of trench and surface and compaction of backfill shall be covered by the excavation and backfill price bid. Without regard for the methods used or material actually excavated, to avoid disputes and simplify the method of calculation, the quantities for common excavation and backfill shall be determined by multiplying the length of particular units of line, the average depth from the ground surface to the invert (flow line) of the pipe, and a width as set forth in the table which follows. In areas in which solid rock is encountered, the pay width of trench shall be the same as under common excavation, but the depth shall be taken as six inches (6") greater than the pipe invert depth.

Pay Widths for Trench Excavation and Restoration of Pavement

<u>Size of Pipe</u>	<u>Excavation Pay Width</u>	<u>Pavement Pay Width</u>
4"	1' 6"	2' 0"
6"	1' 6"	2' 0"
8"	2' 0"	2' 6"
10"	2' 0"	2' 6"
12"	2' 0"	2' 6"
14"	2' 3"	2' 9"
15"	2' 4"	2' 10"
16"	2' 6"	3' 0"
18"	2' 9"	3' 3"
20"	3' 0"	3' 6"
21"	3' 0"	3' 6"
22"	3' 0"	3' 6"
24"	3' 4"	4' 0"
27"	3' 6"	4' 0"
30"	4' 0"	4' 6"
33"	4' 3"	5' 0"
36"	4' 6"	5' 3"
42"	5' 0"	6' 0"
48"	5' 6"	6' 6"

8. Timbering

The Contractor shall furnish, place and maintain such sheeting and bracing as may be required to support the sides of the trench, prevent any movement which may injure or delay the work, injure the street surface or damage adjacent property, will provide full safety to the men on the work and prevent placing unnecessary loads on pipe. If the Engineer is of the opinion that any timbering is inadequate, he may order additional supports to be provided at the expense of the Contractor, but compliance with such orders or failure of the Engineer to call for additional timbering shall not release the Contractor from his responsibility to provide safe and adequate supports.

The Contractor shall, in so far as it is practical to do so, remove all timbering immediately ahead of backfilling operations; provided, however, that timbers below the top of sewer pipe shall be cut off and left in place.

9. Laying Concrete or Vitrified Clay Pipe with Rubber Gasket Joints

Concrete or vitrified clay sewer pipe shall be laid with rubber compression gaskets. Pipe shall be uniformly and evenly supported between bells by hand shaping of original soil in trench bottom as provided under specifications pertaining to trench excavation. Bells shall not rest on the trench bottom. Both ends of pipe shall be clean and free of foreign material before pipe is pressed together. Lubrication of pipe and rubber gaskets shall comply as to material and methods with the recommendations of the pipe and gasket manufacturers. Pipe shall not be supported bell to bell in beam action nor supported on blocks.

Pipe shall be accurately laid to true grade and alignment with uniform, firm support in original ground throughout. If rock is encountered in trench bottom, a cushion shall be provided, as specified under trench excavation.

The pipe to be used shall be fabricated to tolerances which will insure adequately compressed joint rings and watertight joints. Bells shall have adequate strength to withstand the tension induced by compressed joint rings without cracking. Both pipe and gaskets shall be carefully made to insure true, round, smooth ends. The entire procedure to be followed with this type of pipe laying shall be submitted to and approved by the Engineer before materials are purchased and construction begins.

Wye and tee branches shall be installed with connections inclined upward at an angle of 45° unless otherwise directed by the Engineer. Wye and tee branch fittings shall be supported firmly to prevent damage by backfill.

Backfilling around and to a point 6" above the top of pipe shall be mechanically compacted as set forth under the specifications pertaining to backfilling.

10. Laying Asbestos Cement Pipe

Asbestos cement sewer pipe shall be laid on carefully graded trench bottom with bell holes excavated for each collar type joint. Two rubber gaskets of compression type shall be used with an asbestos cement collar at each joint. Ends of pipe, collars and gaskets shall all be clean and free of foreign material when pipe is laid.

Pipe shall be uniformly and evenly supported in the trench bottom without being subjected to beam action between collars. Bell holes shall be excavated sufficiently deep to prevent support of pipe lengths in beam action. Trench bottom shall be excavated by hand in original material to give uniform, even support to the barrel of the pipe, the hand excavation being shaped to conform to the shape of the pipe. No blocking for support of pipe shall be used.

Wye and tee branches shall be of asbestos cement and shall be installed so that connections are inclined upward at an angle of 45° unless otherwise directed by the Engineer. Wye and tee branch fittings shall be supported firmly to prevent damage by backfill.

Backfilling around and to a point six inches (6") above the top of pipe shall be mechanically compacted as set forth under the specifications pertaining to backfilling.

11. Wye and Tee Branches

Wye and tee branches shall be installed as shown on the plans or staked by the Engineer. Before installation they shall be inspected to see that there are no cracks and the branch is properly formed. Branches shall be placed at an angle of approximately 45° with the horizontal. Wye and tee branches to which no immediate connection is to be made shall be closed with a stopper or plug and sealed to secure a watertight closure. Tees, wyes and side sewers crossing the sewer trench shall be supported by concrete or carefully compacted granular material.

12. Side Sewers

Side sewers from wyes and tees to either property line or to connection to building plumbing outlet as may be required shall be installed using same materials, care, laying methods and backfilling as specified for trench excavation, laying sewers and backfilling. Pipe ends not to be connected immediately to a building sewer shall be closed with a stopper or plug set with material which will prevent entry of either dirt or water and which may be readily removed later.

13. Backfilling

After pipe lines have been laid as specified and have been inspected and approved by the Engineer or inspector, the trench shall be backfilled. The filling around the pipe, and for six inches (6") above the top of all sewer pipe and wyes shall be of earth, sand or fine material, free from stones, rocks or lumps, and carefully tamped or rammed in layers not exceeding six inches (6") so that the fill is compact for the full width of the trench, without voids or soft compressible material. Compaction shall be accompanied by use of power tools or hand tamping with a 2" x 4" with suitable handle, or similar tool which will effectively compact the material. Attention shall be paid to moisture content to secure maximum density of backfill. Compaction no less than 95% shall be obtained.

From a point six inches (6") above top of pipe lines the backfill may be made with mechanical equipment using methods which will minimize future settlement. Materials which may properly be compacted with water shall be water settled. The Contractor shall obtain the approval of the Engineer of his proposed backfilling methods before the work begins. Any rock or heavy gravel shall be so distributed that it is completely surrounded by fine material. In case there is any deficiency of suitable backfilling material, the Contractor shall supply same without additional cost. In unimproved ground the surplus material shall be neatly crowned up over the top of the trench. In streets, along roads, in alleys, or in improved ground any surplus shall be hauled away and disposed of at the expense of the Contractor and in a location specified by the Engineer.

Backfilling under hard surface pavements, railroad crossings and similar places shall be given special compaction for full trench depth to avoid future settlement. The Contractor shall be responsible for the support of the finished pavement, railroad tracks and similar structures, and shall at his own expense repair any settlement which may occur, due to his operations, within one year after acceptance of the work.

If ordered by the Engineer, the Contractor may be required to fill the entire trench with select material at railroad crossings and under highway pavement. If so, payment for such select material in place shall be per cubic yard as bid using excavation pay widths as set forth in Item 7, page SS-5.

If material from trench excavation is used as backfill and such material is ordered mechanically tamped by the Engineers, the resultant compaction shall be no less than 95%. Payment for compaction shall be in accordance with unit price bid and quantity calculated from point six inches (6") above top of pipe to elevation of bottom of base rock upon which pavement is placed.

14. Excess and Unsuitable Backfill Material

Excess material or material unsuitable for backfill removed during trench excavation shall be hauled and disposed of at locations determined by, or approved by, the Engineer, and methods of disposition shall also be subject to the Engineer's approval.

15. Manholes

Manholes shall be constructed at places shown on the plans or as directed by the Engineer. Concrete shall contain one and one-half ($1\frac{1}{2}$) barrels of cement per cubic yard. Steel forms, or wooden sectional forms covered with sheet metal shall be used for the inside of monolithic manholes. Otherwise the construction shall conform to the requirements as set forth in the "General Specifications for Concrete Construction," included herewith.

Pre-cast concrete manholes may also be used provided the design, concrete mix and construction are approved by the Engineer. Manhole frame and cover design and size of opening shall conform to the plans. Sections of pre-cast concrete manholes shall be carefully mortared together in place to secure absolute watertightness.

Sewers passing through manholes in a straight line shall be made of half sections of pipe set in concrete, or by carefully forming sections in concrete. At curves or junctions the flowing through channels in manholes shall be made by forming and subsequent hand finishing of concrete so as to obtain smooth, uniform sections.

Special or drop manholes shall be built in conformance with plans and to meet the approval of the Engineer.

Manhole and lamphole rings and covers shall be set on a mortar bed, and accurately leveled up to exact grade. The junction between the top of the manhole and the ring shall be watertight.

16. Watertightness and Tests for Sanitary Sewers

Finished sanitary sewers shall be substantially tight against leakage from either the inside or the outside. Tests of pipe shall be strictly enforced. As a final test of the joints and the finished sewer, sections shall be subjected to an internal pressure test or an external water test before or after backfilling, as shall be determined by the Engineer.

Maximum allowable leakage either by infiltration or exfiltration shall not exceed one half gallon per hour per inch of pipe diameter per 100 feet of sewer.

The Contractor shall furnish bulkheads, fittings, valves, hose and other materials and the necessary personnel for making tests which shall be under the general direction of the Engineer.

In the absence of a high ground water table, external tests for leakage shall be made by filling trenches with water with pipes through manholes open. Quantity of water permitted to enter the pipe shall not exceed the limits set forth

above. Flow of water in sewers shall be measured accurately by either volumetric methods or by means of accurately made weirs.

Internal tests shall be made by closing the sewer at manholes by tight bulkheads or plugs and filling the sewer to a head of six feet (6') over the invert. The head shall be maintained until full absorption has taken place, and then for a further minimum period of six (6) hours for actual test.

Tests shall be conducted as the general construction work progresses in order that any defects in materials and workmanship may be discovered early. If any section is found not to comply with the maximum leakage specified, the sewer shall be reconstructed and retested. Patching with cement mortar or other joint compounds shall not be permitted. Pipe broken for inspection or other purposes shall be replaced with new pipe with rubber gasket joints. Reconstructed work shall comply with leakage requirements as well as all other specifications regarding materials and workmanship.

17. Cleaning Sewers and Manholes

Upon completion of construction, all sewer lines shall be clean and free from dirt, gravel, crushed rock and debris. If such materials are flushed into a treatment plant or pumping station, the Contractor shall remove same at his expense as required by the Engineer.

18. Safety Provisions

All work shall be carried on with due regard for safety to the workmen and the public. Open trenches shall be protected with barricades of a type that can be seen at a reasonable distance, and at night shall be adequately protected by lights. Detours shall be maintained in good condition. Bridges for either vehicles or pedestrians shall have adequately braced handrails, and at night shall be indicated by lights. Safety instructions received from the Engineers or other authorities shall be observed, but following of such instructions shall in no way relieve the Contractor of his responsibility or liability.

All safety requirements of the State Industrial Accident Commission, State Department of Labor, and other state agencies shall be met.

19. Maintenance of Traffic

The work shall be done under a program meeting the approval of the Engineer, and creating a minimum of interruption or inconvenience to traffic. No two adjacent streets shall be closed at the same time. Foot traffic shall be provided for, and unless the necessary detours can be kept within one block, foot bridges shall be built. The Contractor shall carry on the work in close cooperation with city, county and state and railroad authorities having to do with traffic control.

20. Trees, Shrubs, Sod and Cultivated Land

Construction in parking strips and through private property shall receive special care by the Contractor. Top soil shall be excavated separately and piled

on the opposite side of the trench from the subsoil. Backfilling operations shall be conducted in a manner which will restore the terrain to its original condition. The Contractor shall remove and replace any trees, shrubs or plants, or sod that cannot be preserved by short tunnels. All shrubs or plants shall be balled by experienced men, carefully handled and kept watered, and replaced in the original position without damage. Sod shall be handled in a like manner. It is the intent of this paragraph that the Contractor shall not meet unreasonable demands of the property owners, but shall exercise due care in all such operations and keep damage to a minimum. Hand digging will be required in all locations wherein machinery is apt to damage improved property.

21. Pressure Lines

If pressure sewer lines are required in the project, they shall be cement mortarlined Class 150 psi cast iron or ductile iron, or Class 150 asbestos cement; all such pipe shall have "O" ring neoprene gaskets. Cast iron and ductile iron fittings shall be cement mortar lined with ends designed to receive the type of pipe selected and being installed.

All pipe shall be laid and maintained to the required lines and grades. Minimum depth of pipe cover shall be thirty-six inches (36"). Pipe shall not be deflected either vertically or horizontally in excess of that recommended by the manufacturer. Concrete kickblocks for resisting unbalance thrust at fittings shall be provided.

Pressure pipe lines shall be tested under a pressure of no less than 150 pounds per square inch and pipe line shall hold such pressure without loss for a period of four (4) hours.

Procedure for testing shall be in accordance with the standard practice and as approved by the Engineer. The Contractor shall furnish all necessary apparatus and assistance for conducting the tests. The cost for testing shall be included in the unit bid price for pressure pipe in place.

The Contractor shall correct any defects which may develop and he shall make all necessary replacements and repairs to obtain tight pipe lines.

22. Railroad Crossings

Crossings of railroad rights-of-way shall be done in a manner which complies and conforms with the requirements of the railroad having jurisdiction. If any bonds or certificates of insurance protection are required, they shall be furnished to the railroad companies concerned.

Actual permission or easement for such crossings will be obtained by the Owner, but the terms of such permits or easements shall be met by the Contractor.

23. Cast Iron Pipe on Piers

Cast Iron pipe on piers shall be Class 150 "O" ring or mechanical joint, with 1/16" cement lining. Pipe shall be securely anchored to top of piers with gal-

vanized straps and blocked with redwood. Maximum spacing of piers shall not exceed ten feet (10').

24. Private Driveways

While trenches are open the Contractor shall provide adequate plank bridges or otherwise keep private driveways in safe and usable condition, or he shall make arrangements with the property owners for closing the same.

25. Clearing, Grubbing and Clean-Up

In unimproved areas, clearing and grubbing may be required in connection with excavation and sewer installation work. The Contractor shall do all such required work, being certain to conform to the provisions of easements through private property. The Contractor shall dispose of roots, stumps, trees and brush in a manner approved by the Engineer.

Upon completion of the work, and as a condition of acceptance, the Contractor shall remove and haul away all surplus, unused and rejected materials and surplus materials from excavation, and restore the route and site of the work to a condition to that existing before the construction work began.

26. Guarantee

All materials, equipment, labor and workmanship shall be guaranteed for a period of one year following acceptance of the work. This shall include the restoration of settled trenches, crushed rock or graveled surfaces and pavement.

Painting and coatings shall be guaranteed free from discernable defects for a period of two years.

BASIS OF PAYMENT

SANITARY SEWER CONSTRUCTION -- NORTH NEWBERG SEWER PROJECT

CITY OF NEWBERG, OREGON

SECTION A - NORTH AREA DISTRICT

<u>Items</u>	<u>Basis</u>
1, 2 & 3 <u>Sewer Pipe</u>	- per <u>net lineal foot</u> in place in trench, excluding tees; price includes compaction of backfill to point 6" above top of pipe.
4, 5, 6 & 7 <u>Tees</u>	- per each in place.
8 & 9 <u>Stubs & Plugs</u>	- per each for one length of pipe & plug.
10 & 11 <u>Plugs</u>	- per each.
12 <u>Manholes</u>	- lump sum for manhole to depths of 8' to invert; price includes excavation, all concrete work, frame and cover, manhole safety steps.
13 <u>Extra Manhole Depth</u>	- per lineal foot of depth to invert in excess of 8 feet.
14, 15 & 16 <u>Cut & Restore Pavement</u>	- per square yard; pay width as in specs.; price includes base rock for pavement.
17 <u>Excavation & Backfill Common</u>	- per cubic yard; pay widths as in specs.; excess disposed of where and as required by Engineer.
18 <u>Pipe Bedding Gravel or Rock</u>	- per cubic yard in place as required and authorized by Engineer, pay width equal excavation pay width.
19 <u>Select Granular Backfill</u>	- per cubic yard measured compacted in place.
20 <u>Compaction, Common Backfill</u>	- per cubic yard for 95% compaction of common material from trench excavation, where and as directed by Engineer; Compaction to 6" above pipe excluded from this item.

<u>Items</u>	<u>Basis of Payment</u>
21 <u>Crushed-Rock Shoulders</u>	- per cubic yard as required and approved by Engineer.
22. <u>Connect to Existing Manhole</u>	- lump sum

SECTION B - SIDE SEWERS - HIGHWAY #219

Same basis for payment as put forth in SECTION A.

ALL WORK - SECTIONS A & B

Clearing & Grubbing

- No separate payment; if any required cost included in excavation and backfill price.

Protection & Restoration of Trees, Shrubs, Lawns, & Landscaping

- No separate payment; cost thereof included in excavation and backfill unit price.

P

R

O

P

O

S

A

L

PROPOSAL -- NORTH NEWBERG SEWER PROJECT

SANITARY SEWER CONSTRUCTION

Mayor and City Council
City of Newberg, Oregon

Gentlemen:

The undersigned bidder declares that he has examined the plans and specifications, has visited the site, and made such investigations as are necessary to determine the character of the work and the conditions to be encountered, and if this Proposal is accepted he will contract with the City for the work described in these specifications in a form of contract hereto appended, will provide all necessary equipment, labor, materials, tools and apparatus required and as specified, and under the requirements of the Engineer, at the prices hereinafter written. The Bidder further understands that the estimated quantities are approximate only, and that quantities may be increased or decreased within reasonable limits without affecting bid prices.

The Bidder further agrees that the work shall be completed in all respects within 75 calendar days from notice and award of contract.

Should the Bidder fail to complete the work within the time limit set forth above, liquidated damages shall be deducted from moneys otherwise due the Contractor at the rate of Seventy-Five Dollars (\$75.00) per calendar day.

Accompanying this Proposal is a certified check, cashier's check or bid bond drawn on Birmingham Fire Insurance of Pennsylvania in the amount of \$3,086.10 guaranteeing that the Bidder shall enter into a contract for the work if so awarded by the City.

SANITARY SEWER SYSTEM CONSTRUCTIONSECTION A - NORTH AREA DISTRICT

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Amount</u>
1. <u>12" Extra Strength Sewer Pipe, the sum of</u> <u>Three and 65/100</u> Dollars (\$ <u>3.65</u>) per lin.ft.		2,640	\$ <u>9,636.00</u>
2. <u>10" Extra Strength Sewer Pipe, the sum of</u> <u>Three and no/100</u> Dollars (\$ <u>3.00</u>) per lin.ft.		1,850	<u>5,550.00</u>
3. <u>8" Extra Strength Sewer Pipe, the sum of</u> <u>Two and no/100</u> Dollars (\$ <u>2.00</u>) per lin.ft.		3,740	<u>7,480.00</u>
4. <u>12" x 6" Tees, the sum of</u> <u>Sixteen & no/100</u> Dollars (\$ <u>16.00</u>) each		32	<u>32.00</u>
5. <u>12" x 4" Tees, the sum of</u> <u>Sixteen & no/100</u> Dollars (\$ <u>16.00</u>) each		32	<u>512.00</u>
6. <u>10" x 4" Tees, the sum of</u> <u>Fourteen & no/100</u> Dollars (\$ <u>14.00</u>) each		27	<u>378.00</u>
7. <u>8" x 4" Tees, the sum of</u> <u>Twelve & no/100</u> Dollars (\$ <u>12.00</u>) each		76	<u>912.00</u>
8. <u>10" Stubs & Plugs, the sum of</u> <u>Thirty & no/100</u> Dollars (\$ <u>30.00</u>) each		1	<u>30.00</u>
9. <u>8" Stubs & Plugs, the sum of</u> <u>Fifteen & no/100</u> Dollars (\$ <u>15.00</u>) each		12	<u>180.00</u>

SECTION A - NORTH AREA DISTRICT (continued)

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Amount</u>
10. <u>6" Plugs, the sum of</u> <u>Three & no/100</u>			
	<u>Dollars (\$ 3.00)</u> each	2	<u>\$ 6.00</u>
11. <u>4" Plugs, the sum of</u> <u>Two & no/100</u>			
	<u>Dollars (\$ 2.00)</u> each	135	<u>270.00</u>
12. <u>Manholes to 8' Depth, the sum of</u> <u>Two Hun-</u> <u>dred Seventy & no/100</u>	<u>Dollars (\$ 270.00)</u> each	29	<u>7,830.00</u>
13. <u>Extra Manhole Depth, the sum of</u>			
	<u>Twenty-Six & no/100</u> Dollars (\$ 26.00) per foot	100	<u>2,600.00</u>
14. <u>Cut & Restore Concrete Pavement, the sum of</u>			
	<u>Six & no/100</u> Dollars (\$ 6.00) per sq.yd.	25	<u>150.00</u>
15. <u>Cut & Restore Asphaltic Concrete Pavement,</u> <u>the sum of</u>			
	<u>Four & 30/100</u> Dollars (\$ 4.30) per sq.yd.	565	<u>2,429.50</u>
16. <u>Cut & Restore Oil Mat Pavement, the sum of</u>			
	<u>Four & 30/100</u> Dollars (\$ 4.30) per sq.yd.	180	<u>774.00</u>
17. <u>Excavation & Backfill, Common, the sum of</u>			
	<u>Two & 50/100</u> Dollars (\$ 2.50) per cu.yd.	6,150	<u>15,375.00</u>
18. <u>Pipe Bedding Gravel or Crushed Rock, the</u> <u>sum of</u>			
	<u>Three & 50/100</u> Dollars (\$ 3.50) per cu.yd.	190	<u>665.00</u>

SECTION A - NORTH AREA DISTRICT

(continued)

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Amount</u>
19. <u>Select Granular Backfill, Compacted in Place,</u> the sum of			
<u>Four & 50/100</u> Dollars (\$ <u>4.50</u>) per cu.yd.		500	\$ <u>2,250.00</u>
20. <u>Compaction of Common Backfill, the sum of</u>			
<u>Only thirty cents</u> DOLLARS (\$ <u>0.30</u>) per cu.ft.		1,700	<u>510.00</u>
21. <u>Crushed Rock Surfacing - Shoulders, the</u> sum of			
<u>Five and no/100</u> Dollars (\$ <u>5.00</u>) per cu.yd.		200	<u>1,000.00</u>
22. <u>Connect to Existing Manhole, the lump sum</u>			
<u>of Ninety & no/100</u> Dollars (\$ <u>90.00</u>) l.s.			<u>90.00</u>

TOTAL - SECTION A - NORTH AREA DISTRICT\$ 58,659.50

SECTION B - SIDE SEWERS - HIGHWAY #219

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Amount</u>
1. <u>4" Sewer Pipe, the sum of</u>			
<u>One and 60/100</u> Dollars (\$ <u>1.60</u>) per lin.ft.		1,680	\$ <u>2,688.00</u>
2. <u>Cut & Restore Asphaltic Concrete Pavement, the sum of</u>			
<u>Three and no/100</u> Dollars (\$ <u>3.00</u>) per sq.yd.		210	<u>630.00</u>
3. <u>Excavation & Backfill, the sum of</u>			
<u>Two and 50/100</u> Dollars (\$ <u>2.50</u>) per cu.yd.		990	<u>2,475.00</u>
4. <u>Select Granular Backfill, Compacted, the sum of</u>			
<u>Four and 50/100</u> Dollars (\$ <u>4.50</u>) per cu.yd.		160	<u>720.00</u>
5. <u>Compaction of Common Backfill, the sum of</u>			
<u>Only thirty cents</u> Dollars (\$ <u>0.30</u>)		400	<u>120.00</u>
TOTAL - SECTION B - SIDE SEWERS - HIGHWAY #219			\$ 6,633.00

TOTAL - SECTION A - NORTH AREA DISTRICT

\$ 38,639.50

TOTAL - SECTION B - SIDE SEWERS - HIGHWAY #219

6,633.00

TOTAL - SANITARY SEWER CONSTRUCTION

NORTH NEWBERG SEWER PROJECT

65,292.50

Both Sections represent one bid.

If this Proposal shall be accepted by the Owner, and the undersigned shall fail to execute a satisfactory contract and bond as stated in the Instructions to Bidders hereto attached within ten days (10) (Sundays excepted) from the date of notification, then the Owner may at its option determine that the undersigned has abandoned the contract and thereupon this Proposal shall be null and void, and the cashier's or certified check accompanying this Proposal shall be forfeited to and become the property of the Owner; otherwise the check accompanying this Proposal shall be returned to the undersigned.

The full name and residence of all persons and parties interested in the foregoing bid as principals are as follows:

<u>Name</u>	<u>Address</u>
<u>Fred S. Farah</u>	<u>2845 S. E. 48th Avenue, Portland, Oregon</u>
<u>Aflife A. Azar</u>	<u>" " "</u>
<u>Raji A. Azar</u>	<u>" " "</u>

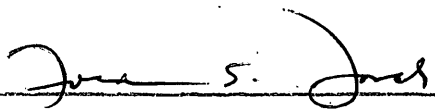
The name and business address of the Surety Company which will furnish the required bond insuring the construction is:

Birmingham Fire Insurance Co. of Pennsylvania

The undersigned bidder has heretofore completed the following pieces of work of a similar nature to that contemplated:

<u>Job</u>	<u>Location</u>	<u>Date</u>
<u>Sewer \$369,000</u>	<u>Metzger, Oregon</u>	<u>June 15, '66</u>
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

Name of Bidder Key Construction Co. ☒ Corporation
 Address of Bidder 2845 S. E. 48th Avenue ☐ Partnership
Portland, Oregon 97206 ☐ Individual

Signature of Authorized Agent 

Title President

Date July 18, 1966 196

AGREEMENT

SANITARY SEWER CONSTRUCTION

CITY OF NEWBERG, OREGON - NORTH NEWBERG SEWER PROJECT

The City of Newberg, Oregon, herein called "OWNER" and _____

Key Construction Co., herein called "CONTRACTOR"

agree as follows:

1. Commencement and Completion of Work

The Contractor shall commence work in the field within ten (10) calendar days after written notice from Owner to proceed with construction, and he shall complete the work within the number of calendar days thereafter as listed hereunder.

Section A - Sanitary Sewers 75 Calendar Days

Section B - Side Sewers - Hillsboro Road 75 Calendar Days

2. Performance of Work

The Contractor shall furnish all labor, material, equipment and instrumentalities to perform all the work necessary or incidentally required for full compliance with the specifications and contract documents issued to the Contractor and included with his Proposal for the improvements shown in detail on the following plans:

<u>No.</u>	<u>Title</u>	<u>Drawing No.</u>
1	North Area Project & Morton Trunk	24-A-43
2	North Area Plan & Profile - 1	24-A-45
3	North Area Plan & Profile - 2	24-A-46
4	North Area Plan & Profile - 3	24-A-47
5	North Area Plan & Profile - 4	24-A-48
6	Manholes & Misc. Details	24-A-40

The Plans, Instructions to Bidders, Special and General Conditions, all Specifications, Basis of Payment and the Contractor's Proposal, dated July 18, 1966, are hereby made a part of this Agreement as though set forth herein. If such documents and this Agreement are in any respect in conflict or inconsistent, the provisions of this Agreement shall control.

3. Bond and Insurance

- A. The Contractor shall furnish a 100% contract public works performance bond in a form satisfactory to the Owner.
- B. The Contractor agrees to obtain and continuously maintain, until completion of all the above work, such insurance as the Owner considers necessary for the proper protection of the parties hereto and in form approved by the Owner.
- C. Contractor shall require, before commencing work, all insurance companies issuing any policies of insurance to Contractor which the Contractor is required to procure hereunder, to certify to the Owner in writing that such policies have been issued and are in force and will not be cancelled or annulled except upon ten (10) days notice in writing to Owner. Contractor shall not cancel any policies of insurance required hereunder either before or after completion of the work, without the consent of the Owner in writing.

4. Indemnity

The Contractor shall indemnify Owner against all claims, costs, expenses, losses and liabilities of every kind, including attorney fees, arising out of or in any manner connected directly or indirectly with the activities of the Contractor under this Agreement, including claims for infringement of any patent rights or damages by reason of the construction.

5. Compliance with Applicable Laws

The Contractor shall comply with all applicable federal, state and local laws, regulations and requirements.

6. Payment for Labor

The Contractor shall promptly make all payments to all persons supplying the Contractor with labor, materials and supplies, for the prosecution of the work or in connection therewith. Any such payment not made by the Contractor when due may be made by the Owner and such payments deducted from any moneys due Contractor under this Agreement.

7. Assignment

The Contractor shall not assign or sublet this contract, or any part thereof, without the written consent of Owner.

8. Completion of Work

If the Contractor shall fail to commence the work within the specified time, or to prosecute said work continuously with sufficient workmen and equipment to insure its completion within the time herein specified for completion, or to perform said work according to the provisions of this Agreement, or if for any other cause or reason whatsoever Contractor shall fail to carry on the said work in a manner acceptable to Owner or its Engineers, Owner may elect to give notice in writing of such default, specifying the same, and if the Contractor within a period of 72 hours after such notice, shall not proceed in accordance therewith, then Owner shall have full power and authority without process of law and without violating this Agreement, to take the prosecution of the work out of the hands of the Contractor and complete it with its own forces, or contract with other parties for its completion, or use such other measures as in the Owner's opinion are necessary for its completion, including the use of the equipment and other property of the Contractor on the job site.

Neither by the taking over of the work nor by its completion in accordance with the terms of this provision shall Owner forfeit its right to recover damages from the Contractor or from Contractor's surety for failure to complete or for delay in such completion. Should the expense incurred by Owner in taking over and completing the work be less than the sum that would have become payable under this Agreement if said work had been completed by the Contractor, then the Contractor shall be entitled to the difference, and should such expense exceed the said sum then the Contractor and Contractor's surety shall be liable to Owner for the amount of such excess. Upon the taking over of the work by Owner as herein provided, no further payment will be made to the Contractor until the work is completed, and any moneys due or that may become due the Contractor under this Agreement will be withheld and may be applied by Owner to payments for labor, materials, supplies and equipment used in the prosecution of the work, and for the payment of rental charges on equipment used therein, or to the payment of any excess cost to Owner of completing said work.

9. Payments

- A. Contractor shall be paid monthly, based on the prices set forth in Contractor's Proposal dated July 18, 1966 and in the Basis of Payment, less ten percent (10%) retention. All payments shall be based upon the estimate made by Owner's Engineers as to the amount of work done by the Contractor, which estimates shall be final and binding upon the parties hereto and shall conclusively establish the amount of work done by the Contractor. The Contractor will receive no compensation for any work done by him which is not approved and accepted by Owner's Engineers.
- B. Final payment shall be made when all work is approved in writing by the Engineers, accepted by Owner, and evidence presented by the Contractor that he has paid all bills and claims, withholding taxes, contributions to both state and federal governments for payroll withholding, workmen's compensation, F.I.C.A., income taxes and any other payments required by law, and a general release furnished to Owner by the Contractor.

10. Completion and Delays

- A. The Contractor shall complete all work herein required by the following dates:

Section A - Sanitary Sewers

October 17, 1966

Section B - Side Sewers - Highway #219

October 17, 1966

- B. No extension of time shall be allowed or claimed by Contractor for any cause whatever unless Contractor shall have made a written request upon Owner for such extension within 48 hours after the cause of such extension occurred and unless Contractor and Owner shall have agreed in writing that such allowance will be made.
- C. The Contractor shall comply with the instructions given by the Owner including any instruction requiring him to delay herein, and the Contractor will not be entitled to any extra compensation or damages because of any such suspension or delay not specifically allowed and paid for by Owner.
- D. Time is of the essence of this Agreement, and Contractor agrees to perform said work within the time and in the manner specified, or within the time of such extensions as may be granted, and Contractor shall be liable in the event of failure to complete the work within the time limits set forth herein for liquidated damages at the rate hereunder: \$75.00 per calendar day.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be duly executed.

DATED this 2nd day of August, 1966.

CITY OF NEWBERG, OREGON

By Roy M. Curtis
Roy M. Curtis, Mayor

Approved as to Form:

Herbert Swift
Herbert Swift, City Attorney

Attest: Myrland C. Gilbert
Myrland C. Gilbert, City Recorder

KEY CONSTRUCTION CO.

CONTRACTOR

By Jack S. Jones
Title President