

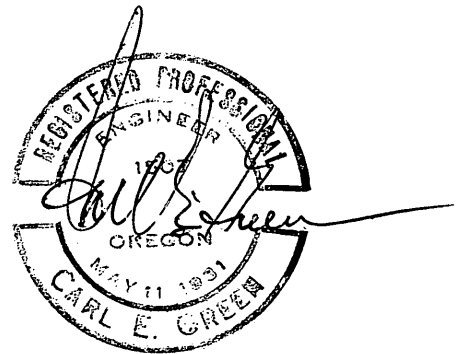
CITY OF NEWBERG, OREGON

SEWAGE TREATMENT PLANT, PUMPING STATION &

INTERCEPTING SEWER CONSTRUCTION

Specifications, Proposal and Contract Documents

5/18/1962



City Officials

Roy M. Curtis, Mayor
Myrland C. Gilbert, City Recorder
Herbert Swift, City Attorney
G. Weller Probasco, Supt. of Public Wks.

Consulting Engineers

Carl E. Green & Associates
510 Henry Building
Portland 4, Oregon
CAPitol 7-2770

Gene H. Settergen

CARL E. GREEN AND ASSOCIATES
Consulting Engineers
510 Henry Bldg.
Portland, Oreg.

April 17, 1962

ADDENDUM #1

To All Plan Holders

City of Newberg, Oregon, Sewerage Project

Bid Opening Date

To comply with U. S. Public Health Service requirements, bid opening has been changed to Noon, Pacific Standard Time, April 27, 1962.

Schedule A - Treatment Plant

Drawing No. 24-A-26

Center line of the 2" wrought iron bulb wells for the thermometer and the temperature controller shall be at elevation 121.75.

Provide two 1" diameter by 6" long pipe sleeves in the upper level floor slab in the new control building for the capillary tubes connecting the bulbs and the thermometer and the temperature controller.

Equipment Section - Laboratory Equipment, Page EQ-13

Add one pH Meter, Beckman Model No. 72, Scientific Supplies Catalog No. 34304.

Proposal Section, Page P-5, Item 23

The estimated quantity for 18" Concrete Cylinder Pipe should be 275 feet

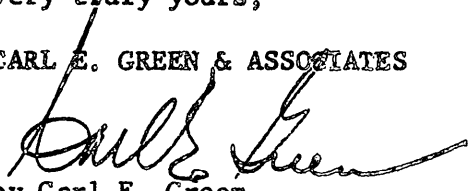
Schedule B-2 - Intercepting Sewer, Pressure Line and Appurtenances

Drawing No. 24-A-39

Intercepting sewer flowing into the wet well of the pumping station should be 10" cast iron from Station 0+00 to Station 0+54 and 10" concrete from 0+54 to manhole 1+54.

Very truly yours,

CARL E. GREEN & ASSOCIATES


by Carl E. Green

BY ORDER OF THE CITY COUNCIL
CITY OF NEWBERG

This 18th day of April 1962

M. C. Gilbert,
City Recorder

CARL E. GREEN AND ASSOCIATES
Consulting Engineers
510 Henry Bldg.
Portland, Oreg.

ADDENDUM #2 - April 23, 1962

To All Plan Holders - City of Newberg, Oregon, Sewerage Project

Schedule A - Treatment Plant

Drawing 24-A-24

Reinforcing steel in bottom slab of final settling tank shall be #4 bars @ 12" both ways

Basis of Payment

Page BP-1 - Omit Item 2 (Site Grading). Cost of site grading shall be included in the unit price bid for Item 4 (Structural and Trench Excavation, Common)

Page BP-1, Item 3 - Fill material shall be obtained from the designated borrow area free of charge to contractor.

Proposal

Page P-2 - Omit Item 2 (Site Grading)

Schedule B-1 - Pumping Station

Drawing 24-A-36

Disconnect switch for pumping station shall be 100 A.

Page PS-2

Capacity of Wemco pumps shall be 325 GPM each @ 54 ft. total dynamic head

Schedule B-2 - Interceptor Sewers and Pressure Line

Drawing 24-A-39

The 4" CI vent shall be located at station 1+37 of the 10" concrete pipe interceptor sewer

Drawing 24-A-40

Enclosed revised print shows the details of the concrete collars and the pipe joint collar as called for on Drawing 24-A-39.

Basis of Payment

Page BP-5, Item 11 and 11 Alternate (Asbestos Cement or CI Pressure Pipe) shall be 8"

Very truly yours,

CARL E. GREEN & ASSOCIATES



by Carl E. Green

cb

encl.

I N D E X

Notice To Contractors	NC-1 - NC-2
Instructions to Bidders	IB-1 - IB-4
Special Conditions and Requirements	SC-1
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Workmen's Compensation	WC-1 - WC-3
Materials Specifications	M-1 - M-7
Concrete Construction Specifications	CC-1 - CC-13
Equipment Specifications (Treatment Plant)	EQ-1 - EQ-18
Construction Specifications (Treatment Plant)	CS-1 - CS-17
Plumbing Specifications (Treatment Plant)	PL-1 - PL-6
Electrical Wiring (Treatment Plant)	EW-1 - EW-6
Pumping Station Specifications	PS-1 - PS-3
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Proposal	P-1 - P-15
Agreement	A-1 - A-5

NOTICE TO CONTRACTORS

SEWERAGE IMPROVEMENTS

CITY OF NEWBERG, OREGON

Sealed proposals addressed to the Mayor and City Council of Newberg, Oregon, and endorsed "Proposal for Sewerage Improvements" will be received by the City Recorder, City Hall, Newberg, Oregon, until 7:30 o'clock P.M., Pacific Standard Time, April 23, 1962, and thereafter will be publicly opened and read aloud at a regular meeting of said Council at the Council Chambers in the City Hall, Newberg, Oregon.

Bids are invited on the construction of additions to the existing treatment plant, a sewage pumping station and intercepting sewer. All materials and equipment shall be furnished by the Contractor. The work shall be bid in two sections: Section A (Treatment Plant), and Section B (Pumping Station and Intercepting Sewer). The principal items and quantities upon which bids are requested are as follows:

Section A - Treatment Plant

Estimated Quantities

Excavation	1,900 cu. yds.
Haul and Fill Material	4,000 cu. yds.
Concrete, Class "6"	825 cu. yds.
Reinforcing Steel	120,000 lbs.
Fencing	
Equipment including Comminutor, Sedimentation Tank Mechanism, Aerators, Pumps, Blowers, Di- gester Cover, Boiler, etc.	

Section B-1 - Pumping Station

Pre-fab with two 250 G.P.M. pumps

Section B-2 - Intercepting Sewer

15" Sewer Pipe	4,720 lin. ft.
8" Pressure Sewer	1,100 lin. ft.
Manholes	15
Excavation and Backfill	4,500 yds.

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 4, Oregon, or at the office of the City Recorder, City Hall, Newberg, Oregon. Copies may be obtained by bona fide bidders upon receipt of deposit checks as follows:

Section A - Treatment Plant	\$60.00
Section B - Pumping Station and Intercepting Sewer	\$30.00

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 to the Consulting Engineers or said City Recorder. 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.

Bidders shall pre-qualify in accordance with the 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 or bidders if he, or they, should fail or refuse to enter into a contract and furnish a one hundred percent (100%) performance bond. The successful bidder, or bidders, 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, or proposals, 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 35 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: April 5, 1962
Second publication: April 12, 1962
Last publication: April 19, 1962

INSTRUCTIONS TO BIDDERS

1. General

The work encompassed by these specifications consists of two sections:

Section A - Construction of additional facilities at the existing sewage treatment plant to provide secondary treatment and to double the present plant capacity.

Section B - 1 - Fabricated steel pumping station and access roadway

B - 2 - Intercepting sewer, pressure line and appurtenances

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.

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 cash funds on monthly estimates prepared by the Engineer, less ten percent (10%) which shall 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, workmens 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 at once to the attention of the Engineers 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 at once.

In the event of a disagreement arising as to the true intent and meaning of the plans and specifications, the Engineers 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 Sewerage Improvements" 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 rates set forth hereunder for each calendar day the work is delayed beyond the completion time bid:

Section A - Treatment Plant

\$75 per calendar day

Section B - Pumping Station, Inter-

ceptor Sewer and Pressure Line

\$50 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 U. S. Public Health Service 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, materials 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 or contracts 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.

17. Federal Anti-Kick Back Regulations

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 - 29CFR, Part 3, all in accordance with the Copeland Act, Title 18, U.S.C.

18. Fire Insurance

The contractor shall provide for fire insurance coverage ample to protect him and the Owner from possible fire damages or losses on equipment and structures. The policy shall be endorsed to name the Owner as assured as well as the contractor. The Owner shall determine the amount and adequacy of such coverage.

SPECIAL CONDITIONS AND REQUIREMENTS

1. Existing Treatment Plant to Remain in Operation

The existing treatment plant will be in use continuously during construction. The Contractor shall schedule and coordinate his work in such a manner that interruptions in the plant operation shall be kept to an absolute minimum. Temporary by-pass shall be provided while modification work is being done on existing facilities. Interruptions or shut-downs of treatment plant shall not occur without consent of the City Superintendent of Public Works and the approval of the Engineer.

2. Haul and Place Fill Material

Fill material for embankment around structures and roadway in the treatment plant site shall be obtained from property located on County Road #65 as shown on the plans. Area from which material is to be excavated shall be cleared and stripped of trees and brush. Determination of quantity shall be made by cross-sectioning of the borrow area before and after excavation. Unit price bid for this item shall include cost of materials, clearing and stripping, hauling, placing and compacting of the fill material.

3. Pump Station Access Roadway

Excavation and subgrade work for the access roadway to the pumping station shall be done prior to the installation of the pressure line.

4. Existing Utilities and Structures

The existence and location of underground utilities and pipe lines indicated on the plans are not guaranteed and shall be investigated and verified in the field by the Contractor before starting work. Excavation in the vicinity of existing structures and utilities shall be carefully done by hand. The Contractor shall be held responsible for any damage to, and for maintenance and protection of, existing utilities and structures.

5. 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.

GENERAL CONDITIONS

1. Owner

Whenever the word "Owner" occurs in the Specifications, the term shall signify the principal or party to the Contract for whom the work is being done.

2. Engineer

Whenever the word "Engineer" occurs in these Specifications, the term shall signify the Engineer of the firm of engineers employed by the Owner for the purpose of having in charge and directing the design and construction 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.

3. Contractor

Whenever the word "Contractor" occurs in these Specifications, the term shall signify the party or parties contracting to perform the work contemplated under these Plans and Specifications, as Party of the Second Part.

4. Arbitration

The Engineer shall decide all questions which may arise between the parties relative to the true intent and meaning of any of the provisions or stipulations contained in the specifications or on the plan, or the amount of quantities, quality, character and classification of the work performed by the Contractor under this contract and his decision in the nature of an award shall be final and binding upon both parties to this agreement.

5. Performance Bond

The Contractor shall furnish a performance bond in an amount no less than one hundred percent (100%) of the total contract price. On work being performed for public bodies or agencies, such bond shall be a public works bond complying with all statutory requirements pertaining thereto in the state in which the work is to be performed. All bonds shall guarantee payments to suppliers of equipment, materials, supplies and services.

6. Insurance

The Contractor shall not begin work under this contract until he has obtained all insurance required by these documents, such insurance has been approved by the Owner, and certificates of such insurance have been presented to the Owner. The Contractor shall not permit any subcontractor to begin work until he has likewise complied with the foregoing insurance requirements.

- 6.1 Compensation Insurance - The Contractor shall procure and shall maintain during the life of this 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 project under this contract and, in case of any such work sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's em-

ployees 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 project under this contract is not protected under the Workmen's Compensation Statute, the Contractor shall provide and shall cause each Subcontractor to provide adequate employer's liability insurance for the protection of such of his employees as are not otherwise protected.

- 6.2 Contractor's Liability and Property Damage Insurance - The Contractor shall procure and shall maintain during the life of this contract Contractor's 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, on account of one occurrence, and Contractor's Property Damage Insurance in an amount not less than \$50,000.
- 6.3 Subcontractor's Liability and Property Damage Insurance - The Contractor shall either (1) require each of his Subcontractors to procure and to maintain during the life of his subcontract, Subcontractor's Public Liability and Property Damage Insurance of the type specified in subparagraph 6.2 hereof, in amounts approved by the Owner, or, (2) insure the activities of his Subcontractors in his policy, specified in subparagraph 6.2 hereof.
- 6.4 Scope of Insurance and Special Hazards - The insurance required under subparagraphs 6.2 and 6.3 hereof shall provide adequate protection for the Contractor and his Subcontractor, respectively, against damage claims which may arise from operations under this contract, whether such operations 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 this contract: such as blasting.
- 6.5 Insurance Certificates - All certificates of insurance shall include a statement by the surety to the effect that no insurance shall be cancelled or materially altered except after ten (10) days written notice has been received by the Owner.

7. Laying Out of Work

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 under this improvement. 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 this improvement. In the event any of them have to be replaced unnecessarily by the Engineer, the Contractor shall be charged the expense thereof, and the same may be deducted from his estimate.

8. Inspection

The Contractor shall not work on any part of the improvement without notifying the Engineer of his intention to do so. If an Inspector 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 work by the Contractor immediately after its rejection, and shall not be used on the project. Instructions given by the Inspector shall be respected and executed by the Contractor, but no Inspector shall have the power to waive the obligations resting upon the Contractor to furnish high quality equipment, supplies and materials or do good work. Any omission to condemn work at the time of its construction shall not be construed as an acceptance of any defective work, but the Contractor shall at any time prior to final acceptance, upon notice from the Engineer to do so, tear out, remove and properly reconstruct, at his own cost, any portion of the improvement which may be found defective; and the Contractor will be held wholly responsible for the safety, proper construction and efficiency of the entire improvement until the same has been finally accepted by the Owner.

9. Orders Given Contractor

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 by them be received and obeyed. 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.

10. Change in Plans

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 work 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 this contract.

11. Subcontractors

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.

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.

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.

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 General Conditions 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 contract documents.

Nothing contained in this contract shall create any contractual relation between any Subcontractor and the Owner.

12. Assignments

The Contractor shall not assign the whole or any part of this contract or any moneys due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any moneys due or to become due under this contract, the instrument of assignment shall contain a clause substantively 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 cooperations for services rendered or materials supplied for the performance of the work called for in this contract.

13. Prosecution of Work

The work embraced in this project shall be begun within the shortest possible and reasonable time after the date of this Contract, and shall be prosecuted regularly and uninterruptedly thereafter, unless the Owner in writing especially directs otherwise, with such force and vigor as to secure its completion by the time bid.

If the Contractor shall fail to complete the work within the time specified, the Contractor shall reimburse the Owner for additional expense and damage incurred by reason of an extended time and cost of engineering service due to such delay, interest of the invested capital, and inability to use the facilities being constructed under this contract. The amount of reimbursement to the Owner by the Contractor shall be as set forth under the following section.

14. Completion Time and Liquidated Damages

It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning, rate of progress, and the time for completion of the work to be done hereunder are essential conditions of this contract.

The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the Owner the amount specified in the contract, not as a penalty but as liquidated damages for

such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work.

The 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 and said amounts shall be retained from time to time by the Owner from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to:

- (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
- (2) Any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsection (1) of this article.

15. Taking Over Work & Termination of Contract

If, in the opinion of the Engineer, the Contractor or his Subcontractors are using defective material or improperly performing the work, and shall neglect or refuse to take up or reconstruct such work at his own cost as shall have been rejected by the Engineer as defective, or in conflict with the Plans and Specifications, 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 is given shall not be accepted.

The Owner may serve notice on 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 ten (10) calendar days after serving of such notice upon the Contractor the violations or delays shall cease and satisfactory arrangements are made for correction, the contract shall cease and terminate.

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 of the

mailing to such Surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract or by force account for the account and at the expense of the Contractor, and the Contractor and his Surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefor.

If it shall appear to the Engineer that the work done under this agreement has been abandoned or that the said work is unnecessarily delayed and will not be finished within the prescribed time, he shall so certify in writing to the Owner, and the Owner shall have the power to notify the Contractor to discontinue all work or any part thereof under this contract, and thereupon the Contractor shall discontinue said work and the Owner shall thereupon have the power, by contract or otherwise, as may be determined, to employ such persons, and to use such implements, tools, and materials as they may deem necessary to complete the work, and charge the expense of all labor and materials for such completion to the Contractor under and by virtue of the contract for this improvement and in case such expense is less than the sum which would have been payable under said contract if the same had been fulfilled by the Contractor, then the Contractor shall be entitled to receive the difference and in case such expense is greater, the Contractor shall pay the Owner the amount of such excess so due, and his Surety shall answer and be liable therefor.

16. Temporary Suspension of Work

The Owner reserves the right to suspend operations 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 or said work from or by reason of said temporary suspension.

17. Contractor's Bills

The Contractor shall promptly pay all payrolls and all bills for materials, supplies, outfits, equipment, machinery, appliances and expenses incurred upon or on account of the work. Prior to final settlement, the Contractor shall furnish the Owner satisfactory evidence that all payrolls and bills are paid, 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.

18. Damage Claims

The Contractor agrees to indemnify and hold harmless the Owner 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 to be imposed by any public authority as a result of the prosecution of the work under said contract, and the Contractor further agrees to accept 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 this contract.

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 be and is hereby empowered to settle or compromise such claims as best it can and charge the cost thereof to the Contractor as so paid on this Contract, 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 or not, the Contractor shall be privileged to furnish the Owner 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 the primary obligation outlined in this section of the contract.

19. Fees, Royalties & Patents

The Contractor shall hold and save 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 of the contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

License and/or royalty fees for the use of a process which is authorized by the Owner of the project must be reasonable, and paid to the holder of the patent, or his authorized agent or licensee, direct by the Owner and not by or through the Contractor.

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 is mutually agreed and understood, that, without exception, the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his Sureties shall indemnify and save harmless the Owner of the project 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 this 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.

20. Equal Materials, Supplies & Equipment

Whenever a material or article required is specified or shown on the plans by using the name of the proprietary product or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design will be considered equal and satisfactory providing the material

or article so proposed is of equal substance and function in the Engineer's opinion. It shall not be purchased or installed without his written approval.

21. Guarantee & Acceptance of Work

Neither the final estimate for payment nor any provision 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 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 resulting therefrom, which shall appear prior to or within a period of one year from the date of final acceptance of the work unless a longer period is specified elsewhere in these documents. The Owner will give notice of observed defects with reasonable promptness.

22. Contractor's Obligations

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 this contract, within the time herein specified, in accordance with the provisions of this contract and said specifications and in accordance with the plans and drawings of the work covered by this contract and any and all supplemental plans and drawings, 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, efficiency and adequacy of his plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance, or operation. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the contract and specifications, and shall do, carry on, and complete the entire work to the satisfaction of the Engineer and the Owner.

23. Engineer's Authority

The Engineer shall give all orders and directions contemplated under this contract and specifications relative to the execution of the work. The Engineer shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this 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, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, 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 this contract affected in any manner or to any extent by such question.

24. Obligation To Furnish Good Materials, Equipment & Workmanship

No Inspector or Engineer shall have the power to waive the obligations of the Contractor to furnish good materials and equipment or perform sound and reliable work, and any failure or omission of an Inspector or Engineer to condemn

any defective material, equipment or work shall not release the Contractor of the obligation to at once tear out, remove and properly reconstruct or replace the same at his own cost at any time upon discovery of a defect or upon receipt of a notice to do so.

25. Contractor's Risk

It is understood that the whole of the work to be performed under the contract for this improvement is to be done at the Contractor's risk, 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.

26. Rights-of-Way

The Owner shall furnish all land and rights-of-way necessary for the carrying out of this contract and the completion of the work herein contemplated and will use due diligence in acquiring said land and rights-of-way as speedily as possible. But it is possible that all lands and rights-of-way may not be obtained as herein contemplated before construction begins, in which event the Contractor shall begin his 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 the 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 time for completion of the work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to be set forth in writing.

27. Statutory Labor Clauses

The Contractor agrees that he will comply with all Federal and State laws pertaining to the employment and compensation of labor. Typical forms for reporting Workmen's Compensation are included in these documents.

28. Permits

The Contractor shall secure all municipal, county and state permits incidental to or necessary in the actual performance of the work under this contract, and shall during its progress, comply with all laws, statutes and governmental regulations pertaining to or necessary to the carrying out of the work. The Owner shall, however, 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.

The Contractor shall furnish all bonds and insurance which may be required by any unit of government, highway department, railroad, etc. in connection with permits, easements or licenses necessary to carry on the work included in the project.

29. Safety Requirements

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.

30. Payments

In consideration of the faithful performance of all the covenants, stipulations and agreements in this contract to be kept and performed by said Contractor, the Owner hereby covenants and agrees to pay the Contractor, in accordance with the schedule of prices in the Proposal submitted by the Contractor to the Owner, which Proposal is attached hereto and made a part hereof.

Payments for the work shall be made on monthly estimates of the Engineer, taken about the end of each calendar month. Ten percent (10%) shall be retained by the Owner to insure the faithful completion of the work and payment of all claims. Within thirty (30) days after the work is fully completed and a certificate to this effect is given by the Engineer to the Owner and upon the execution of the release heretofore 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 this contract.

31. Revisions of Estimates

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 therefore or payments made, but all such estimates made before the final payment shall be considered only as being altogether approximate and provisional, and same shall be subject to revision and adjustments, readjustments and correction by the Engineer for the Owner for errors or omissions as to the determination of the amount of work done or material furnished under this 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 therefore, having reference to the uncompleted part of said work and material as well as the work done and the material furnished.

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 the Contractor at his own cost, must remove and rebuild or make good any work, materials or equipment which the Engineer may find defective in any way.

32. Extra Work

Any work necessary or incident to the carrying out of the work herein contracted, but which is not clearly indicated in 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 actual cost of said work as determined by the Contractor's account of material and labor, if and as approved by the Engineer, plus fifteen percent (15%) for the Contractor's supervision, use of tools and equipment, bond premiums and profit.

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 days before the day upon which the monthly estimates are to be prepared by the Engineer.

33. Release

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 out of or connected with the contract.

The Contractor shall also furnish a statement and evidence that all bills and claims have been paid or settled and that there are no outstanding bills, claims, suits, or attachments against him in any way related to the project covered by these specifications and documents.

36. Guarantee

All materials, equipment, workmanship and completed project shall be guaranteed against all defects for a period of no less than one (1) year following acceptance of the work. This guarantee shall include restoration of settled fills, trenches, pavement and surfaces.

WORKMEN'S COMPENSATION

The Contractor shall comply with 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.

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

OREGON PUBLIC WORKS PROJECT - CONTRACTOR'S WAGE CERTIFICATION FORM

(Form W-1)

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

Chapter 627, Oregon Laws, 1959, states as follows:

"Section 5. 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 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 workman employed by him upon such public work, and further certifying that no workman employed by him on such 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."

<u>Crafts Employed and Minimum Rates Paid</u>			
Classification:	Rate Per Hr.	Classification:	Rate Per Hr.
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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, depose and say that I hereby certify the above schedule
as the hourly rate of wages 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 the above 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 _____

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 Concrete Pipe C-11-59 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 in Pounds Per Foot 3 Point Bearing</u>
4 inch	3/4 inch	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-A including Amendment #1, dated March 16, 1955, for all Class 1 and 2 sewer pipe. Pipe shall be classed in accordance with three point bearing strength as follows:

Class 1,500
Class 2,400
Class 3,300
Class 4,000
Class 5,000

4. 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-296-59T and American Water Works Association Specifications C-400-53T. Class 150 pipe shall be used. Fittings for asbestos cement pressure pipe shall be cast iron

with cement mortar lining and coal tar sealed. Ends of fittings shall be suitable for reception of rubber ring gaskets used with asbestos cement pipe.

5. Cast Iron Pipe and Fittings - Pressure Pipe

Cast iron pipe for pressure sewers shall be Class 150 bolted mechanical joint or Tyton rubber ring joint pipe. Fittings for foregoing pipe shall be mechanical joint. 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. Bell and Spigot Cast Iron Pipe - Bell and spigot cast iron pipe shall be class 150 unless otherwise specified and shall conform to American Standards Association specifications A-21.6 or A-21.8 and American Water Works Association C-106-53 or C-108-53 for centrifugally cast pipe in metal or sand lined molds. No pipe shall be less than 16 feet in length.

B. Mechanical Joint Cast Iron Pipe - Mechanical joint cast iron pipe shall conform to the specifications for bell and spigot pipe except that bells shall be drilled or cored to receive high strength cast iron bolts and shall conform to American Standards Association Specifications A-21.11 as well as A-21.6 or A-21.8.

C. 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.

D. Fittings, Bell and Spigot Cast Iron Pipe - Fittings for use with bell and spigot pipe shall conform to American Standards Association Specifications A-21.1, Class 250 lbs. per square inch.

E. 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.

F. Cast Iron Pipe Flanges and Flanged Fittings - Cast iron pipe flanges and flanged fittings shall conform to American Standards Association Specifications B-16.1, 1948, Class 125.

6. Cast Iron Soil Pipe

Cast iron soil pipe shall conform to Federal Stock Catalog Specifications WWP-401 as amended July 18, 1951, for service weight Class B and extra heavy Class A, and American Society for Testing Materials Specifications, designation A-74.

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 & Covers

All castings shall conform to the Standard Specifications of the American 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 overall 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 airblown 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.

13. 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 ($2\frac{1}{2}$ ") 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.

14. 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 level.

Check valves two and one-half inches ($2\frac{1}{2}$ ") inches and smaller shall be of all brass or bronze construction and shall have screwed ends for standard pipe threads.

15. 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.

16. Shear Gates

Shear gates shall be iron body, bronze seat ring and disc ring, spigot frame, Mueller A 2520-11 or approved equal. Lift handles shall be of lengths as indicated on plans.

17. Head Gate

Head gate shall be cast iron, flat back frame with steel frame angle and steel stem. Pekrul Model No. 13 or approved equal.

18. Dresser Couplings

Couplings for steel pipe shall be Dresser Style #38 couplings having a middle ring thickness of not less than $\frac{1}{4}$ " and a follower ring thickness not less

than $\frac{1}{4}$ ". The length of the middle ring shall be not less than five inches (5").

19. Steel Pipe and Fittings

Steel pipe and fittings shall be Class A standard weight pipe, conforming to Federal Stock Catalog Specifications WW-P-403a, with Type I steel.

Fittings and welding flanges shall be Tube-Turns, Taylor Forge, Grinnell or equal.

20. Corrugated Metal Pipe

Corrugated metal pipe shall be galvanized and bituminous coated with size and metal thickness as called for in the plans.

21. Concrete Cylinder Pipe

A. General - Reinforced concrete pipe shall be of the prestressed or partially prestressed type having a steel cylinder and wrapped with spiral rods or wire conforming with the Tentative Specifications of the American Water Works Association 7B.2, or it may be non-prestressed steel pipe lined and coated with cement mortar. The latter pipe shall in no case have steel cylinder thickness less than 10 gauge.

Lengths of pipe shall be not less than 16 feet unless special shorter lengths are specifically called for, and the pipe shall be connected together by means of steel bell and spigot rings with a rubber gasket between the rings, or other joint approved by the Engineer. All pipe shall have a finished inside diameter of the size bid or called for the specifications.

Plans for the type of joints proposed shall be submitted to the Engineer for approval.

B. Class of Pipe - Pipe shall be suitable for use under a working pressure of 100 lbs. per square inch with a factor of safety of no less than two unless a different operating pressure is called for elsewhere in these Specifications. Design drawings of pipe shall be submitted to and approved by the Engineer before fabrication is begun.

Steel in the cylinder and rod wrapping shall not be stressed in excess of 13,500 lbs per square inch, and welded steel cylinders shall have a thickness of no less than #14 gauge for 18" pipe and #16 gauge for 16" pipe. Both horizontal and circumferential welds of cylinders shall develop the full tensile strength of the sheet steel from which the cylinders are fabricated. Cylinders shall be tested to a fiber stress of no less than 22,000 lbs. per square inch after welding is completed.

C. Steel Sheets, Rods and Wire - Steel sheets used for pipe cylinders shall conform to A.S.T.M. specifications for Hot Rolled Carbon Steel Sheets, designation A-245 and including all latest revisions and amendments thereof.

Steel rods used for spiral reinforcement bars conforming to A.S.T.M. Standard Specifications designated A-15, including all latest revisions and amendments thereof. Steel wire shall conform to A.S.T.M. Standard Specifications A-229, A-227, or A-82.

D. Cement - Cement used in both the interior lining of the pipe and external covering shall conform to the Standard Specifications of the American Society for Testing Materials, designation C-150 including the latest revisions and amendments thereof.

E. Mortar Aggregates - All aggregates used in the mortar lining and covering shall conform to the standard specifications of A.S.T.M., designated C-33, C-40, C-87, C-109 and C-136 and including all latest revisions and amendments thereof, and shall be clean, hard, uncoated and durable.

F. Joint Rings - Joint rings shall be of the bell and spigot type which will permit adjoining sections of pipe to be telescoped together and held watertight by means of a rubber gasket between the bell and spigot. The joint shall be suitable for the application of a final protective covering of cement mortar in the field.

Rubber gaskets shall be made of all new material having a record of successful, long life for the application intended, and shall be manufactured by a concern thoroughly experienced in this special field of production.

G. Pipe Lining - Pipe lining shall be centrifugally spun in place so as to secure maximum density and smoothness. The mortar lining in place shall have a thickness of not less than one-half inch and shall contain no less than one part of cement to two and one half parts of dry aggregate by volume. Gauge rings shall be used to insure even depth of mortar and uniform finished inside diameter. Mortar shall be placed with as little water as possible to insure maximum density of lining and maximum strength.

H. Spiral Rod or Wire Reinforcing - Size and spacing of spiral rod or wire reinforcing shall be submitted to and approved by the Engineer before fabrication begins. Bars or wire used for spiral reinforcing shall comply with A.S.T.M. Standard Specifications as heretofore set forth.

Spiral reinforcing shall be continuous from end to end and shall be wrapped under tension against the cylinder wall. Maximum spacing of spiral bars shall be two inches (2"), and ends shall be lapped welded at ends.

I. Exterior Concrete Mortar - Exterior concrete covering of steel cylinder and spiral rod reinforcing shall be applied by grout gun or brush coating machine process which will insure a dense, strong concrete mortar covering not less than 3/4" thick.

Mortar shall contain not less than one part of cement to three and one-half ($3\frac{1}{2}$) parts of dry sand by volume. Moisture content shall be kept as low as possible for the type of application used, but in no case shall water exceed four and one-half ($4\frac{1}{2}$) gallons per sack of cement.

Mortar mix shall be fresh and none shall be applied which has been mixed for longer than thirty minutes. A multiple number of passes may be used to apply mortar to exterior of the pipe. Special care shall be taken in removing coated pipe from machine and in handling and storage so as to prevent damage.

The exterior coating shall develop a 28 day compressive strength of not less than 4,500 p.s.i.

J. Curing of Mortar - Pipe shall be cured by either steam curing for not less than thirty-six (36) hours, by continuous exposure to moisture spray for not less than one week, or by sealing all concrete mortar surfaces with a bitumastic sealer especially designed for the purpose.

22. Plumbing, Drainage and Electrical Work

All materials used in plumbing, drainage and electrical work shall comply with State and City code requirements.

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, water-tightness and good surface appearance.

2. Cement

All cement shall be of a standard and accepted brand and shall conform to the Standard Specifications for Type 1 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 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 111, 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 per cent (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 $\frac{1}{4}$ inch 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 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 directly 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.

Bends 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 of 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 and footings	3 $\frac{1}{2}$	2
Plain footings and substructure walls	3	1
Slabs, beams and reinforced walls	4	2
Building Columns	4	2
Pavement	2	1 $\frac{1}{2}$
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 ($1\frac{1}{2}$) 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, water tight, 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 r.p.m. 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 ($1\frac{1}{2}$) 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 ($1\frac{1}{2}$) 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.

Insofar 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 or 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 in advance 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 wet 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 the 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 surplus 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.

EQUIPMENT SPECIFICATIONS

1. General

All equipment herein specified shall be guaranteed by the bidder as to workmanship and material for a period of one (1) year from date of acceptance of the project. Motors and drive units shall have standard factory enamel finish. All fabricated steel assemblies shall receive one shop coat of rust-inhibitive primer paint. Motor starting and control equipment shall be provided under "Electrical Work" of these specifications.

Equipment of equal quality to that called for on the plans and in the specifications may be used if prior approval is granted by the Engineer.

2. Solids Comminutor

Solids comminutor shall be a motor driven unit of the type that can be readily installed in a straight rectangular sewage channel, similar to Type 15C5 manufactured by Worthington Corporation or equivalent approved by the Engineer.

The comminutor shall be capable of handling a minimum flow of 0.30 M.G.D., average flow 2.0 M.G.D., and maximum flow of 3.0 M.G.D.

The comminutor shall be driven by a 3/4 h.p. vertical, squirrel cage, induction motor, operated at 440 volts, 3 phase and 60 cycles, and suitable for outdoor service.

3. Primary Settling Tank Sludge-Collecting Mechanism

Equipment for settling tanks shall be for installation in one primary settling tank 14' wide x 66' long x 9' 3" average water depth.

Collector shall consist of a complete assembly comprised of flight, chain, sprockets, idler assemblies, bearings, drive assembly and tracks. It shall be arranged to scrape the sludge from the tank bottom to the hoppers and skim the water surface on the return run concentrating the scum in front of the scum pipe. The flights shall be supported at their outer end by suitable return tracks bolted to tank wall. The flight shall travel two feet (2') per minute.

All flights shall be 2" x 6", S4S select heart redwood mounted at 10' 0" centers on two strands of chain. Each flight shall be provided with 3/8" thick wearing shoes.

Chains shall be made of a corrosion resisting processed metal, having an average tensile strength of 70,000 p.s.i. and an average Brinell hardness of 170.

Two 3" channel sections shall be furnished by the General Contractor for the tank bottom. Installation shall be in accordance with the manufacturer's instructions.

All shafts shall be cold-rolled steel, straight and true, and continuous

between bearings mounted on tank walls. All submerged bearings shall be self-aligning, water-lubricated type.

All sprockets shall mesh accurately with collector chains.

All parts of the mechanism shall be amply proportioned for all stresses which may occur during fabrication, erection, and intermittent or continuous operation. Workmanship shall be of high grade in all respects.

Motor shall be totally enclosed, ball bearing, constant speed unit of ample power for starting and operating the mechanism under normal operating conditions without overloading. It shall be designed for outdoor operation on 3-phase 440 volts 60-cycle current.

The drive unit speed reducer shall be fully enclosed with all gears running in oil, and of approved make. A shear pin device shall be provided for full protection of equipment from overloading.

The chain drive above the operating platform shall be covered with a removable metal guard of #14 gauge steel, galvanized after fabrication.

Galvanized steel anchor bolts shall be furnished by the manufacturer.

Drive and support shall be shop finished with gray color machinery enamel. All underwater and structural parts shall receive one shop coat of rust-inhibitive paint.

4. Scum Skimming Equipment

Scum skimming equipment shall consist of an 8" diameter pipe with longitudinal slots, mounted in cast iron flanged wall bearings, and shall include a grease resistant rubber seal. A 1½" diameter x 4" 6" long steel pipe operating lever shall be provided.

Galvanized steel anchor bolts and accessories shall be furnished. The skimming pipe shall receive one shop coat of rust-inhibitive paint.

5. Aerator Equipment

The turbine aerator equipment shall be capable of satisfying a demand for oxygen of 60 pounds per hour with an average operating dissolved oxygen level in the aeration basin of 1.5 p.p.m. Oxygen shall be transferred under the above conditions by the turbine aerators operating with a maximum air input of 400 S.C.F.M.

The aerator equipment shall be in two units for installation in the aeration tank 54' long x 32' wide by 15' water depth. Each unit shall be a turbine type agitator mounted on a concrete structure spanning the tank and shall include the air sparger. Each agitator shall be complete with drive motor, speed reducer, couplings, shaft, turbines and bottom steady bearing with supports.

Agitator motor shall be 7½ horsepower, totally enclosed, 1750 R.P.M., 3-phase, 60 cycles, 440volt.

Sparger shall have a sufficient number of 5/8" holes to pass the maximum air rate of 200 S.C.F.M. and shall be removable without disturbing the agitator.

All surfaces requiring painting shall be thoroughly dry and free of all rust, grease and dirt before applying one shop coat of Inertol Rustinhibitive Primer No. 621.

Motor starting equipment shall be furnished by others under the "Electrical Work" section of the specifications.

Aerator equipment shall be as manufactured by Dorr-Oliver, Inc., Mixco, or approved equal.

6. Air Blowers

There shall be furnished and installed 3 rotary positive displacement blowers of the two-lobe involute type design complete with accessories as described. One of the blowers shall be equipped with variable speed drive. Each blower shall deliver 200 C.F.M. of free air when operating at 1150 R.P.M. and against 8 P.S.I.G. discharge pressure.

Impeller case shall be strongly ribbed. Impellers shall be close grain cast iron strongly ribbed internally. Exterior surfaces of the impellers shall be machined. Shafts shall be made of machined steel and securely fastened into the impellers.

Each blower shall be equipped with 4 heavy duty anti-friction bearings. Timing gears shall be lubricated by a splash oiling system. Air vents shall be located between the seals and the impeller chamber to relieve excessive pressure on the seals.

Blowers shall be mounted in the horizontal position. Drive shaft extension shall be right. Air discharge shall be to the bottom when viewed from the drive end. Blowers shall be V-belt driven by 1750 R.P.M. motors.

Blowers shall be Sutor built, California Series, Size 6H or approved equal.

7. Air Blower Accessories

- A. Motors shall be 440 volt, 3 phase, 60 cycle, open drip-proof, N.E.M.A. B classification, normal starting torque and low starting current. Frame sizes shall be N.E.M.A. standards.
- B. V-belt drive shall be high capacity type, oil and heat resistant, static dissipating and shall be designed to allow at least a 1.5 service factor.
- C. V-drive guards shall be of sheet metal and formed with a lock roll. Guards shall conform to state, and local safety codes.
- D. Variable speed drive shall include an adjustable motor base with hand wheel, spring loaded motor pulley, variable speed belt, flat pulley for

the blower and all accessories for a complete unit. The variable speed drive shall provide an output speed range of 366 to 1100 R.P.M. and shall be suitable for use with the motor furnished for the blower.

- E. Common base for blower and motor shall be fabricated steel, reinforced to withstand normal loading.
- F. Relief and unloading valve shall be supplied for each blower. Relief valve shall be weighted type and set to open at 8 P.S.I.G. Unloading valve shall be of ample size to by-pass complete blower volume to atmosphere for no-load start-up. Relief valve must be capable of passing 100% of the air volume delivered by the blower.
- G. Check valves shall be either tilting disc or standard swing check valve with outside lever and weights.
- H. Discharge silencer shall be of the multiple-chamber design for maximum sound attenuation.
- I. Inlet filter-silencer shall be Air-Maze type S-50 or equal.
- J. Expansion joints shall be sleeve type.
- K. Butterfly valve shall have a completely tight shut-off.
- L. Pressure gauge shall be supplied with each blower, 0 to 15 p.s.i. range, $3\frac{1}{2}$ " dial size, bronze bourdon tube, U.S. Gauges Figure 500 S or equal. A pulsation damping device shall be provided.

8. Final Clarifier

The clarifier mechanism furnished shall be suitable for installation in concrete tank 40' inside diameter by 10' side water depth with 1' 3" freeboard and a bottom sloping 1" per foot as shown on the drawings. Clarifier shall be of the center column, siphon feed and peripheral overflow type with a central driving mechanism which shall support and rotate a center cage with two rake arms. A combination of scraper blades and deflector blades shall be attached to the bottom of the arms to flow the biologically active solids to the openings of the uptake pipes and to rake the low volatile waste solids to the sludge pocket at the center of the tank.

The clarifier mechanism shall include the walkway with handrailing, center assembly with drive unit, drive control assembly, influent column, center cage, sludge control box, sludge removal arms with baldes, deflectors and squeegees, overload protective device and alarm unit, weir plates, and anchor belts. All submerged steel structural members shall have a minimum thickness of $\frac{1}{4}$ ". The clarifier mechanism shall operate at a speed of approximately 2.7 revolutions per hour.

The walkway shall extend from the tank side to the center and shall have ample strength to safely withstand all normal live and dead loads. It shall consist of two 8" deep structural members with 3/16" checkered floor plates 3' wide. Handrails 42" high of $1\frac{1}{2}$ " double row horizontal pipe on both sides of the walkway shall be provided. End posts on one side shall be provided with stubs at top to receive lighting posts as indicated on plans.

The drive unit and gear motor shall be of ample size to operate the mechanism and shall be totally enclosed. The motor shall comply with the standard N.E.M.A. specifications for outdoor service and have a rating of at least $\frac{1}{2}$ h.p. An overload protective device shall be provided at the drive unit and an industrial type alarm horn, relay, and reset button shall be provided for remote installation.

All fabricated surfaces requiring painting shall be thoroughly cleaned and painted with one shop coat of Inertol Rust inhibitive primer No. 621.

The equipment manufacturer shall furnish a representative to inspect the equipment after erection, supervise any necessary adjustments and instruct the owner's personnel during the initial operating period.

The equipment shall be Dorr-Oliver, Eimco or approved equal.

9. Pumps

A. General

Pumps shall be of high grade material, workmanship and construction and manufactured by a concern having representation and service available in the Portland area.

Motor and pump speeds shall not exceed 1150 R.P.M. Motors shall be non-over loading throughout entire operating range of the pumps furnished.

Pump performance curves and descriptive data for all pumps shall be furnished for approval by the Engineer. Curves shall show head capacity, efficiency and horsepower requirements throughout the entire operating range of the equipment. Cuts, catalogs and descriptive data shall be supplied which show type of design, materials and construction of pump bid. Bidders shall also clearly indicate the kind, rating and manufacturer of electric motors to be furnished. The equipment proposed for the installation shall be approved by the Engineer before it is ordered.

In addition, all sewage pumps shall be tested for compliance with guaranteed efficiencies and acceptance will be conditioned upon actual performance.

B. Electric Motors for Pump Drives

(1) Motors shall be of standard manufacture, built and tested in accord with N.E.M.A. and A.I.E.E. standards, equal to Allis Chalmers, Westinghouse, General Electric or Louis Allis as approved by the Engineer. No motors or motor equipment will be approved unless complete service and parts are readily available and stocked locally.

(2) Motors shall be of the polyphase squirrel cage induction type, normal starting torque, N.E.M.A. design B, with pre-lubricated ball bearings. Voltage ratings shall be 440 volts, 60 cycle or as noted on the plans.

(3) Motor enclosures shall be open, drip-proof construction with motors

rated for not more than 40 degrees C temperature rise under full load operation. Insulation to be N.E.M.A. Class A.

(4) Motor operation shall be appropriate for the associated pump and shall not exceed 1150 R.P.M. In each case the motor h.p. shall be adequate to provide the pump performance specified elsewhere under the stated conditions and within the requirements specified in this section. The h.p. ratings shown shall not be taken as the specific h.p. requirement for the associated pump.

(5) Starting equipment shall be furnished under "Electrical Work" of these specifications.

10. Primary Sludge Pump

The primary sludge pump shall be of the plunger type manufactured by a reputable concern having long experience in the manufacture of sludge pumps. The pump shall have a maximum capacity of 100 G.P.M. against a total dynamic head of 28 feet, including 4 feet suction lift. Lower capacities shall be provided by means of overhead variable eccentric drive to the plunger. Shear pin protection shall be provided for the eccentric. Connecting rod eccentric bearings shall be lined with babbitt and lubricated by sight feed oiler. Valves shall be neoprene rubber ball type of proper size. Valve chambers shall be designed to prevent clogging with quick opening covers for ready inspection and cleanout.

Air chambers of adequate capacity shall be provided on both the suction side and the discharge side. Discharge side of the pump shall be provided with a 1" sampling valve. A $\frac{1}{4}$ " pet cock shall be provided at the base of the pump body.

Suction and discharge openings shall be of flanged and drilled for not less than 4" pipe connections.

Pump and motor unit shall be mounted on a common welded steel base, having a drip gutter, equipped with 1" threaded drain connection.

The pump shall have sectionalized construction with separate castings for pump body and stuffing box. It shall permit removal of stuffing box, plunger and connecting rod without disturbing the pump body valve chambers, piping or main eccentric shaft.

The unit shall operate without vibration or pounding at any rate of pumping throughout its entire range of capacity. The primary sludge pump shall be Marlow Type PE sludge pump or approved equal.

11. Sludge Recirculation Pump

Sludge recirculation pump shall be a vertical close coupled Wemco Torque-Flow pump with motor mounted on frame directly above pump. Suction and discharge shall have 125 lb. A.S.A. flange connections of not less than 4" in diameter.

The pump shall be capable of delivering 300 G.P.M. against a total dynamic head of 12 feet. The maximum allowable speed shall be 1150 R.P.M. Pump casing and impeller shall be cast iron. Pump shaft shall be forged steel, and shall

be protected throughout the packing area by a removable, chrome-plated steel shaft sleeve. The cast iron pedestal base shall be rugged enough to support the full weight of the pump and motor.

A hand hole shall be equipped at the suction base elbow for inspection and cleaning.

12. Return Sludge Pump

Return sludge pump shall be a horizontal end suction centrifugal sewage pump with a variable speed drive. The pump shall be "non-clog" type and shall be able to pass 2 3/4" spheres. A special increasing suction head with a hand hole for inspection and cleaning shall be provided. Pump casing shall be cast iron construction. Suction and discharge shall have 125 lb. A.S.A. flange connections of not less than 4" in diameter.

The pump shall be capable of delivering 450 G.P.M. at 17' total dynamic head with a maximum speed of 1150 R.P.M.

Variable speed drive shall include an adjustable motor base with hand wheel, spring loaded motor pulley, variable speed belt, flat pulley for the pump and all accessories for a complete installation. The variable speed drive shall provide an output speed which would lower the design capacity by 50%.

A 14 gauge sheet metal belt guard shall be provided.

13. Sump Pump

Sump pump shall be submersible unit complete with automatic float switch control; single phase, 60 cycle, 110 volt a.c., 1/3 h.p. motor and overload protection. The unit shall be Pacific Pumping Company Model A.S.M. or equal, having a capacity of approximately 1250 G.P.H. @ 20' T.D.H. A 6' heavy rubber cord with grounded twist lock plug shall be provided.

14. Digester Floating Cover

Digester floating cover shall be for installation in a 40' diameter tank; shall be made up of fabricated assemblies; and shall be of the truss type designed to receive a wood and composition roof.

All structural steel used in the floating cover shall comply with the A.S.T.M. No. A-7 Specifications. Minimum plate thickness shall be 1/4". All structural members shall be designed to support the following loadings:

Dead load and roof load..... 35 lbs. per sq. ft.
Live snow and vacuum load.... 50 lbs. per sq. ft.

Total 85 lbs. per sq. ft.

Maximum allowable stresses shall not exceed the limiting stresses as set forth in A.I.S.C. Specifications for Structural Steel for Buildings as follows:

Tension 20,000 lbs. per sq. in.
Shear 13,000 lbs. per sq. in.
Compression 17,000 lbs. per sq. in. with maximum of
17,000 minus $0.485 \frac{12}{r^2}$

The cover shall include the following appurtenances:

Four 8" drain sumps in outer ceiling sections with 6" access wells above with aluminum ventilating covers, bird screens and disc damper shut-off plates

One 24" entrance hatch and cover

One 27" manhole

Two 8" sampling wells

Four top rollers

Eight bottom spring guides

One 24" gas pipe housing with combination pressure and vacuum relief valve, Varec No. 5800-81 or equal.

Provide flashing bars at rim plate and at manholes and gas domes.

All shop and field welding shall be shielded arc welding, conforming to the latest standards of the American Welding Society.

All structural steel work shall be provided with one shop coat of Inertol #621 primer paint on all surfaces except within 3" of all seams to be field welded.

The manufacturer shall provide a factory representative to check the completed installation and inspect the testing of the cover.

Alternate Digester Cover

Consideration will be given to the buoyant type cover as an alternate to the truss type cover specified above. The buoyant type cover shall be dome-shaped, fabricated of steel plate welded to a framework of arched radial ribs and purlins. The buoyant chamber shall be designed to float the cover under all design loadings and to provide insulation.

The equipment shall include the buoyant cover with supporting members; guide rollers and vertical anti-rotational guides; center rings; manholes; gas bonnet and gas pipe; sample tube; pressure relief-vacuum breaker with flame arrester; assembly bolts and appurtenances.

All structural steel used in the cover shall comply with the A.S.T.M. No. A-7 Specifications. Minimum plate thickness shall be $\frac{1}{4}$ ". All structural members shall be designed to support the dead load of the cover and appurtenances plus a live, snow and vacuum load of 35 lbs. per sq. ft.

The cover shall be designed to produce, by its own weight plus ballast if necessary, a gas pressure of 6" water column. It shall be self supporting when resting on the corbels of an empty tank; on the digester contents when operating under designed loadings, and shall be stable against tipping when subjected to un-

balanced loads.

Maximum allowable stresses, painting, welding, and testing requirements shall conform to those as specified for the truss type cover.

The cover shall include the following appurtenances:

Two 24" diameter manholes, with cover plates, bolts and gaskets

Two 20" buoyant chamber inspection ports

One 12" diameter gas bonnet with purge valve and 2½" gas line

One 8" diameter sampling tube with gas-tight bolted-flange cover

One 2" diameter pressure relief vacuum breaker with flame arrester, Varec No. 5800-81 or equal

One 36" diameter ports for future sludge mixer

15. Sludge Gas Equipment

The following sludge gas equipment shall be furnished for installation and modification of the existing gas system. The equipment shall be manufactured by Vapor Recovery System Company, Pacific Flush Tank Company, Rockwell Manufacturing Company or equal approved by the Engineer.

- A. Drip Trap shall have 1" size N.P.T. inlet and outlet and a 2½ qt. capacity. Construction shall be anodized cast aluminum throughout except for stainless steel shaft and spring. Drip trap shall be manual operated and shall equal Varec Fig. 246.
- B. Thermal Valve and Flame Trap Assembly shall have 2" size 125 lb. A.S.A. flanged connections. Construction shall be cast aluminum with stainless steel plug, stems, and shall equal to Varec Fig. 450. Three extra fusible elements shall be furnished.
- C. Waste Gas Burner shall have a 2" size N.P.T. waste gas connection. Construction shall be steel with heat resistant iron alloy pilot ignition ring, cast iron cover and frame for the ignition port and stainless steel orifices for the pilot gas supply. Waste gas burner shall be Varec Fig. 239 or equal.
- D. Flame Check shall be Varec Fig. 52 or equal with ½" size N.P.T. connections.
- E. Gas Meter shall have a minimum capacity of 500 cubic feet per hour at ½" water column differential. Meter housing shall be either aluminum or cast iron. Inlet and outlet connections shall be 2" size. Gas meter shall be Rockwell or approved equal.
- F. Pressure Relief and Vacuum Breaker Valve shall be Varec Fig. No. 5800-81, 2" size, with pressure setting at 7" W.C. and vacuum setting at 2" W.C.

16. Flow Meters

Flow meters shall be electronic type for indicating, recording and totalizing sewage flows. Two flow meters shall be for 9" Parshall Flume installation; and one for 90° V-notch weir.

The transmitter shall be single float operated type utilizing a spherical stainless steel float supported by a stainless steel rod, pivoted and counter-balanced. It shall be enclosed in a watertight case, with universal brackets for mounting directly in the flow stream above the primary device.

The receiver shall record flow on a 12" diameter, uniformly graduated, weekly chart. Flow shall be indicated on a uniformly graduated scale, and the indicator pointer shall be separate from the pen arm. The receiver mechanism shall be housed in a dust and moisture proof case for wall mounting.

One year's supply of charts, ink, instruction book and Calibration check rod shall be included with each meter.

Flow meters shall be Burgess-Manning Type ML or approved equal.

17. Low Pressure Steam Boiler

Steam boiler shall be designed for use with sewage or natural gas and shall be enclosed in a fiberglass insulated cabinet. The boiler shall have an A.G.A. output of 240,000 B.T.U. per hour for an A.G.A. input of 300,000 B.T.U. per hour.

The boiler controls and accessories shall include jacket with insulation, cast iron body and stainless steel ribbon burner. Manual gas shut-off valve, electric safety pilot, diaphragm gas valve, transformer, gas pressure regulator, low water cut-off, automatic water feed, steam pressure control, steam gauge, water gauge and pop safety valve. Two sets of the following items shall be furnished, one for natural gas operation and another for sewage gas: pilot gas cock, pilot gas tubing, pilot gas filter, manifold with orifice plug.

The conversion from natural to sewage gas operation shall be accomplished by relacing the manifold only.

The boiler shall be American Standard G-405, Crane 26, size 7, or approved equal.

18. Telescopic Valve

Telescopic valve shall consist of hand wheel, cast iron floor stand, channel support, non-rising bronze stem, connecting tube, brass pipe with V-notch weir, cast iron pipe flange and gasket and anchor bolts. Telescopic valve shall be manufactured by Link-Belt Company or Chain Belt Company.

19. Sludge Pump Timer

Timer for controlling the sluge pump shall be Eagle Signal Company "Flexopulse" HG 96 repeat cycle timer.

20. Sludge Indicating Thermometer

Sludge indicating thermometer shall have a 6" diameter dial, white face with black figures reading from 0° F to 150° F and shall be arranged for surface mounting in black case with bottom connection. The thermometer shall have a mercury actuated thermal system including stainless steel plain bulb (6" length) and 25 feet of stainless steel spirally wound tubing over stainless steel capillary. a 3/4" compression union bushing shall be provided for installation at the end of a wrought iron bulb well.

21. Float Switch

A float switch for cutting out the return sludge pump in case of a low level in the sludge pump well shall be provided. It shall be N.E.M.A. 4 construction with 15 feet bronze chain, copper float, cast iron counterweight, adjustable tape stop floor mounting bracket and accessories. Allen-Bradley catalog 840 B4 and 840-5BC47 or approved equal.

22. Hot Water Heater

Hot water heater shall be electrically heated, 30 gallon capacity. Tank shall be glass-lined and insulated. Safety pressure relief valve and hose bibb drain shall be provided.

23. Tools

The contractor shall furnish the following tools:

<u>Quantity</u>	<u>Woodbury Catalog F</u>	<u>Description</u>
1	Trimo-Alloy	8" Pipe wrench
1	Trimo-Alloy	14" Pipe wrench
2	Trimo-Alloy	18" Pipe wrenches
1	Trimo-Alloy	24" Pipe wrench
1	Proto No. 2406	Set of 10 open double end wrenches, 1/2" to 1"
1	Proto No. 5400 AB	Set of 10 and handle socket, hex wrenches 7/16" to 1"
1	Crescent No. A-110	Crescent adjustable wrench, 10"
1	Parker No. 434 1/2	Combination jaw and pipe vise, swivel base
1	Stanley #402	Blacksmith hammer, 2 1/2 lb.
1	Stanley #312	Ball pein hammer, #2

(continued)

Tools - continued

<u>Quantity</u>	<u>Woodbury Catalog F</u>	<u>Description</u>
1	Stanley #100+11	Claw hammer, #1
1	Cee Tee Co.	8" Combination pliers
1	Stanley No. 1006	6" Screwdriver
2	Simonds	10" mill bastard file
1	Enderes Octagon #123	½" Cold chisel
1	Enderes Octagon #147	1" Extra long chisel
1	Crescent No. 1049	Hacksaw
1 doz.	Simonds Molybdenum	Hacksaw blades (4 ea.: 18, 24, 32 teeth per inch)
1	Stanley-Atha No. 130	30" Wrecking bar
1	Atkins, No. 400	26" 8-point hand saw

24. Office Furniture

The contractor shall furnish one (1) of each of the following:

Desk: Art Metal 9145 FBR, laminated top

Chair: Cosco 15 S vinyl cover

Stool: Flewelling No. 100, swivel type, adjustable

Color shall be as selected by the Engineer.

25. Laboratory Equipment

The contractor shall furnish the following laboratory equipment:

<u>Quantity</u>	<u>Scientific Supplies Catalog Number</u>	<u>Nurnberg Scientific Supplies Cat. No.</u>	<u>Description</u>
<u>For Settleable Solids Determinations:</u>			
3	66189	WS2430	Imhoff sediment cones, 1000 ml, Pyrex brand glass, blunt tip
1		WS2440	Imhoff cone support rack
<u>For Temperature Determinations:</u>			
2	61012	G23890	Thermometer, laboratory grade, with both Fahrenheit and Centigrade scales (Centigrade range -10 to 110, 12-inch)
1		G23940	Armor for 12-inch thermometer
<u>For pH and Residual Chlorine Determinations:</u>			
1			Wallace & Tiernan comparator kit consisting of the following: (Catalog number in parenthesis) Standard comparator with prism attachment (U-2374), 2 - 26 mm sample tubes, 1 pipette bottle, 100 ml of ortho-tolidine solution and 1 chlorine color disc (U-7241)
1			Leather case (U-3567)
1			Bromthymol Blue disc (U-3145)
1			Phenol Red disc (U-5439)
2			26 mm sample tubes
4			Dropping bottles (U-10596)
100 ml			Bromthymol Blue indicator (U-7133)
100 ml			Phenol Red indicator (U-5440)
50 ml			Ortho-tolidine solution (U-7787)

(continued)

Laboratory Equipment - continued

<u>Quantity</u>	<u>Scientific Supplies Catalog Number</u>	<u>Nurnberg Scientific Supplies Cat. No.</u>	<u>Description</u>
			<u>For Relative Stability Tests:</u>
4	53065	G20300	1 ml. measuring pipettes (with 0.01 ml. divisions, Mohr, Blue Line)
10 gms			U.S.P. Methylene Blue powder (Shaw Surgical Company)
24	16285	WS1230	Incubation bottles (glass stoppered) 300 ml capacity B.O.D.
2	16525	G2355	Reagent bottle, 500 ml, Pyrex
1	12350	G1260	Trip balance
1 set	12710		Weights, 10 mg to 1000 gm
1	24711	G882	Graduated cylinder, 500 ml, Blue Line
3	13912	G1700	Beakers, Pyrex, Griffin (600 ml)
3	13912	G1700	Beakers, Pyrex, Griffin (100 ml)
			<u>Miscellaneous Items:</u>
2		WS1280	Brushes for cleaning Imhoff cones
6		G2935	Brushes for cleaning Imhoff cones
1			Box Calgonite for cleaning glassware
1	17980-1		Burner, Tirrill, natural gas
1	32033		Gas analyzer for CO ₂
1			Refrigerator, 4 cu. ft. capacity, under-counter application, Davis Model 24 or approved equal
			<u>For Total Solids:</u>
1	11705	G1070	Analytical balance (200 gm) (1 mg Sen)
1	12668-1	G1485	Analytical balance weights (1 mg-50 mg)

(continued)

Laboratory Equipment - continued

<u>Quantity</u>	<u>Scientific Supplies Catalog Number</u>	<u>Nurnberg Scientific Supplies Cat. No.</u>	<u>Description</u>
2	12578	G1420	Balance pan glasses (75 mm)
2	25310	G7085	Evaporating dishes (#2 Coors - 90 mm)
2			Evaporating dishes (#00A Coors - 75 mm)
1	52410	C17040	Drying Oven 125-350 F
1	25010	G7030	Desiccator, Pyrex 250 mm
1	25040	G7077	Desiccator plates (230 mm)
			<u>For Suspended Solids:</u>
4	23835	G6735	Crucibles, Gooch (#3 Coors)
4	23871	G6785	Crucibles, Gooch, fritted disc, M, 30 mm
1	24065	G6835	Crucible holder, Walter
1	24040		Crucible holder, soft rubber (Central Scientific Co. of Calif. 10107)
1	62450		Crucible Tongs, 12"
2	29416	G8840	Flasks, suction (500 ml, Pyrex)
1	28650	G8455	Filter pump, 3/8"
1	28645	G8485	Coupling, filter pump to faucet 3/8"
5 ft.	56430	G21680	Tubing, rubber (1/4 ID, 3/16 thick)
1/4 lb.			Asbestos, medium fibre (acid washed)
2	62720		Triangles, pipe stem 2" (Central Scientific Supply Co. of Calif. 19735B)
			<u>For Volatile Solids:</u>
1	30602	G9740	Muffle furnace, variable heat switch, attached pyrometer, built-in thermocouple

(continued)

Laboratory Equipment - continued

<u>Quantity</u>	<u>Scientific Supplies Catalog Number</u>	<u>Nurnberg Scientific Supplies Cat. No.</u>	<u>Description</u>
			<u>For Dissolved Oxygen Test (Sodium Azide Modification):</u>
1	17590	G3355	Burette, automatic, 25 ml x 0.1 ml
2	53075-4	G20325	Pipettes, Serological 2 ml x 0.1 ml
1			Pipettes, Serological 5 ml x 0.1 ml
1			Pipettes, Serological 10 ml x 0.1 ml
2	53045	G20280	Pipettes, volumetric exax 100 ml
2	13912	G1700	Beakers, Pyrex, low form, 400 ml
1	17685	G3425	Burette support, double castalloy, white lease
2	29140	G8780	Flask, Erlenmeyer, Pyrex, wide mouth, 500 ml
6	16151	G2210	Bottles, glass, approx. 1000 ml
10	23420	G6505	Corks, assortment (10 each #5 - #15)
6	56382	G21610	Stopper, 2 hole No. 6
1 set	23460	G6545	Cork borers, wing handle, steel, 1 - 6
2	30205	G9255	Funnels, 75 mm short stem
1	30235	G9290	Funnels, 16 oz. ribbed
1	30305	WS2250	Funnels, Buchner 2A
1	30535		Funnel support
2	24711	G6882	Cylinders, graduated, Exax 250 ml
1	60110	G23185	Iron support 4" x 6" base, 18" rod
2	60120	G21455	Rings, iron with clamp 4"
1	56380	G21600	Rubber stoppers #1 - 6 ass't., 1 lb.
2	29611	G8925	Flask, volumetric, 1 liter Exax
1	16652	G2715	Wash bottle, 1 liter

(continued)

Laboratory Equipment - continued

<u>Quantity</u>	<u>Scientific Supplies Catalog Number</u>	<u>Nurnberg Scientific Supplies Cat. No.</u>	<u>Description</u>
2	57940	G22280	Spatulas, 3" stainless steel
2	24825		LaMotte Filterion, 10 gallon cap. ea.
1	62766	G25280	Tripod, 5" diameter
2	66238	G26135	Wire gauze, asbestos center, 6" x 6"

Reagents:

Copper sulfate, small crystals, 1 lb.
Aluminum sulfate, CP 1 lb.
Manganous sulfate, MnSO_4 , 4 H_2O or MnSO_4 ,
 H_2O , CP, 1 lb.
Potassium Bi-iodate, GFS 1 oz.
Potassium dichromate, CP 1 lb.
Potassium iodide CP 1 lb.
Salicylic acid CP $\frac{1}{4}$ lb.
Sodium azide 100 grams
Sodium hydroxide pellets CP
Sodium thiosulfate CP, $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ 1 lb.
Stopcock grease 2 oz.
Starch, potato CP for iodometric titrations
4 oz.
Sulfuric acid, tech. 1 x 9 lb.
Sulfuric acid, CP. SG 1.84 1 x 9 lb.

For Biochemical Oxygen Demand (BOD):

1	35925		Imperial Incubator, small size
1	32810	G10875	Glass tubing 7 mm 1 lb
1	56420	G21660	Rubber tubing 1/4 x 1/16, 50 ft.
2	21720	G5130	Pinch clamps, small
2	16141	G2220	Carboys, 5 gallon
1	28130	G8170	File 4" small triangular

(continued)

Laboratory Equipment - continued

Description

Reagents:

Ammonium sulfate CP 1 lb.

Calcium chloride, anhy. 12 mesh CP 1 lb.

Ferric chloride, $\text{FeCl}_3 \cdot 6 \text{H}_2\text{O}$ CP 1 lb.

Iodine CP 1/4 lb.

Magnesium sulfate $\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$ CP 1 lb.

Potassium acid phosphate (d. hydrogen) CP
1 lb.

CONSTRUCTION SPECIFICATIONS

1. Scope of Work and Local Conditions

The work covered by these specifications consists of furnishing all labor, material and equipment required for construction of additions to the existing sewage treatment plant. The new additions will provide secondary treatment facilities and double the capacity of the existing plant. Alteration of the existing control building, changes in existing piping, and other modifications will be required.

The site is located at the foot of River Street at the bank of the Willamette River. Some clearing and grubbing will be required. Both power supply and water service are available on the site and no charge will be made for same.

The Contractor shall furnish, haul and place fill material for roadway construction and embankment around structures. Fill material shall be obtained from borrow area indicated on the Vicinity Map.

The Contractor shall confine his operations to the land owned by the City.

The Contractor shall schedule and coordinate his work in such a manner that interruptions in the plant operation shall be kept to an absolute minimum. Interruptions or shut-downs of treatment plant shall not occur without consent of the City Superintendent.

2. Clearing and Grubbing

The area within limits shown on the plans shall be cleared of trees, stumps, brush and vegetation. Spoiled material and debris shall be burned or hauled away, subject to approval of the Engineer.

3. Excavation and Grading

Excavated material shall not be classified for quality of material or presence of water. All structural and trench excavation, whether for pipe lines, footings, slabs, etc. shall be bid as one item. The bid price shall include stock-piling, backfilling, embankment and grading. All material from excavation will be used for fill around the plant.

Excavation for footings and basin slabs shall be made accurately to lines and slopes shown on plans or as staked on the ground. Except with special written permission by the Engineer, excavation by machinery shall not be carried closer than three inches (3") of the finished grade, and the remainder shall be finished by hand. Any excavation inadvertently carried below grade shall be replaced with compacted gravel or crushed rock at the expense of the Contractor.

Alignment and depth of cut for all pipe trenches shall be in accordance with the plans. The width of the trench shall be such as will permit the careful laying and jointing of the pipe.

For types of pipe requiring bell holes, the cost of excavation thereof shall be included and absorbed in the price paid for pipe laying. At trench intersections, or where trench and structures overlap, the excavation shall be paid

for only once.

Structural excavation shall be measured to a vertical plane one foot outside of the outer edge of the heel of vertical walls and distance of excavation shall be determined by measurement to the bottom of the wall footings and bottom slabs.

Trench excavation shall be determined by multiplying the length of pipe line, the average depth from existing ground surface to the invert of the pipe and the fixed pay width.

The fixed pay width for excavation for pipe shall be one foot four inches (1' 4") wider than the nominal inside diameter of the pipe for pipe up to and including 12" pipe. For pipe larger than 12", the pay width shall be one foot eight inches (1' 8") wider than the nominal inside diameter of the pipe.

For trenches containing two or more adjacent pipes the pay width shall be one foot four inches (1' 4") wider than the sum of the indicated distances between the pipes plus one-half of the nominal diameter of the two outside pipes.

4. Backfilling, Grading and Embankment

Backfill in areas over which concrete is to be placed shall be thoroughly and completely compacted in accordance with methods approved by the Engineer before any concrete is placed thereon. Care shall be taken not to damage walls during the course of the backfilling and its compaction.

The backfilling and grading around the treatment plant structures shall be brought to grade with material from excavation and with additional material to be hauled in by the Contractor.

Filling material under roadbed shall be placed, spread, and compacted in layers not to exceed nine inches (9") with heavy hauling equipment, tractors, or rollers. The density of the compacted fill shall not be less than 95% at optimum moisture content. Embankment along the sides of the aeration tank and the secondary clarifier shall not be compacted except for roadways and areas adjacent to roadways.

No extra payment will be made over excavation for grading, backfilling and embankment. Fill material hauled to the plant site shall be paid for on a cubic yard basis. Measurement shall be determined by the cross-sectioning of the borrow area before and after the excavation.

5. Trench Backfill

Backfilling shall be placed with special care to a point 6" above top of the pipe to secure full support and avoid displacement. Material around and under the pipe shall be carefully tamped and settled in place by hand methods to a point six inches (6") over the top of the pipe. For trenches outside of structures, the remainder of trench backfill may be settled with water or tamped to insure thorough compaction. Under structures, the complete backfill shall be thoroughly tamped so as to prevent any settlement whatsoever.

Cost of backfilling shall be absorbed in the price bid for excavation.

6. Concrete

The General Specifications for Concrete Construction shall govern, but in addition the Contractor shall comply with the supplemental requirements herein described.

The Engineer shall have rigid control over concrete mixes and shall determine proportions of fine and coarse aggregate to be used for each class of concrete and for each area in which it is to be placed. Careful controls shall be exercised by the Contractor in regulating the mix and amount of water used. Slump tests will be used by the Engineer for the regulation, control and modification of water-cement ratios. All concrete shall be placed as dry as reasonable to obtain a workable mix and secure maximum density, strength and impermeability in place.

All concrete shall be vibrated in accordance with the requirements of the Engineer and the Contractor shall so construct his forms and conduct his concrete placing operations as to obtain concrete of maximum density, strength and water tightness.

No concrete pouring operations shall begin unless the Contractor has on hand and in good mechanical condition at least two (2) vibrators suitable for use on the concrete placement operation to be undertaken.

After concrete is placed, it shall be kept wetted down during the curing process. Sealing compounds may not be used in lieu of keeping concrete wet without specific permission from the Engineer, and then only with adequate protection and heat.

Smooth, true surfaces are required in order to secure proper hydraulic operation. Forms for all exposed surfaces, including the various channels, the inside walls, and the outside walls above ground surface shall be faced with plywood, matched flooring or other material which will give comparable finish. Facing shall be adequately backed to prevent a wavy finish and special attention shall be given to ties and bracing. If forms bulge or spring when concrete is poured, such concrete will be required to be torn out and replaced. Facilities shall be provided for accurate screeding of top surfaces in channel floors and weir walls. At sharp curves in channels the forms shall be lined with sheet metal or plywood to give a true, smooth surface.

All form ties shall be of the rigid type which will break off below the finished surface, and core holes shall be dry packed with cement mortar immediately after stripping.

All structural concrete shall be Class "6" containing six (6) sacks of cement per cubic yard.

Backfill concrete shall be Class "4" containing four (4) sacks of cement per cubic yard.

Payment for concrete in place shall be in accordance with the unit prices bid, and shall include all costs of materials, forming, placing, finishing and curing as well as construction joints, metal water stops and alterations of existing concrete structure.

7. Placing Concrete

Concrete placing operations shall comply with the detailed requirements as set forth in the General Specifications for Concrete Construction. Care shall be taken to obtain both watertight structures and even, smooth, attractive surfaces.

The order of concrete construction shall be submitted to and approved by the Engineer.

8. Placing Reinforcing Steel

Reinforcing steel shall be accurately placed both as to spacing and alignment in conformity to the plans and General Specifications for Concrete Construction.

Splices in spacer and temperature bars and reinforcing in the bottom slabs, floors, walkways, channels, etc. shall be lapped not less than thirty (30) diameters.

Reinforcing steel shall be continuous through all construction joints, but no bars shall extend through expansion joints.

Payment for reinforcing steel shall be made on a pound basis in accordance with the unit price bid for reinforcing steel in place. The quantity for payment shall be determined by the amount actually in place and called for in the plans.

9. Wall Footings of Structures to Hold Water

Wall footings shall be placed with keyed joints and galvanized iron water stops. Joints between adjoining sections of wall footings to be keyed, include water stops, and shall have steel running continuously through the joint unless an expansion-contraction joint. Steel shall be accurately placed and well anchored. Keyways for construction joints shall be formed to the size shown on the plans and the metal water stop shall be accurately set and centered in the keyways and protected from damage.

Joints between footings and walls not subject to hydraulic pressure shall be keyed, but metal water stops shall not be required.

Cost of keyed joints and metal water stops shall be absorbed in the unit price bid for concrete in place.

10. Slabs

Reinforcing steel in floor slabs of basins and control building shall be accurately held in proper position by means of "chairs" or supports. Screeds shall be substantial and both accurately and carefully set. All floors shall slope evenly to drains.

Rods shall be heavy and straight. All concrete shall be worked down to a smooth plane and finished to accurate lines and grades. All slabs shall be given

a steel trowel finish unless otherwise noted. Control building floor and walkway slabs shall be given a non-skid mat finish.

11. Vertical Walls

Vertical wall sections shall be placed to and between construction joints as indicated in continuous pours without cold joints, and forms shall be of ample strength and rigidity to permit such an operation. Bulkheads in vertical walls shall not be located in line with constructed joints in footings.

Vertical wall to be poured against existing building wall shall be separated by a layer of $\frac{1}{2}$ " thick asphalt impregnated joint filler. Existing wall surfaces shall be cleaned and primed with one (1) coat of asphalt primer. Joint filler board shall be installed using suitable type of asphaltic adhesive.

Vertical construction joints in hydraulic structure walls shall be keyed, have 18 gauge galvanized iron water stops and steel shall run continuously through the joints.

Rigid form ties and spacers of a type approved by the Engineer shall be used. They shall be such as to permit cutting off or unscrewing approximately one inch (1") beneath the finished surface of the concrete walls. Wire ties will not be permitted.

Every possible precaution shall be taken during concrete placing to secure watertight walls free from any voids or gravel pockets. After forms are removed, both surfaces shall have all fins and pronounced offsets, if any, removed.

12. Horizontal Grooves

Ornamental horizontal grooves in the exterior of the building walls shall be accurately placed as to horizontal line, uniformity of depth and contact cross section by nailing strips to the anterior surface of the wall forms.

No extra payment will be made for grooves, the cost thereof being included in the price bid for concrete in place.

13. Construction Joints

No horizontal construction joints will be permitted in walls. Vertical construction joints in vertical wall sections shall be keyed and shall have reinforcement running continuously through all joints and all such joints shall be provided with galvanized iron water stops of 18 gauge metal, as shown on the plans.

Payment for galvanized iron water stops shall be included in unit price bid for Class "6" concrete.

14. Poured Expansion-Contraction Joints

Hot-poured rubber asphalt joints shall be made between wall footings and slabs in basins.

Top surfaces of basin wall footings to support floor slabs shall be

thoroughly cleaned, primed and given a heavy coat of asphalt before concrete floors are placed. Wedged shaped strips shall be used to allow space for making poured joints to surface of floors. Joint form strips shall be completely removed and the joint wire brushed and thoroughly cleaned and dried before primer is applied. After primer has thoroughly bonded to both faces of concrete in the joint, place preformed asphaltic joint filler and drive down tight. Then the joint shall be poured flush with Para-plastic Code 2341 hot-poured rubberized asphalt joint sealing compound or equal as approved by the Engineer. Pouring procedure and heating of compound shall be in strict accordance with manufacturer's instructions.

Payment for poured expansion-contraction joints shall be made on a lineal foot basis in accordance with the unit price bid. The bid price shall include the premolded joint filler in the joint.

15. Premolded Asphalt Joints

Premolded or preformed asphaltic joint filler shall be used between the floor of the building and the footing, and floor concrete shall be poured against performed strips.

Premolded asphaltic joint filler shall be Servicised Asphalt No. 1301 or equal.

Payment for Premolded Asphaltic Joints shall be made on a lineal foot basis in accordance with unit price bid.

16. Copper Construction Joints Between Existing and New Channels

Copper water stop shall be inserted into a sawed groove on existing concrete wall and anchored with lead wedges. The projecting half of the copper water stop shall have 3/4" diameter perforations on 8" centers and shall be embedded in the new concrete construction. The space in the joint shall be filled with preformed joint filler. Sealing compound equal to Vertiseal 2381 shall be applied on each side of the joint following manufacturer's instructions.

Copper construction joints shall be soldered, continuous and of first class workmanship.

Payment for copper construction joints shall be made on a lineal foot basis in accordance with the unit price bid. The bid price shall include the preformed joint filler and the sealing compound.

17. Diversion Box

A diversion box shall be constructed over the present 18" concrete incoming sewer. After the diversion box is constructed, the portion of 18" concrete pipe within the box shall be removed and all pipe openings finished smooth with grout. Separate connections shall be made from the diversion box to the new grit chamber and to the existing outfall manhole.

18. Temporary By-Pass

To facilitate the construction of the new inlet channel to the primary

settling tanks, temporary by-pass connections will be required. The new primary settling tank shall be constructed and put in use with a temporary connection from the new pretreatment unit by-passing the existing inlet channel. After the new inlet channel is constructed, all temporary openings shall be plugged with concrete.

19. Equipment Installation

The Contractor shall furnish and install following equipment complete and ready to operate:

1. Comminutor
2. Primary tank mechanism
3. Aeration tank equipment
4. Secondary clarifier mechanism

Equipment shall be accurately set and securely anchored. Shaftings shall be installed in true alignment. Anchor bolt setting, concrete recesses, clearances, lubrication, etc. shall be in accordance with manufacturer's certified drawings. Before placing the equipment in operation, the installation shall be checked and adjusted by the manufacturer's representative, and shall be approved by the Engineer.

20. Pump Installation

The Contractor shall furnish and install all pumps and make all necessary pipe connections. Pumps shall be set to true alignment and shall operate without vibration or leaky glands, and all bearings shall run cool. Piping connections shall be tight, firmly supported and assembled without strain on pump flanges and casings. Bed plate drains shall be connected to the floor drainage system.

21. Blower Installation

Blowers shall be furnished and installed by the Contractor. Piping connection and accessories shall be provided as indicated.

22. Digester Floating Cover

The Contractor shall furnish and erect complete in place a floating cover to fit a 40' diameter digester. All field welding shall be shielded arc welding and conform to the latest standards of the American Welding Society.

After erection, the floating cover shall be tested for gas tightness by filling the tank with water and trapping air beneath the ceiling plate. All welded seams shall be checked for leaks by means of a soap suds solution and any leaks rewelded. After the air test, the floating cover shall be floated on water and all seams tested for water tightness.

Piping and supports within the digester are shown for both the truss type and the buoyant covers. The Contractor shall furnish and install piping and supports according to the type of cover furnished.

The Contractor shall supply and place concrete block ballast sufficient

to develop a gas pressure of 6" water column when the cover is floating free on the liquid. Ballast shall consist of precast concrete blocks of size and location shown on the manufacturer's drawings.

23. Digester Roofing

Nailing strips of 2" x 4" on edge at 24" maximum span shall be bolted on the top chord of each truss and also in the intermediate spaces. Seasoned 2" T&G standard grade douglas fir roof decking shall be installed. Lumber shall be pressure treated by cresoting to a retention of a minimum of 8 lbs. per cu. ft. of wood, or by impregnation with wolmanizing salts equivalent to 3/4 lb. per cu. ft. of wood.

A four-ply built up roofing shall be applied over the roof decking. Built up roofing shall be equal to Carey Specification No. 2-A 15-year bond roof.

Around the entire circumference of the cover shall be placed a 20-gauge galvanized metal flashing as shown. Suitable flashing shall be provided around the center dome, manholes, sampling wells, and other openings through the roof.

24. General Outside Piping

Outside piping work shall include sewer lines, pressure lines for sewage and sludge whether of concrete, concrete cylinder, cast iron, or steel pipe. This work shall also include connections to existing plant piping. Detailed specifications for trench excavation pipe laying and backfilling set forth elsewhere in these specifications shall apply.

25. Sewage and Sludge Piping

This work shall include all sewage and sludge piping within the buildings and tank structures. Piping shall be installed in a neat and workmanlike manner and shall be adequately supported. Modifications of sludge piping in the existing control building are included in this work.

A new swing joint shall be installed in the existing sludge well at the primary settling tank. Relocate existing winch and install pulley directly over swing pipe.

26. Sludge Gas Piping and Equipment

Existing sludge gas piping and equipment shall be modified as shown on the plans. Connection from the new digester shall be made. Existing waste gas burner in chimney shall be disconnected. New waste gas burner shall be installed outside of present control room. A gas meter shall be furnished and installed.

All sludge gas pipes shall be genuine wrought iron with malleable iron fittings. Pipes shall be sloped to the drip traps. Pipe hangers, supports, brackets, etc. shall be provided.

27. Natural Gas Piping

Northwest Natural Gas Company will extend its gas main to a point within the plant site as shown on plans. The Contractor shall make connection to the meter

and provide a shut-off valve at that point. Standard weight galvanized iron pipe and fittings shall be used.

28. Water Piping

Water piping work shall include all water piping outside of buildings. All outside valves shall have cast iron valve box and stop and waste. Vacuum breakers and spray nozzles shall be provided as shown. Connection to existing water piping shall be made at the northwest corner of the existing primary settling tank. A new 4" gate valve shall be installed in the existing water supply line immediately inside the new fence. Portion of the 4" cast iron water line shall be lowered or moved if necessary for the construction of the new pretreatment unit.

All water piping 3" and smaller shall be standard weight, double galvanized pipe.

29. Air Piping

Air piping shall be cast iron pipe and shall be adequately supported. A vacuum breaker shall be provided. Piping connections shall be airtight.

30. Area Drainage Piping

Area drainage piping shall include 4" soil pipe drain under sludge truck loading slab, and the 6" concrete drain from the present Control Building to the Final Clarifier. A 12" corrugated metal culvert under the roadway shall be installed as indicated.

31. Chlorination Piping

The Contractor shall furnish and install 4" C.I. soil pipe or water pipe and the 1" rubber chlorine hose, as indicated. The existing rubber hose shall be removed and the new rubber hose shall be connected to the chlorine distributor manifold in the chlorinator room.

32. Flow Meters Installation

The Contractor shall furnish and install 3 electronic type flow meters. The transmitter units shall be mounted directly over the Parshall flumes or the weir box; and the receiver units for the Parshall flumes shall be mounted in the present Control Building. The receiver unit for the V-notch weir shall be mounted in the Blower Room.

The Contractor shall also remove the existing Leupold & Stevens B-FT flow recorder from the present Control Building and re-install it on the south wall in the Blower Building. Two guide pulleys with angle brackets are required to transmit the float action to the recorder. The steel float well in the present Control Building shall be burned off at the floor, leveled and filled with concrete.

33. Control Buildings, Blowers and Pump Building

A. Order of Construction

In so far as it is practical to do so, all piping passing through or under footings and wall foundations shall be placed in advance of placing concrete. Excavation for footings and foundations shall then be done to accurate alignment and elevation, and concrete placed in such footings and foundations.

B. Footings and Foundation

All foundation walls shall be accurately located and constructed to exact dimensions. Openings for drainage and plumbing, conduits, and piping shall be provided by square box at least two inches (2") larger each way than the outside diameter of the pipe. Knockouts shall be provided for future piping.

C. Conduits and Piping

The Contractor for the concrete work shall familiarize himself with the plans for plumbing, heating, piping and electrical work, and shall in no case place concrete until piping and conduits are in place in the forms. He shall cooperate in every possible way with the Contractors or Subcontractors handling other trades.

D. Concrete Floors, Walkways, Slabs

Floors and slabs supported on earth or sand and gravel fill shall be placed only after the material has been thoroughly compacted to maximum density. Floors and slabs shall be placed in one course, without topping, and shall have a non-skid mat finish. Slopes to drain shall be provided where drains are indicated.

E. Exposed Walls

Exposed walls shall be formed with plywood or comparable materials new or in new condition. The Contractor shall obtain wall finishes which are free from fins, gravel pockets, off-sets, etc. All concrete shall be vibrated.

Immediately after stripping of forms, form tie recesses shall be dry packed with 1:2 cement sand mortar carefully packed and finished. As soon as the pointing has set sufficiently, all the exposed surface shall be thoroughly wet with a brush and rubbed with a carborundum stone bringing the surface to a smooth texture and removing all form marks. The paste formed by rubbing shall be spread uniformly over the surface and allowed to take a reset, after which it shall be finished by rubbing down with dry burlap.

F. Lumber

All lumber used in the buildings shall be construction grade Douglas fir.

G. Wall Board

Gypsum wall board shall be $\frac{1}{2}$ " thick. Ends and joins shall occur over nailing members. Joints on opposite sides of a partition shall be staggered. Joints shall be taped and corners shall be reinforced with metal corner beads. Method of erection and finish shall follow manufacturer's recommendations and standard practice.

H. Asphalt Floor Tile

Asphalt floor tile for the laboratory and office area shall be $\frac{3}{16}$ " thick and 9" square in Group "C" color and design approved by the Engineer. Tile shall be marbelized. Rubber cover base shall be installed around the perimeter of the laboratory and office area and at the base of the partition wall in the boiler room. Provide edging strip under the door between the laboratory and office area and the boiler room.

I. Aluminum Windows

All windows shall be aluminum projected type conforming to all requirements for Quality-Approved aluminum windows in Aluminum Window Manufacturer's Association, Master Specification P-A2 equal to Truscon A 413, Series 900P or CECO A 413, Series 525.

All members shall be extruded 6063-T5 aluminum alloy. Overall depth of frame shall be a minimum of $1\frac{1}{2}$ ". Depth of all ventilator sections shall be $1\frac{5}{8}$ " and minimum thickness of solid web $1\frac{1}{8}$ ".

All windows shall be designed for outside glazing with glazing compound and spring wire glazing clips.

Ventilators shall be weather stripped around their entire perimeter with vinyl weatherstrip.

Polished white bronze cam handle shall be provided.

Erection fittings shall be of aluminum or hot galvanized steel, designed to provide for normal expansion and contraction.

Care shall be taken that lime mortar or any other corrosive substance shall be promptly removed from exposed aluminum surfaces.

All joints between window frame and masonry shall be caulked with suitable materials.

All glass shall be double strength B quality.

J. Steel Doors and Louvers

Hollow metal doors shall be flush type, 18 gauge panels, sound deadened and prepared to receive hardware and locks. All doors shall be Bonderized and receive one coat of baked-on primer paint. Finish hardware as indicated on door schedule shall be provided.

Metal louvers shall be furnished and installed as shown on the plans.

All door and louver frames shall be caulked with sealing compound.

K. Wood Cabinets

Wood cabinets shall be furnished and installed as shown on the plans. All hardware shall be included.

L. Counter Top

Counter top shall be constructed of 3/4" exterior grade Douglas fir plywood. Covering shall be 1/16" Formica standard grade; edges shall be banded with same material. The entire counter top and the backsplash shall be securely screwed to the cabinets.

34. Existing Control Building

A new metal shower stall shall be furnished and installed in the existing control building. Cold and hot water piping shall be connected to existing system. Shower floor drain shall be connected to drainage pipe under concrete floor slab. Portion of the partition shall be removed and new partition shall be constructed using wall boards. Re-install existing wood door with new trims on new partition.

Existing counter, sink, and cupboards shall be removed. Water and drain connection not used shall be capped.

35. Roof Slab Coating

Concrete roof slabs including the top of parapet walls shall be given two (2) coats of cold applied fibrated asphalt roof coating, Johns-Manville or equal approved by the Engineer. A primer coat shall be applied and allowed to dry thoroughly before the first coating is brushed on. Finish coat of asphalt shall not be applied until the first coat has dried and become firm.

Roof coating shall be guaranteed for two years following acceptance of the work.

36. Boiler and Steam Piping Installation

Boiler, controls and all equipment shall be properly installed with all necessary mountings, guards, supports and fastenings. Piping shall be graded down in direction of flow and supported by hangers. Unions shall be provided at final connections to equipment.

37. Site Grading and Roadway Work

Upon completion of construction of the plant, the site shall be finish graded to grades as shown on plans. This work shall include the preparation of sub-grade for roadways, the shaping of the fill slopes, and shaping surface drainage ditches.

The Contractor shall furnish and place crushed rock or gravel on the

roadway area as called for by the plans. Size of rock and thickness of each course shall be as indicated. A 3" crown shall be provided over the 12' width of roadway. Finish course shall not be applied until construction work is otherwise completed.

Contractor shall cut or fill and compact to base rock elevation in accordance with stakes set by the Engineer.

Payment for Roadway Construction will be made at the unit price bid per cubic yard for the base rock and for the finish rock furnished and placed in accordance with the plans and specifications. The cost for cutting, filling, compacting and grading shall be absorbed in the items for excavation and site grading.

38. Structural Steel and Iron Work

Structural steel and iron work shall be furnished and installed as shown on the plans. This classification shall include steel brackets, checkered plates, steel gratings and frames, ladders, step rungs, clip angles, hand railings, weir plates, overflow troughs, gas dome cover for existing digester, float stops, fasteners, nuts and washers. All outside items shall be hot dip galvanized. All inside items shall be given a shop coat of rust inhibitive primer paint after thoroughly cleaned of rust, splatter, oil, dirt and grease.

Gratings shall be banded around edges where indicated on drawings.

Hand railings shall be fabricated 1½" standard, black steel pipe. Joints shall be welded, neatly filleted and ground smooth. Posts shall be grouted in place in circular recesses 5" deep. In locations wherein recesses are not feasible for anchorage, flanges and anchor bolts may be used.

Aluminum gate and gate guides shall be included in this work.

The following are to be furnished by the equipment suppliers:

1. Walkway and hand railings thereon for the final clarifier
2. V-notch weir plates and anchor bolts in the final clarifier
3. Anchors for the equipment in primary settling tank, aeration tank, and the final clarifier

Payment for structural steel and iron work shall be made in accordance with lump sum price as bid

39. Fencing

Fencing shall be installed after other construction work is complete and fill materials have thoroughly settled. Total height of fence shall be seven (7) feet. Fabric shall be woven #9 gauge wire and shall be six feet (6') high. Top extension arms set at 45° shall provide an additional vertical height of one foot (1'). Each extension arm shall carry 3 strands of 4 point pattern No. 12½ gauge wire. Line posts shall be 2" x 2½" H column, weighing 4.1 lbs. per lin. ft.; end, corner, angle and pull posts, 3" O.D. standard full-weight tubular steel,

5.79 lbs. per lin. ft. Posts are to be spaced not farther apart than 10 ft. centers and set 36" in Class "4" concrete footings. Top rail shall be 1 5/8" O.D., 2.27 lbs. per lin. ft. Horizontal braces shall be provided for end, gate, and corner posts.

Gates shall be full height topped with three strands of barbed wire and shall be equipped with latches, keepers, hinges and stops for a complete installation.

All arms, posts, braces, rails and fittings, shall be hot-dip galvanized. Fabric and barbed strands shall be galvanized after weaving.

The existing fence shall be carefully dismantled. Fence fabric, gates and other salvable parts shall be stored on job site and shall be re-erected as part of the new fence. All other parts of the existing fence not used in new construction shall be removed and disposed of by the contractor.

Lump sum bid for fencing shall include the complete installation of the new fence and the removal of the existing fence.

40. Painting

The following specifications shall cover complete painting of surfaces throughout the interior and exterior of the existing structures and the new additions.

No paint shall be applied to the following:

- A. Building floor and walkway surfaces, top of concrete walls, and exterior walls below finish grade
- B. Exterior walls of settling tanks and aeration tank
- C. Galvanized miscellaneous steel items
- D. Aluminum windows and trims
- E. Motors, control centers, flow recorders, shower stall and other equipment that is completely finished at the factory
- F. Redwood flights in primary settling tank
- G. Inside of existing digester
- H. Underside of concrete slab and concrete walkways over tanks

The workmanship shall be the best. All paints shall be spread evenly and flowed on without sags, runs, or excessive brush marks. Only skilled workmen shall be employed to do finish work.

All surfaces shall be thoroughly clean and free of grease, dirt or foreign material before paint is applied. Each coat of paint shall be slightly different

shade than preceeding coat. The top and bottom edges of all wood and metal doors shall be finished with two coats of paint as used for finish coats.

Woodwork shall be sandpapered to smooth and even surface and then dusted off. Fill all nail holes and other surface imperfections with spackle after primary coat has been applied.

Metal surfaces shall be thoroughly cleaned of oil, grease, dirt, mill scale, rust oxidation or other substances. Dirt, rust scale and loose rust shall be removed by scraping and wire brushing. On previously painted surfaces, deteriorated coatings shall be removed. Abraded portions of shop-coated metal surfaces and bare portions of previously painted surfaces shall be spot primed. Painting shall be applied with brushes.

Concrete surfaces shall be cleaned of form oil, dust and dirt, and shall be treated to a condition suitable for the finish paint used.

The painting contractor shall submit color charts to the Engineer for approval prior to painting.

During painting of interior walls, ceilings, piping, etc., tarps or drop cloths shall be used to protect all equipment, piping, floors, etc. from spatter and spills.

Upon completion of the painter's work, all scaffolding and surplus material shall be removed, and paint spatter on floors and adjoining surfaces shall be thoroughly cleaned up. Acceptance will be made only when premises are clean throughout and ready for use.

All painting work shall be guaranteed to be free of any faulty workmanship or inferior materials for a period of two years following acceptance of the project work by the Engineer. Any defects which are discovered or observed during the guarantee period shall be corrected to the satisfaction of the Engineer and Owner at the expense of the contractor.

41. Painting Schedule

A. Exterior Concrete, above grade, including all buildings and digesters

Two (2) coats Ramuc Masonry paint

B. Interior Concrete, non-submerged, walls and ceilings in all buildings including existing control room

Two (2) coats Ramuc Utility Undercoater

One (1) coat Ramuc Utility Enamel

C. Interior Concrete, submerged, wall and bottom surfaces of diversion box, channels, existing and new pre-treatment units, and return sludge control box. Wall surfaces only of existing and new primary settling tanks, aeration tanks, final clarifier and new digester. Apply first

coat to full height of wall and bottom surfaces where required. Apply second coat from top of wall to 3' below maximum water level.

Two (2) coats Inertol Standard

- D. Submerged Metal, equipment and supports in primary settling tank, aeration tank, and final clarifier and all metal surfaces of digester cover, submerged and non-submerged of either truss type or buoyant type.

Two (2) coats Inertol No. 49 Thick over shop primer Inertol Rustinhibitive Primer #621

- E. Non-submerged Metal, not galvanized - Steel doors, steel sash, ladders, pipe supports, valves, pumps, blowers, all exposed piping, etc. (Bituminous coated pipes, fittings and valves shall have two coats of Inertol Tar Stop prior to the application of finish coating). Digester cover excluded.

Indoors: Two(2) coats Pontoke Enamel over shop primer

Outdoors: Two (2) coats Glamortex Enamel over shop primer

- F. Non-submerged Metal, galvanized - Outdoor handrails, ladder, miscellaneous steel items.

One (1) coat Galvanoleum

- G. Indoor Wood and Wallboard

One (1) coat Inertol Interior Undercoater No. 623

Two (2) coats Ponkote Enamel

42. Water Tightness

It is intended the concrete walls, bottom slabs, construction joints and contraction joints, when complete, shall be thoroughly watertight without porous spots, voids or honeycomb sections which may permit leakage. Actual checking for leakage shall not take place until sufficient time has elapsed to allow for absorption of water by the concrete.

If any leakage occurs, the Contractor shall remedy the defects at his own expense in accordance with methods approved by the Engineer.

43. Safety Provisions

All safety requirements of the State Industrial Accident Commission shall be adhered to and the entire operation shall be conducted so as to minimize all hazards to workmen and others on the project.

44. Grading and Clean-Up

The Contractor shall place the plant site in a neat and finished appearance, with earth graded so as to permit planting of lawn and shrubs. Form lumber and debris shall be removed, burned, or disposed of as directed by the Engineer. Piles of excess concrete material, construction roadways, and other surface evidence of construction work shall be re-graded and settled areas shall be re-filled.

All cleanup work shall be to the satisfaction of the Engineer and the cost thereof shall be included and absorbed in other unit bid prices.

45. Guarantee

All materials, equipment, supplies and workmanship shall be guaranteed for a period of one (1) year from date of official acceptance by the Owner with the exception of all painting work which shall be guaranteed for two (2) years from date of official acceptance by the Owner.

PLUMBING

1. Scope of Work and General Information

The plans and specifications for this section of work call for a complete plumbing system for the new control building and the installation of a shower unit in the existing control building. The work shall include furnishing and installing all fixtures, hot and cold water piping, floor drainage and roof drainage systems. Separate bid items shall cover piping, fittings, valves, etc. for sludge piping and exterior water pipings.

All materials used and all work done shall be in strict compliance with the State of Oregon and City of Portland Plumbing Codes. The plumbing contractor shall obtain and pay for all permits and licenses required. No plumbing fixture, device or construction shall be used which will provide a cross connection of any sort between the potable water supply and a polluted water supply, drainage system or waste pipe.

All materials and fixtures shall be new, and where not hereafter particularly specified, shall be of the best quality and grade. Only skilled mechanics shall be employed, and the work shall be done strictly in conformance with the plans and the requirements of the Engineer.

2. Drawings

The plumbing contractor shall familiarize himself with the structural details of the building insofar as they affect his work, and shall cooperate with other trades in locating necessary openings in walls and floors and roughing in piping and fixtures.

3. Openings, Cutting and Sleeves

Before the floors are poured, or partition work begun, the risers and such parts of branches that are to be enclosed in floors, wells or partitions, or are to pass through floors or ceilings, shall be placed in position; otherwise suitable sleeves shall be placed by the plumbing contractor whenever necessary before the general contractor proceeds with his work, it being the intention to reduce all cutting to an absolute minimum. Under no condition shall any beams, girders, or columns be cut, or any pipes in any way run through same, unless so shown on plans, or unless written approval is obtained from the Engineer.

Any cuttings of walls, floors, etc., or repairing of any work due to the plumbing contractor neglecting to direct the location of necessary openings and framing beforehand, shall be paid for by the plumbing contractor.

4. Excavation and Backfill

Trenches for the underground pipe lines shall be excavated to the required depths. The bottom of trenches must be tamped hard and graded to take advantage of all available fall. Bell holes shall be excavated to insure that the pipe will rest for its entire length on solid ground. Sewer and water pipes shall be laid in separate trenches. Trenching shall be done so as not to affect bearing of soil at footing locations.

After the pipe lines have been tested, inspected and approved, the trenches shall be filled with suitable material which shall be firmly compacted, flooded if necessary, and thoroughly tamped.

All costs for trench excavation and backfill shall be included in the lump sum price bid for plumbing.

5. Materials

All drainage pipe under concrete and all plumbing piping 2 $\frac{1}{2}$ " and larger shall be standard weight hub and spigot soil pipe conforming to Federal Specifications WW-P-401. All vent piping and water pipe 2" and under shall be standard weight galvanized steel pipe conforming to Federal Specifications WW-P-403a. Fittings shall conform to Federal Specification WW-P-521a. Water fittings shall be galvanized and drainage fittings shall be cast iron. Valves 3" and larger shall be iron body, double disc valves brass mounted, conforming to the standard specifications of the American Waterworks Association. Valves 2 $\frac{1}{2}$ " and smaller shall be solid brass gate valves of best quality and of an approved make.

6. Plumbing Fixtures

Fixtures shall conform to the plan and tabulation. In order to accurately indicate the requirements, specific make and catalog numbers are given, but it is understood that other makes will be acceptable if the dimensions are substantially the same, and the materials, quality of workmanship, and wholesale cost are not inferior to those listed. The Contractor shall submit to the Engineer a detailed list of the fixtures he proposes to furnish, and shall secure a written approval of the same before ordering.

7. Hangers and Supports

Horizontal overhead runs of pipe shall be hung with approved malleable iron, solid ring expansion pipe hangers, spaced not over 10 feet apart; vertical runs to have heavy wrought iron clamps or collars for support. No chain, strap iron, or wire hangers will be permitted.

8. Soil, Waste, Drain and Vent Piping

Horizontal soil and waste pipes shall be given a grade of $\frac{1}{4}$ " per foot where possible, but in no case less than $\frac{1}{8}$ " per foot. All main vertical soil and waste stacks shall be extended full size to and above the roof line as vents. Where practicable two or more vent pipes shall be connected together and extended as one pipe through the roof.

Vertical vent pipes may be connected into one main vent riser above fixtures vented. Where an end or circuit vent pipe from any fixtures or line of fixtures is to be connected to a vent line serving other fixtures, the vent line shall be extended 4 feet above the floor on which the fixtures are located before being connected to the other vent line, thus preventing the use of any vent line as a waste. Horizontal waste lines, receiving the discharge from two or more fixtures shall be provided with vents unless separate venting of fixtures is required.

All changes in pipe size on soil, waste and drain lines shall be made with reducing fittings or recessed reducers. Y-fittings and 1/8 and 1/16 bends or combinations shall be used wherever possible.

Sanitary long trap bends and turn may be used for connections of branch lines to fixtures and on vertical runs of pipe. Long turn fittings shall be used where space and other conditions permit.

Joints between bell and spigot pipe and threaded pipe shall be made as above, the end of threaded pipe having a ring or part of a coupling screwed on to form a spigot end.

Joints between cast iron and vitrified clay or concrete sewer pipe shall be made with picked calum gasket and Portland cement mortar mixed relatively dry in proportion one part cement and one part clean, sharp sand, filled full depth and troweled to a smooth bevel around the socket of the pipe. Each length of vitrified pipe, after being firmly set in place, shall be mopped out to insure that no mortar or other debris be left in the pipe. Each joint shall be of uniform thickness.

The use of long screws and bushings is prohibited.

Slip joints will be permitted only in trap seals or on the inlet side of the trap. Unions on the sewer side of the trap shall be ground faced, and shall not be concealed or enclosed.

9. Flashing Connections

Openings in the roof for vent pipes shall be flashed with not lighter than 4 lb. lead flashing. The flashing shall be made watertight at the roof and the lead shall extend up to the top of the vent pipe (not less than 12" or more than 18" above the roof line). Lead flashing shall be turned over and down into the hub of the pipe at least one inch.

A flashing shield shall extend not less than 8 inches from the vent and shall be placed with roofing to make a water-tight installation.

10. Branch Connections

Size of soil, waste and water pipe branches to the various fixtures shall be as follows, unless otherwise indicated.

	<u>Waste</u>	<u>Soil</u>	<u>Cold Water</u>	<u>Hot Water</u>
Water Closets		4"	1/2"	
Service Sinks	3"		1/2"	1/2"
Lavatories	1-1/2"		1/2"	1/2"
Showers	1-1/2"		1/2"	1/2"
Drinking Fountains	1-1/4"		1/2"	
Urinals	2"		3/4"	
Floor Drains	2"			

11. Traps

Running "S" or "P" traps shall be installed in branch lines from fixtures and floor drains, or wherever else required. Traps installed in connection with threaded pipe shall be recess drainage pattern. Traps installed in connection with cast iron pipe shall be of the same quality and grade as the pipe. Traps installed in connection with fixtures shall have a seal of not less than 2" nor more than 4". Traps installed in connection with floor drains shall have a seal of not less than 4".

12. Cleanouts

Cleanouts on cast iron pipe shall each consist of a long sweep 1/4 bend or two 1/8 bends extended to the grade. An extraheavy trap screw ferrule shall be caulked into the fitting. Floor cleanouts shall have countersunk brass plus.

13. Floor Drains

Extra heavy cast iron double drainage pattern floor drains with seep holes shall be used.

Gratings shall be circular and not less than 5-inch diameter for two inch drains and shall have polished chromium plated covers.

14. Pipe Sleeves

Cast iron, wrought iron, or steel pipe sleeves, properly secured in place, with approximately 1/4" space between the sleeve and the pipe passing through it, shall be provided for all pipe passing through concrete or masonry walls. Where pipes pass through footings, cast iron sleeves shall be provided, not less than two sizes larger in diameter than the pipes that will use them.

All pipe sleeves shall be built in place as the walls, partitions and floors are built up. The joints between sleeves and pipes passing through floors shall be made watertight with suitable plastic material.

15. Water Piping

All lines shall be run parallel to each other and parallel with the lines of the building with supplies and outlets of the sizes indicated.

All pipes shall be cut accurately to required measurements and shall be worked into place without springing or forcing. Care shall be taken not to cut or weaken any structural portions of the building. All water piping shall be run concealed in all finished rooms. Overhead piping shall be supported in an approved manner. Proper means shall be provided for expansion and contraction of piping.

The hot water heater and tank shall be furnished and placed as a part of the plumbing work. The hot water supply system shall be run from the water heater to all fixtures having hot water outlets.

Changes in pipe sizes shall be made with reducing fittings.

Pipe threads shall conform to Federal Specification GGG-P-351. The ends of all pipes shall be reamed before being made up with fittings.

Threaded joints shall be made up with graphite and oil or an approved graphite compound applied to the male thread only. Threads shall be full cut and not more than three threads on the pipe shall remain exposed. Caulking of threaded joints to stop or prevent leaks will not be permitted.

16. Painting

All piping run in or through concrete, floor fill or tile floors shall be given one (1) coat of acid-resisting paint, having a bitumastic base. All exposed threads on galvanized pipe shall be given one coat of same acid-resisting paint.

Pipe hangers, supports and all other iron work shall be thoroughly cleaned and painted one coat of black asphaltum varnish.

All concealed non-conducting covering shall be painted two coats of black asphaltum paint.

All finished painting in exposed portions is specified under the detailed section on "Painting".

17. Supports and Fastenings

All fixtures, equipment and materials shall be supported and fastened in a proper manner. Where secured to concrete or masonry walls, they shall be fastened with 1/4" expansion bolts not less than four inches long, where possible and practicable to use these sizes. Where secured to wood partitions, they shall be fastened with round head brass wood screws.

Where wood screws are used, they shall go into solid wood, such as joists, studs, or solid pieces set between studs. Where through bolts are used they shall be provided with plates or washers at back, set so that heads, nuts and washers will be concealed by plaster. Exposed heads of bolts and nuts shall be hexagonal with rounded tops finished and plated. Exposed nuts and heads of screws shall be provided with plated washers.

Expansion bolts shall be 1/4" bolts with 20 threads to the inch and of sufficient length to extend at least 3 inches into solid concrete or brickwork and fitted with sleeves of proper length to expand in the masonry walls. This clause applies wherever expansion bolts are specified.

18. Fixture Connections

The connection between earthenware of any fixture and flanges on the soil pipe shall be made absolutely gas and watertight with a closet-setting compound in accordance with Federal Specification HH-C-536, or gaskets in accordance with Federal Specification HH-C-116. Rubber gaskets or putty will not be permitted for this connection. Bolts shall be not less than 1/4 inch and equipped with plated nuts and washers.

Fixtures with outlet flanges shall be set the proper distance from the floor or wall to make a first class joint with the gasket and fixture used. No fixture shall be set in place until the flange has been inspected and approved.

19. Tests for Plumbing and Drainage System

The entire system of soil, waste and vent piping in each building shall be tested with water or air as directed, and proved tight to the satisfaction of the Engineer before connection is made to sewer, trenches backfilled, piping covered or fixtures connected. All defects disclosed in the work by the following specified tests must be corrected.

Water Tests: If tests are made with water, the connection from the building to sewer and the drainage system below floors of ground level shall be filled with water to the top of a vertical section of pipe 10' high and the water allowed to stand for at least thirty minutes for inspection, after which, if the lines prove tight, the water may be drawn off and the trenches backfilled.

The soil, waste, drain and the vent piping above the floor or ground level shall have the openings plugged where necessary and the piping system above filled with water to the level of the top of vent pipes and allowed to stand for at least thirty minutes for inspection, after which, if the lines prove tight, the water shall be drawn off and the fixtures connected. Each vertical stack above the first floor or ground level with its branch waste and vent pipes may be tested separately.

Air Tests: If tests are made with air, a pressure of not less than 10 lbs. per square inch, (20" mercury) shall be applied with a force pump and said pressure maintained at least fifteen minutes without leakage. A mercury column gage shall be used in making the air tests.

20. Tests on Water Supply System

At its completion each water supply system shall be tested to an hydrostatic pressure of 100 lbs. per square inch and proved tight.

Water piping, if in any way concealed by structural work, shall be tested to the above pressure and proved tight before pipes are concealed.

21. Cleaning and Adjusting

At the completion of the plumbing work, all parts of the installation shall be thoroughly cleaned. All piping and connected facilities shall be cleaned of all grease, metal cuttings, and foreign matter of every kind. Any stoppage or any discoloration or other damage to any part of the building, its finish or furnishings, due to failure to clean the piping system properly shall promptly be repaired.

At the completion of the work, all flush valves and other parts of the work shall be adjusted for quiet operation. All automatic control devices shall be adjusted for proper operation.

ELECTRICAL WIRING

1. General Requirements

- a. Provide each item mentioned or indicated, of the quality or subject to the qualifications noted; perform each operation prescribed; and provide all necessary labor, equipment and incidentals.
- b. The general conditions specified governing the general contractual agreement shall also govern this work.
- c. Bidders shall view the site and ascertain existing conditions and note all factors affecting this work. All costs to provide the installation as shown on the drawings and specified herein shall be included in the initial proposal.

2. Permits, Codes and Inspections

- a. Comply with all Electrical Code requirements of the State of Oregon and all applicable local regulations.
- b. Obtain all permits, inspections, etc., required by Code. All fees shall be included in the contract price.
- c. Furnish a certificate of approval from the inspection authority at completion of the electrical work, delivered to the Engineer.
- d. All materials and equipment shall be approved by the Underwriters' Laboratories, Inc., or by the local inspection authority.

3. General Methods and Requirements

- a. Conduits shall be concealed in the construction so far as is practicable with conduit up to $1\frac{1}{2}$ " permitted in slabs, placed as directed. Exposed conduits shall be run parallel or at right angles to structural building lines. Exposed conduits shall be neatly offset into boxes and fittings. Exposed outlet boxes and conduit fittings to be cast metal, threaded hub type, equal to Appleton "Unilets" or Crouse Hinds "Condulets."
- b. Conduits shall be supported nominally every six feet along runs and within eighteen inches of each outlet, fitting, ell or cabinet, for both concealed and exposed wiring. Wooden plugs will not be permitted for fastenings and wood screws will be permitted only for attachment to wooden members.
- c. The entire installation shall be made in a neat, workmanlike, finished and safe manner. The work shall be under competent supervision at all times.
- d. Provide protection where necessary to protect electrical installation from damage by other trades during construction.
- e. Splices and taps for branch circuits made up mechanically secure and then soldered and taped. Scotchlok connectors installed in accord with manu-

facturer's instructions may be used in lieu of soldering. Single wire pigtails shall be left for connection of fixtures at lighting outlets and for devices. Connections for No. 6 and larger conductors to be made with non-ferrous pressure tool applied connectors and lugs, equal to T. & B. Series 54,000 or Burndy Hydent.

- f. Cutting, patching, removal of debris, etc., shall be as directed by the Engineer. Trenching, backfilling and restoration of the site required by this work shall be included hereunder.
- g. Guarantee the installation against defects in material and workmanship which may occur under normal usage, for a period of one year after acceptance. Such defects shall be promptly remedied without cost to the Owner.
- h. The Contractor shall submit a list of materials he proposes to use within 20 days after award of this work. The list to show type, size, rating, catalog number and manufacturer's names for all switches, receptacles, cast outlet boxes, dry transformers, motor starters or controllers, safety switches, panels, heater units, thermostats, motor control centers, switchgear and lighting fixtures.
- i. Electrical plans are diagrammatic indicating approximate locations of outlets and controls. Refer to the construction and mechanical drawings and details and coordinate the electrical work to assure proper roughing in and to avoid conflicts. Where conflicts appear or the requirements are not clear the Engineer shall be requested to provide proper installation instructions.
- j. Minor changes in locations shall be made without added cost to the Owner if ordered prior to roughing-in.

4. Work Excluded

The following items will be provided under other divisions of the work. This work shall be conducted in a manner to cooperate with the other divisions of the work.

- a. Pump motors, float or flow operated control devices, alarm horn, gas boiler and heating system controls and control wiring, laboratory oven, refrigerator and flow recorders. Refer to equipment connections herein.
- b. Metering equipment and wiring for the electrical power, beyond the installation of conduit, meter sockets and weatherproof cabinet as noted.
- c. Telephone wiring, terminals and instruments.

5. Materials

- a. Conduit: Rigid galvanized throughout. Conduits buried underground or below floor slabs to have all threads red lead coated before assembly. See support requirements above. Flexible metallic conduit will be permitted only where required for flexibility, as at motors or controls, in lengths up to nominally 18 inches, using jacketed waterproof type equal to Sealtite with T. & B. watertight fittings.

- b. Boxes: Cast galvanized, equal to Crouse Hinds "Condulets" or Appleton "Unilets", threaded hubs for exposed wiring. Concealed or embedded boxes for interior work may be 4 inch octagon for lighting outlets and 4 inch square for receptacles and switch devices, galvanized pressed steel.
- c. Tumbler Switches: P. & S. No. 20 AC, 20 ampere, 277 volt rated or equal.
- d. Receptacles: Bryant No. 5252, 2 wire, 3 pole, grounding type.
- e. Plates: Galvanized steel for interior surface outlets, or stainless steel for flush devices. Device covers exposed to weather or excess moisture shall be cast, gasketed, weatherproof type, equal to Crouse Hinds.
- f. Safety Switches: Type ND, enclosed, H.P. rated. Enclosures to be weatherproof when installed out of doors or where subject to moisture.
- g. Fuses: Time lag, one time type
- h. Panel Assemblies: Circuit breaker type with bolted bus connections. Lighting panelboards to be type "NLAB". Provide protected typewritten circuit schedules in each panelboard accounting for every breaker and provide engraved phenolic nameplates at each panel corresponding with similar nameplate at the feeder breaker. All lugs, except at load terminals of molded case breakers, shall be pressure tool set, equal to Burndy Hydent.
- i. Transformers: Dry, air cooled, single phase, 480/120-240 volt with two 2½ percent full capacity taps below 480 volts, Class "H" insulated with maximum rated temperature rise of 80 degrees Centigrade.
- j. Wire: Copper, all type "RHW" insulated. Minimum size No. 12 except No. 14 may be used for control circuits.

6. Service

- a. Provide a new master service in the blower and pump building, as shown for 277/480 volt, 4 wire, 3 phase "wye" system, with solid grounded neutral. Service to be run underground to the new power pole and up the pole nominally 25 feet as directed by the serving agency. Distribution to the various buildings shall be as shown on the drawings, all underground, using rigid galvanized conduits with joints red leaded before assembly.
- b. Service equipment shall be molded case, air circuit breakers as shown on the riser diagram, bolted type construction. Service assembly may be combined with the motor control center. Each breaker shall be identified with an engraved phenolic nameplate clearly indicating the panel or load served.
- c. Provide system neutral and equipment grounding in accord with Code rules to cold water piping. Secondary neutrals of each dry transformer shall be similarly grounded.

- d. Provide a blank conduit with weatherhead and a weatherproof two socket meter cabinet having two 13 jaw sockets as designated by the serving agency, installed as directed on the Power Company pole. Provide a ground bond to the power service conduit to ground the metering conduit and enclosure. Meters, wiring and accessory devices will be installed by others to complete the metering.
- e. Temporary service shall be maintained until the new permanent power source is connected to the existing digester plant as a part of this work. Temporary interruptions or shut downs will be permitted for such period and at such times that operation of the existing plant is not impaired, subject to the approval of the Engineer.

7. Equipment Connections

- a. It is the intent hereunder to provide the electrical connections complete to each item of equipment or control requiring such connection which is indicated on the drawings or specified herein, including all incidental devices, fittings, materials and labor necessary. Methods and sequences of control and operation are specified under other divisions of the specifications and indicated or scheduled on the drawings. These shall be closely followed and the completed installation shall properly operate as directed by the Engineer. Phase rotation shall be made correct to provide proper operation of each motor driven unit.
- b. Pumps will be furnished with motors and set in place under another division of the work. Connections to be made hereunder, using waterproof flexible connections. Sump pumps will be set in place under another division of the work but installation of proper cord caps and receptacles will be a part of this work.
- c. Provide the electrical connections complete to each flow recorder as indicated by the drawings. Recorders and measuring devices by others.
- d. Furnish and install the weatherproof pushbuttons at the outdoor motors indicated, equal to Square D, Class 9001, Catalog GD-29, securely mounted to prevent turning or displacement.
- e. Float switch and sludge pump timer shall be furnished, mounted and electrically connected complete under this work.

8. Motor Control Centers

- a. Provide motor control centers containing the units shown on the drawings, in general purpose enclosures, N.E.M.A. Class 1, type C construction, equal to Square D or Allen-Bradley.
- b. Disconnect devices shall be air circuit breakers, equipped for multiple padlock locking, sized to permit cross-line starting of the motor and equipment shown.
- c. Starters shall be provided for the respective motor loads indicated. Each starter shall be equipped with three thermal overload devices, one in each

phase. Thermal elements shall be coordinated with the motor nameplate running current and shall operate at 125 percent of the nameplate current. Holding coils and control circuits are to be 240 volts with control energy derived from the lighting panels.

- d. Each starter unit shall be equipped with a thermal reset button and a hand-off automatic selector switch, cover mounted. Starters operated by remote pushbutton stations shall also be equipped with start-stop pushbuttons in the cover.
- e. Each starter unit shall be provided with an engraved phenolic nameplate clearly indicating the load served, permanently attached.
- f. Wherever practicable, panels, transformers and motor control centers should preferably be made up as single assemblies.
- g. Three existing three-phase motors are to be reconnected for 480 volt, 3 phase operation as a part of this work. Starters are provided for these motors in the plan schedule. Motor rotation shall be checked and the motors left running in the proper direction.

9. Telephone Provisions

- a. Provide the system of blank conduits and outlets shown for telephone use in the new digester building.
- b. Telephone service will be brought to the building underground by direct burial cable which will be installed by the Telephone Company in the trenches provided under this work. All necessary trenching from the building to the utility pole, including backfill, shall be provided under this work. In general, the necessary trenching will follow the underground electrical conduit routings as indicated on the electrical plot plan. Trenches shall be a minimum of 24 inches below finish grade for both telephone and power, with width enough to allow a separation of at least 18 inches below power conduit and the telephone cable.
- c. It shall be this contractor's responsibility to notify the West Coast Telephone Company ten days before the trench will be clear and ready for them to install their cable, which will be done only after all electrical work has been installed. Backfilling shall not be started until the telephone cable is in place.
- d. Outlets shall be 4 inch square boxes with one gang covers and bushed, stainless steel, telephone finish plates.

10. Electric Heating

- a. Provide the electric unit heaters shown complete with line voltage thermostat controls, all for 277 volt, single phase operation.
- b. Heaters to be similar and equal to Chromalox type LUH-50-241 for ceiling mounting.
- c. Thermostats to be rated 18 amperes at 277 volts, two pole, similar and equal to Chromalox type WT-16T2, mounted 5 feet above the floor.

- d. Connection of the gas boiler in the new digester building including boiler controls is not required under this work. Connection of the control circuit for the 5 h.p. sludge recirculating pump to the auxiliary contacts provided on the modulating control as indicated on the electrical drawings is a part of this work.

11. Lighting Fixtures

- a. Lighting fixtures complete with lamps shall be furnished and installed. Fixtures shall be those specifically named or similar and equal units approved by the Engineer. Furnish all incidental devices, material and labor necessary for a proper complete installation.
- b. Lamps, 120 volt, inside frosted "Maxda" quality.
- c. Fixtures shall all be clean and in operation at time of acceptance of the work.
- d. Fixture Types:
 - "A" All white, slotted neck, R.L.M. dome reflector on box cover, equal to Abolite or Benjamin.
 - "B" W.P. cast metal bracket, assymetric hinged refractor, Holographane No. 415
 - "C" Island light assemblies as detailed and noted on the drawings
 - "D" Two lamp fluorescent, enclosed with prismatic plastic, having 10 percent or more uplight, C.B.M. labelled ballast with integral thermal protector or fused primary, Globe No. P-3002 mounted on 12 inch stems with aligners.
 - "F" Ceiling mounted downlight, aluminum finish, equipped with 150 watt R-40 reflector flood lamp, Prescolite No. 7071.
 - "G" Wall bracket, opal globe, Prescolite No. WB-2 with WG-6 guard.

SECTION B - PUMPING STATION SPECIFICATIONS

1. General

The Contractor shall furnish and install one complete factory built, automatic, steel fabricated, underground pumping station at location shown on plans. Clearing and grading for the access roadway will be required. A 6' 0" inside diameter wet well shall be also included in this contract.

2. Clearing and Grubbing

The Contractor shall remove and dispose of roots, stumps, trees and brush within the limits indicated on plans. Spoiled material and debris shall be burned or hauled away, subject to approval of the Engineer. Area to be excavated shall be stripped clean prior to excavation.

3. Pumping Station Excavation and Backfill

Material excavated for the pumping station shall not be classified for quality of material or presence of water. All structural and trench excavation, whether for pipe lines, footings, slabs, etc. shall be bid as one item. The bid price for excavation shall include backfilling and grading around the pumping station and the spreading of excess material as directed by the Engineer. The bid price for excavation shall cover and absorb the cost of pumping, draining and otherwise taking care of any water encountered. It shall also cover the cost of providing, placing and removing any sheeting, bracing or shoring if any is required.

Excavation for the bottom slab sections and wall footings shall be made accurately to lines and slopes shown on the plans or as staked on the ground. Except with special written permission by the Engineer, excavation by machinery shall not be carried closer than three inches (3") above the neat lines of the finished excavation and the remainder shall be finished by hand. Any excavation inadvertently carried below grade shall be replaced with compacted gravel or crushed rock at the expense of the Contractor.

The pumping station site shall be graded to smooth, compact surfaces and drainage ditches shall be provided in conformity with the plans.

4. Roadway Excavation and Grading

Excavation for roadway shall conform to limits indicated on plans. Subgrade shall be 8" below the finish grade as shown on drawings. Excavated material shall be used for fill around the pumping station. Fill material shall be free of trees, roots, sod, or muck and shall be compacted with approved equipment. Cut slopes along each side of the roadway shall be finished in a neat appearance.

5. Fabricated Steel Pumping Station

A. Structural - Station shall be shipped in two sections and joined by welding at job site. Each section shall be a rolled and welded cylinder of the following sizes:

B. Pumps - Station shall be equipped with two (2) Wemco torque flow pumps to meet the following specifications:

C. Motors - Pumps shall be driven by ventilated, vertical solid shaft, 400° C. rise, squirrel cage electric motors of the following characteristics:

D. Electrical Controls - All controls shall be mounted within separate N.E.W.A. 1 enclosures and securely mounted to station wall. The following controls are to be included:

E. Auxiliary Equipment - The following auxiliary equipment shall be furnished and installed in the pump station:

PS - 2

F. Pump Piping - Suction and discharge lines shall be Class 150 cast iron pipe. Fittings, valves, couplings and hangers shall be installed as indicated on plans.

G. Painting - The entire chamber and access tube shall be sand-blasted inside and out. The following protective coating shall be factory applied prior to shipment:

Outside and inside of pump chamber and access tube.....	2 coats Amercoat No. 78 Epoxy Resin, 30 mills min. dry film thickness
Piping, pumps, equipment, controls, etc.....	1 coat of high grade primer 2 coats of high grade machinery enamel
Floor.....	Heavy rubber non-slip mat

The Contractor shall retouch all outside walls and projections after welding to the satisfaction of the Engineer.

H. Electric Wiring - The pump station shall be completely wired in rigid conduit at the factory in accordance with the National Electric Code. Feeder conduit shall be brought from a service pole with a meter and a weatherproof disconnect switch to the station. Wiring and conduit shall be provided from the pump control to the electrical panel.

6. Wet Well

A 6' 0" inside diameter manhole shall be provided as the wet well for the pumping station. Bottom of manhole shall be filled with class "4" concrete to provide 1:1 slope. A precast concrete slab with cast iron manhole cover and frame shall be set over the manhole. Two 8" concrete stubouts with plugs shall be provided.

7. Pump Controls

The pumps shall be automatically controlled by a Healy-Ruff RS-3 Rototrol or Auto Con Liftrol with 2-pump alternator and automatic second pump cut-in for parallel operation. The controls shall be for 110 V. A.C. and shall have N.E.M.A. 1 enclosure. A time delay device shall be incorporated for recharging the compression pipe. A high water alarm circuit shall be included.

The control equipment shall be mounted on a frame directly over the 8" compression tube in the wet well. A substantial galvanized sheet metal cover with locking device shall be furnished for protection of the equipment.

8. Clean-up

The Contractor shall place the pumping station site in a neat and finished appearance. Form lumber, waste material and debris shall be removed, burned, or disposed of as directed by Engineer.

9. Guarantee

All equipment, materials and workmanship shall be guaranteed for one year following acceptance.

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 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, 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, underground 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 elevations 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.

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 subbase and surfacing material shall be replaced, using the same or greater thicknesses. 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 the cut and tunnel method, he shall be allowed for replacing 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 open up holes when he is 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 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"	21"	3' - 6"
6"	2' - 0"	24"	3' - 10"
8"	2' - 0"	27"	4' - 2"
10"	2' - 2"	30"	4' - 6"
12"	2' - 5"	33"	4' - 10"
14"	2' - 8"	36"	5' - 0"
15"	2' - 9"	42"	5' - 6"
16"	2' - 10"	48"	6' - 0"
18"	3' - 1"		
20"	3' - 6"		

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.

The cut and tunnel method of excavation may be used unless special conditions make it undesirable or impractical, as determined by the Engineer. Under the latter method, tunnels shall not exceed five feet (5') in length, and shall in no case cover a tee branch. All tunnels must be high enough to permit proper work and easy inspection and the roof shall be sloped upward to the adjoining trench sufficient to allow proper placing of backfill 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 resorted 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 is 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 and 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 sand 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 sand and gravel 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, insofar as it is practical to do so, remove all timber 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 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.

Both pipe and gaskets shall be approved by the Engineer, and pipe 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.

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.

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 water tight closure.

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 accomplished 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.

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 completion 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 Engineer, 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 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 dumped at locations determined or approved by the Engineer.

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 (1.5) barrels of cement per cubic yard. Steel forms, or wooden sectional forms covered with sheet metal shall be used for the inside of the manhole. 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. No pre-cast concrete manholes shall be approved unless one side of the finished structure provides a vertical face for entry and exit, and provided further that the manhole frame and cover design and size of opening conform to the plans. Sections of pre-cast concrete manholes shall be carefully mortared together in place to secure absolute water tightness.

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. Water Tightness 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 the test, 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 6 feet over the invert. The head shall be maintained until full absorption has taken place, and then for a further minimum period of 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 re. 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 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, 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 Line

Pressure line shall be either Class 150 cast iron, mechanical joint pipe with 1/16" cement lining, or Class 150 asbestos cement pipe with rubber ring gasket couplings. Fittings shall be cast iron cement lined with ends suitable for direct reception of the type of pipe to be used.

All pipe shall be laid and maintained to the required lines and grades. Minimum depth of pipe cover shall be 36 inches. Pipe shall not be deflected either vertically or horizontally in excess of that recommended by the manufacturer. Concrete kickblocks for resisting unbalanced thrust at fittings shall be provided as indicated on plans.

Pressure pipe line shall be tested under a pressure of 50 lbs. per square inch and pipe line shall hold such pressure without loss for a period of 30 minutes. Permissible leakage shall not exceed 37 gallons per 24 hours per mile per inch diameter of pipe.

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. Water for testing shall be furnished by the Owner.

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 mechanical joint, with 1/16" cement lining. Pipe shall be securely anchored to top of piers with galvanized 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. Clean-up

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.

BASIS OF PAYMENT

Section A - Treatment Plant

1. Clearing and Grubbing - lump sum
2. Site Grading - per cubic yard of original excavated material and shall include placing and compacting such material in fill, embankment and final grading. Structural and trench excavation excluded from this item.
3. Furnish, Haul and Place Fill Material - per cubic yard of fill material obtained from borrow area as indicated on plans and shall include placing and compacting.
4. Structural and Trench Excavation, Common - per cubic yard measured from either original surface or site graded surface, whichever is lower. For structural excavation, pay quantity calculated to vertical planes one foot outside of exterior walls of structures. For trench excavation, pay widths in accordance with size of pipe.
5. Class "6" Concrete - per cubic yard in place and called for in the plans. Price shall include keyways, construction joints and any galvanized iron water stops required.
6. Class "4" Backfill Concrete - per cubic yard in place and called for by Engineer
7. Reinforcing Steel - per pound in place and called for in plans
8. Structural Steel and Iron Work - lump sum
9. Comminutor - lump sum complete with factory finish paint, motor starter and wiring excluded.
10. Primary Settling Tank Equipment - lump sum complete with scum skimmer, motor starter and wiring excluded
11. Aeration Tank Equipment - lump sum complete, motor starter and wiring excluded
12. Final Clarifier Equipment - lump sum complete, motor starter and wiring excluded
13. Digester Floating Cover - lump sum
- 13 Alt. Alternate Digester Floating Cover - lump sum
14. Digester Roof - lump sum complete including decking, roofing and flashings
15. Blower and Accessories - lump sum complete, motor starter and wiring excluded
16. Sludge Pump - lump sum complete, motor starter and wiring excluded

17. Sludge Recirculation Pump - lump sum complete; motor starter and wiring excluded
18. Return Sludge Pump - lump sum complete; motor starter and wiring excluded
19. Flow Recorders - per each complete in place
20. Remove and Reinstall Existing Flow Recorder - lump sum complete including guide pulleys
- 21, 22, General Outside Piping - per lineal foot; including fittings, valves, valve
23, 24, boxes, couplings, etc. for underground sewer lines and pressure lines
25, 26 outside of building and tank structures. Bid price shall include connections to existing piping and temporary by-pass. Measurement shall include length of fittings and valves.
27. Sewage and Sludge Piping - lump sum complete including exposed piping, valves, fittings, couplings, swing joints, telescopic valve, sludge heater, head gate, shear gates, mud valve, etc. inside & outside of buildings and tanks. This item shall also include connections to and alteration of existing piping in the control room; excludes gas piping, water piping, plumbing, and chlorination piping.
28. Sludge Gas Piping and Equipment - lump sum complete with all pipe equipment. Alteration of existing piping included.
29. Air Piping - lump sum complete
30. Natural Gas Piping - lump sum complete. Meter and pressure regulator furnished and installed by gas company.
31. Plant Water Piping - lump sum complete including spray nozzles, vacuum breaker, hose bibbs and supports, etc. Excludes plumbing in building.
32. Chlorination Piping - lump sum complete
33. Drainage Piping - lump sum complete for all concrete drain pipes and corrugated metal pipe
34. Carpentry Work - lump sum complete for all woodwork, including sheetrock partitions, counter tops, removing of cupboards and cabinets in existing control building
35. Aluminum Windows - lump sum complete including hardware, caulking, glazing, and cleaning.
36. Metal Doors and Louvers - lump sum complete including frame, hardware, calking, glazing, screens, etc.
37. Wood Cabinets - lump sum
38. Plumbing - lump sum including all hot and cold water piping inside buildings, countertop sink, service sink, shower stall, sump pumps, hot water heater, floor drainage.

39. Boiler, Steam Piping and Controls - lump sum including boiler, accessories, temperature controller, motorized valve, steam piping and water hook-ups. Thermometer installation included in this item.
40. Electrical Work - lump sum including furnishing and installing all equipment, motor starting gear and controls, all wiring conduit and fixtures, all connections to equipment and recording devices.
41. Roof Coating - lump sum
42. Expansion-Contraction Joints - per lineal foot
43. Pre-formed Expansion Joints - per lineal foot
44. Copper Construction Joints - per lineal foot
45. Tile Work in Laboratory - lump sum including rubber base
46. Fence Installation - lump sum including removal of existing fence and erection of new fence. Salvable parts of existing fence shall be used in the new fence.
47. Crushed Rock or Gravel Road Base - per cubic yard in place measured in road base and as shown on plans
48. 3/4" Minus Crushed Rock for Road Top Course - per cubic yard in place and as shown on plans
49. Pit Run Sand and Gravel Backfill - per cubic yard compacted in place as shown on plans or as ordered by the Engineer.
50. Painting - lump sums
51. Tools - lump sum for all tools listed under Equipment Section
52. Office Furniture - lump sum
53. Laboratory Equipment - lump sum

Section B-1 - Pumping Station

1. Clearing and Grubbing - lump sum
2. Pumping Station Excavation and Backfill - lump sum
3. Roadway Excavation and Grading - lump sum for excavation, fill and compaction, grading and drainage ditches
4. Concrete Foundation - lump sum for all concrete and reinforcing steel in place including Class "4" concrete for anchoring down pumping station
5. Fabricated Steel Pump Station - lump sum complete in place including pump chamber, access tube and ladder, pumps, pipe, fittings, valves, sump pump, ventilating blower, dehumidifier, electrical control panel, painting, etc.
6. Wet Well Manhole - lump sum complete in place including Class "4" concrete fillet, precast concrete cover, cast iron manhole cover and frame, galvanized rungs, and concrete pipe stubouts.
7. Pump Control - lump sum including mounting stand and galvanized sheet metal cover
8. Electrical Work - lump sum complete including service from pole to pumping station, and wiring and conduit between pump control and electrical panel
9. Piping Work Outside of Fabricated Pumping Station - lump sum complete in place including 6" C.I. pipe between wet well and pumping station, 1 1/4" galvanized sump pump discharge, 8" compression tube in wet well, 1/4" piping to pump control and 8" overflow pipe
10. Roadway Base Rock - per cu.yd.
11. 3/4" Minus Finish Gravel - per cu. yd.
12. Backfill Gravel - per cu. yd.

Section B-2 - Interceptor Sewers & Pressure Line

1. Trench Excavation & Backfill, Common - per cubic yard using pay widths in Item 7, page SS-5; includes compaction to point 6" above top of pipe
2. Trench Excavation & Backfill, Solid Rock - per cubic yard using pay widths in Item 7, page SS-5; includes compaction with common material to point 6" above top of pipe
- 3, 4 & 5. Cut and Restore Pavement - per square yard, using pay width in Item 7, page SS-5; price includes cost of furnishing and placing base rock for pavement
6. Crushed Rock or Gravel Bedding - per cubic yard; maximum pay width shall not exceed trench pay width
7. Pit Run Sand and Gravel Backfill - per cubic yard in place based upon excavation pay width; price includes compaction
- 8, 9. Concrete Sewer Pipe - per lineal foot in place, excluding wyes, tees
10. 10" Cast Iron Pipe on Piers - per lineal foot in place, price includes fittings and kickblocks
- 11, & 11 Alt. 10" Asbestos Cement or Cast Iron Pressure Pipe - per lineal foot in place; price includes fittings and kickblocks
12. Concrete Tees - per each in place, includes length of pipe in which connection is installed and plug in side connection
- 13 & 14. Concrete Plugs - per each in place
15. Manholes - per each complete for depths of 8 ft. to flow line; excavation paid as trench excavation
16. Extra Manhole Depth - per foot of depth below 8 ft.; excavation paid as trench excavation
17. Cutting-in Existing Manhole - per each
18. Concrete Pier Base - per each in place complete; price includes concrete reinforcing steel and excavation; anchor strap, bolts and redwood blocking at top of pier also included.
19. Concrete Pier Column - per foot in place
20. Concrete Collars - per each in place
21. Railroad Crossing - lump sum
22. 4" Vent Assembly - lump sum; price includes 4" C.I. pipe and fitting 10" x 6" concrete tee, and backfill concrete.

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PROPOSAL

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, after signing the contract, within the number of calendar days set forth hereunder for the various sections bid:

<u>Section A - Treatment Plant</u>	<u>270</u>	Days
<u>Section B - Pumping Station, Interceptor Sewers, and Pressure Line</u>	<u>180</u>	Days

Should the Bidder fail to complete the work within the time limits set forth above, liquidated damages shall be deducted from moneys otherwise due the Contractor in accordance with the following schedule: Section A (Treatment Plant) \$100 per day; Section B (Pumping Station, Interceptor Sewers & Pressure Line) \$50 per day.

Accompanying this proposal is a certified check, cashier's check or bid bond drawn on Maryland Casualty Company of Baltimore, Md. in the amount of 5% of amount of bid guaranteeing that the Bidder shall enter into a contract for the work if so awarded by the City.

SECTION A - Treatment Plant

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
1. <u>Clearing and Grubbing, the lump sum of <u>Eight</u></u> <u>Hundred Sixty & no/100</u> Dollars (\$ <u><u>860.00</u></u>)			\$ <u><u>860.00</u></u>
2. <u>Site Grading, the sum of</u> _____ _____ Dollars (\$ _____) per cu.yd.			<u><u>OMIT</u></u>
3. <u>Furnish,</u> <u>Haul and Place Fill Material, the sum of</u> _____ <u>One and 40/100</u> Dollars (\$ <u><u>1.40</u></u>) per cu. yd.		8,000	<u><u>11,200.00</u></u>
4. <u>Structural & Trench Excavation, Common Material,</u> the sum of <u><u>Two and 10/100</u></u> _____ Dollars (\$ <u><u>2.10</u></u>) per cu. yd.		1,900	<u><u>3,990.00</u></u>
5. <u>Class "6" Concrete in place, the sum of <u>Sixty-</u></u> <u>four and no/100</u> Dollars (\$ <u><u>64.00</u></u>) per cu. yd.		825	<u><u>52,800.00</u></u>
6. <u>Class "4" Concrete Backfill, the sum of <u>Forty-</u></u> <u>eight and no/100</u> Dollars (\$ <u><u>48.00</u></u>) per cu. yd.		20	<u><u>960.00</u></u>
7. <u>Reinforcing Steel in place, the sum of</u> _____ <u>Fifteen and one-half</u> Cents (\$ <u><u>0. 15</u></u>) per lb.		120,000 ✓	<u><u>18,600.00</u></u>
8. <u>Structural Steel, Iron and Metal Work Complete,</u> <u>with piping support tower in digester furnished</u> <u>with truss-type cover, the lump sum of</u> <u><u>Seven Thousand Nine Hundred Fifty-eight and</u></u> <u>no/100</u> Dollars (\$ <u><u>7,958.00</u></u>)			<u><u>7,958.00</u></u>

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
8. <u>Structural Steel, Iron and Metal Work Complete,</u> (Alt.) <u>with piping support brackets in digester fur-</u> <u>nished with buoyant-type cover, the lump sum of</u> <u>Seven Thousand Six Hundred Forty-Eight and</u> <u>no/100</u> Dollars (\$ <u>7,648.00</u>)		\$	<u>7,648.00</u>
9. <u>Comminutor, Complete in place, the lump sum of</u> <u>Three Thousand Six</u> <u>Hundred and no/100</u> Dollars (\$ <u>3,600.00</u>) Equipment manufactured by <u>Worthington</u>			<u>3,600.00</u>
10. <u>Primary Settling Tank Equipment, Complete in</u> <u>Place, the lump sum of</u> <u>Three Thousand Seven</u> <u>Hundred Fifty and</u> <u>no/100</u> Dollars (\$ <u>3,750.00</u>) Equipment manufactured by <u>Chain Belt</u>			<u>3,750.00</u>
11. <u>Aeration Tank Equipment, Complete in place,</u> the lump sum of <u>Three Thousand One Hundred</u> <u>and no/100</u> Dollars (\$ <u>3,100.00</u>) Equipment manufactured by <u>Mixco</u>			<u>3,100.00</u>
12. <u>Final Clarifier Equipment, Complete in place,</u> the lump sum of <u>Seven Thousand Five Hundred</u> <u>Thirty-four and no/100</u> Dollars (\$ <u>7,534.00</u>) Equipment manufactured by <u>Dorr-Oliver</u>			<u>7,534.00</u>
13. <u>Truss-type Digester Floating Cover, Complete in</u> <u>Place, the lump sum of</u> <u>Twelve Thousand One Hundred</u> <u>Eleven and no/100</u> Dollars (\$ <u>12,111.00</u>)			<u>12,111.00</u>

SECTION A

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
13. <u>Buoyant-type Digester Floating Cover, Complete</u> (Alt.) <u>in Place, the lump sum of</u> <u>Twelve Thousand Nine</u> <u>no/100</u> <u>Hundred Forty-three & /</u> Dollars (<u>\$ 12,943.00</u>)		\$	<u>12,943.00</u>
14. <u>Digester Roof for Truss-type Cover, Complete,</u> <u>the lump sum of</u> <u>Two Thousand Nine Hundred</u> <u>and no/100</u> Dollars (<u>\$ 2,900.00</u>)			<u>2,900.00</u>
15. <u>Blowers and Accessories, Complete in Place, the</u> <u>lump sum of</u> <u>Four Thousand and no/100</u> Dollars (<u>\$ 4,000.00</u>) <u>Equipment manufactured by</u> <u>Sutorbelt</u>			<u>4,000.00</u>
16. <u>Sludge Pump Complete in place, the lump sum of</u> <u>One Thousand Five</u> <u>Hundred and no/100</u> Dollars (<u>\$ 1,500.00</u>) <u>Pump Manufactured by</u> <u>Carter or Marlow</u>			<u>1,500.00</u>
17. <u>Sludge Recirculation Pump Complete in Place,</u> <u>the lump sum of</u> <u>Eight Hundred Fifty and</u> <u>no/100</u> Dollars (<u>\$ 850.00</u>) <u>Pump manufactured by</u> <u>Wemco</u>			<u>850.00</u>
18. <u>Return Sludge Pump, Complete in Place, the</u> <u>lump sum of</u> <u>Twelve Hundred and no/100</u> Dollars (<u>\$ 1,200.00</u>) <u>Pump manufactured by</u>			<u>1,200.00</u>

SECTION A

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
19. <u>Flow Recorders, Complete in Place, the sum of</u> <u>One Thousand Thirty-</u> <u>four and no/100</u> Dollars (\$ <u>1,034.00</u>) each Equipment Manufactured by <u>Chronoflo</u>		3	\$ <u>3,102.00</u>
20. <u>Remove and Reinstall Existing Flow Recorder, the</u> <u>lump sum of</u> <u>Four Hundred Forty and no/100</u> Dollars (\$ <u>440.00</u>)			<u>440.00</u>
21. <u>18" Concrete Sewer Pipe and Fittings, In Place,</u> <u>the sum of</u> <u>Five and 60/100</u> Dollars (\$ <u>5.60</u>) per lin. ft.		60	<u>336.00</u>
22. <u>10" Concrete Sewer Pipe and Fittings, In Place,</u> <u>the sum of</u> <u>Three and 50/100</u> Dollars (\$ <u>3.50</u>) per lin. ft.		150	<u>525.00</u>
23. <u>18" Concrete Cylinder Pipe and Fittings, In Place,</u> <u>the sum of</u> <u>Thirty-four and no/100</u> Dollars (\$ <u>34.00</u>) per lin. ft.		275 225	<u>9,350.00</u>
24. <u>8" Cast Iron Pipe and Fittings / In Place, the sum</u> <u>of</u> <u>Thirteen and no/100</u> Dollars (\$ <u>13.00</u>) per lin. ft.	<u>& Valves,</u>	150	<u>1,950.00</u>
25. <u>6" Cast Iron Pipe, Fittings and Valves, In</u> <u>Place, the sum of</u> <u>Seventeen and 85/100</u> Dollars (\$ <u>17.85</u>) per lin. ft.		280	<u>4,998.00</u>

SECTION A

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
26. <u>4" Cast Iron Pipe and Fittings, In Place, the</u> <u>sum of</u> <u>Six and 40/100</u> <u>Dollars (\$ 6.40)</u> <u>per lin. ft.</u>		95	<u>608.00</u>
27. <u>Sewage and Sludge Piping, Complete in Place,</u> <u>(with sludge piping in digester for truss-type</u> <u>cover), the lump sum of</u> <u>Five Thousand One</u> <u>Hundred and no/100</u> <u>Dollars (\$5,100.00)</u>			<u>5,100.00</u>
27. <u>Sewage and Sludge Piping, Complete in Place,</u> <u>(Alt.) (with sludge piping in digester for buoyant-</u> <u>type cover), the lump sum of</u> <u>Four Thousand</u> <u>Seven Hundred & no/100</u> <u>Dollars (\$ 4,700.00)</u>			<u>4,700.00</u>
28. <u>Sludge Gas Piping and Equipment, Complete In</u> <u>Place, (with sludge gas piping in digester for</u> <u>truss-type cover), the lump sum of</u> <u>One Thousand</u> <u>and no/100</u> <u>Dollars (\$ 1,000.00)</u>			<u>1,000.00</u>
28. <u>Sludge Gas Piping and Equipment, Complete In</u> <u>(Alt.) Place, (with sludge gas piping in digester for</u> <u>buoyant cover), the lump sum of</u> <u>Nine Hundred</u> <u>and no/100</u> <u>Dollars (\$ 900.00)</u>			<u>900.00</u>
29. <u>Air Piping, Complete In Place, the lump sum of</u> <u>Five Thousand Nine</u> <u>Hundred and no/100</u> <u>Dollars (\$ 5,900.00)</u>			<u>5,900.00</u>
30. <u>Natural Gas Piping, Complete in Place, the lump</u> <u>sum of</u> <u>Two Thousand and no/100</u> <u>Dollars (\$ 2,000.00)</u>			<u>2,000.00</u>

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
31. <u>Plant Water Piping, Complete in Place, the lump</u> <u>sum of</u> <u>One Thousand One Hundred and no/100</u> <u>Dollars (\$ 1,100.00)</u>		\$	<u>1,100.00</u>
32. <u>Chlorination Piping, Complete in Place, the lump</u> <u>sum of</u> <u>Four Hundred Fifty and no/100</u> <u>Dollars (\$ 450.00)</u>			<u>450.00</u>
33. <u>Drainage Piping, Complete in Place, the lump sum</u> <u>of</u> <u>Five and no/100</u> <u>One Hundred Seventy</u> <u>Dollars (\$ 175.00)</u>			<u>175.00</u>
34. <u>Carpentry Work, the lump sum of</u> <u>Six Hundred</u> <u>Forty and no/100</u> <u>Dollars (\$ 640.00)</u>			<u>640.00</u>
35. <u>Aluminum Windows, Complete, the lump sum of</u> <u>Three</u> <u>Hundred Twenty & no/100</u> <u>Dollars (\$ 320.00)</u>			<u>320.00</u>
36. <u>Metal Doors and Louvers, Complete, the lump sum</u> <u>of</u> <u>One Thousand Four Hundred and no/100</u> <u>Dollars (\$ 1,400.00)</u>			<u>1,400.00</u>
37. <u>Wood Cabinets, the lump sum of</u> <u>One Thousand</u> <u>Three Hundred and no/100</u> <u>Dollars (\$ 1,300.00)</u>			<u>1,300.00</u>
38. <u>Plumbing, the lump sum of</u> <u>Two Thousand Three</u> <u>Hundred Fifty & no/100</u> <u>Dollars (\$ 2,350.00)</u>			<u>2,350.00</u>
39. <u>Boiler, Steam Piping and Controls, Complete, the</u> <u>lump sum of</u> <u>Two Thousand Five Hundred Fifty</u> <u>and no/100</u> <u>Dollars (\$ 2,550.00)</u>			<u>2,550.00</u>

SECTION A

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
40. <u>Electrical Work, Complete, the lump sum of</u> <u>Nine Thousand Eight Hundred Fifty and</u> <u>no/100</u> Dollars (\$ <u>9,850.00</u>)		\$	<u>9,850.00</u>
41. <u>Roof Coating, Complete, the lump sum of</u> <u>Three</u> <u>Hundred Fifty and no/100</u> Dollars (\$ <u>350.00</u>)			<u>350.00</u>
42. <u>Expansion-Contraction Joints, the sum of</u> <u>No and 80/100</u> Dollars (\$ <u>0.80</u>) per lin. ft.		130	<u>104.00</u>
43. <u>Pre-formed Expansion Joints, the sum of</u> <u>One and no/100</u> Dollars (\$ <u>1.00</u>) per lin. ft.		245	<u>245.00</u>
44. <u>Copper Construction Joints, the sum of</u> <u>Three and no/100</u> Dollars (\$ <u>3.00</u>) per lin. ft.		50	<u>150.00</u>
45. <u>Tile Work in Laboratory, the lump sum of</u> <u>One</u> <u>no/100</u> Dollars (\$ <u>168.00</u>) <u>Hundred Sixty-eight & /</u>			<u>168.00</u>
46. <u>Fence Installation, the lump sum of</u> <u>One Thousand</u> <u>Two Hundred Ninety</u> Dollars (\$ <u>1,290.00</u>) <u>and no/100</u>			<u>1,290.00</u>
46a. <u>Additional Length of Fence, the sum of</u> <u>Two and 30/100</u> Dollars (\$ <u>2.30</u>) per lin. ft.		70	<u>161.00</u>
47. <u>Crushed Rock or Gravel Road Base, the sum of</u> <u>Five and no/100</u> Dollars (\$ <u>5.00</u>) per cu. yd.		100	<u>500.00</u>
48. <u>3/4" Minus Crushed Rock for Road Top Course,</u> the sum of <u>Six and no/100</u> Dollars (\$ <u>6.00</u>) per cu. yd.		35	<u>210.00</u>

SECTION A

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Amount</u>
49. <u>Pit Run Sand and Gravel Backfill, the sum of</u> <u>Three and no/100</u> Dollars (\$ <u>3.00</u>) per cu. yd.		90	\$ <u>270.00</u>
50. <u>Painting</u>			
A. <u>Exterior Concrete, above grade, the lump</u> <u>sum of One Thousand Rfn Four Hundred</u> <u>Eleven and no/100</u> Dollars (\$ <u>1,411.00</u>)			<u>1,411.00</u>
B. <u>Interior Concrete, Non-submerged, walls</u> <u>and ceilings in all buildings, the lump</u> <u>sum of One Thousand Six Hundred Eighteen</u> <u>and no/100</u> Dollars (\$ <u>1,618.00</u>)			<u>1,618.00</u>
C. <u>Interior Concrete, Submerged, the lump sum</u> <u>of One Thousand Seven Hundred Eighty-</u> <u>seven and no/100</u> Dollars (\$ <u>1,787.00</u>)			<u>1,787.00</u>
D. <u>Submerged Metal, including truss-type di-</u> <u>gester cover, the lump sum of Two Thousand</u> <u>Five Hundred Sixty-</u> <u>four and no/100</u> Dollars (\$ <u>2,564.00</u>)			<u>2,564.00</u>
D. <u>Submerged Metal, including buoyant-type di-</u> <u>(Alt.) gester cover, the lump sum of Two Thousand</u> <u>One Hundred Thirty-</u> <u>seven and no/100</u> Dollars (\$ <u>2,137.00</u>)			<u>2,137.00</u>
E. <u>Non-submerged Metal, not galvanized, the</u> <u>lump sum of Six Hundred Fifty-one and</u> <u>no/100</u> Dollars (\$ <u>651.00</u>)			<u>651.00</u>

SECTION A

<u>Item</u>	<u>Unit Price</u>	<u>Estimated Quantity</u>	<u>Estimated Total</u> \$
F. <u>Non-submerged Metal, galvanized, the</u> lump sum of <u>Two Hundred Seventy</u> <u>and no/100</u> Dollars (\$ <u>270.00</u>)			<u>270.00</u>
G. <u>Indoor Wood and Wallboard, the lump sum of</u> <u>Two Hundred Seventy-eight and no/100</u> Dollars (\$ <u>278.00</u>)			<u>278.00</u>
51. <u>Tools, the lump sum of</u> <u>Two Hundred Ten and</u> <u>no/100</u> Dollars (\$ <u>210.00</u>)			<u>210.00</u>
52. <u>Office Furniture, the lump sum of</u> <u>Two Hundred</u> <u>Forty and no/100</u> Dollars (\$ <u>240.00</u>)			<u>240.00</u>
53. <u>Laboratory Equipment, the lump sum of</u> <u>One Thousand</u> <u>no/100</u> <u>Seven Hundred Fifty and /</u> Dollars (\$ <u>1,750.00</u>)			<u>1,750.00</u>
<u>TOTAL - Section A - Treatment Plant</u>	<u>(with Truss-Type Cover)</u>	\$	<u>206,584.00</u> ✓
" " "	<u>(with Buoyant-Type Cover)</u>		<u>203,279.00</u>

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 (10) days (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>
Gene H. Sattergren	Portland, Oregon

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

Maryland Casualty Company

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>Treatment Plant</u>	<u>Willamette, Oregon</u>	<u>1955</u>
<u>Reservoirs</u>	<u>Forest Highlands Dist., Oswego</u>	<u>1961</u>
<u>Fire Station on Willamette River</u>	<u>City of Portland</u>	<u>1960</u>

Name of Bidder Gene H. Settergren ☐ Corporation
☐ Partnership
☒ Individual

Address of Bidder **1625 S. E. Woodward, Portland 2, Oregon**

Signature of Authorized Agent

Title	Owner	Date	
		April 27	, 196 2

AGREEMENT

FOR SEWERAGE IMPROVEMENTS

CITY OF NEWBERG, OREGON

The City of Newberg, Oregon, herein called "Owner" and Gene H. Settergren, 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 signing of Contract and shall complete the work on or before the following date:

Section A: _____

Section B: _____

X X X X

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>Title</u>	<u>Drawing No.</u>
<u>Section A - Sewage Treatment Plant Improvements</u>	
Vicinity, Map, Plot Plan & Schematic Profile	24-A-14
General Plant and Piping Layout	24-A-15
Plant Site Cross Sections	24-A-16
Pretreatment Unit - Section and Details	24-A-17
Primary Settling Tank - Plan	24-A-18
Primary Settling Tank - Sections and Details	24-A-19
Primary Settling Tank - Details	24-A-20
Aeration Tank - Plan and Sections	24-A-21
Aeration Tank - Sections and Details	24-A-22
Aeration Tank - Structural Details	24-A-23
Final Settling Tank	24-A-24
Digester - Plan, Section and Details	24-A-25
Digester Control Building - Plan, Section and Details	24-A-26
Digester - Details	24-A-27
Building Elevations	24-A-28
Sludge and Gas Piping Diagrams	24-A-29
Window and Miscellaneous Steel Details	24-A-30
Miscellaneous Details	24-A-31
Digester - Alternate Cover	24-A-32
Electrical Plot Plan & Details	24-A-33
Blower & Pump Building Electrical Plan & Details	24-A-34
New Digester Building Electrical Plan & Details	24-A-35

Section B - Pumping Station, Interceptor Sewers & Pressure Line

Pumping Station - Plans and Details	24-A-36
Chelahem Interceptor - Plan Sheet No. 1	24-A-37
Chelahem Interceptor - Plan Sheet No. 2	24-A-38
Chelahem Interceptor - Profiles	24-A-39
Standard Manhole Details	24-A-40

The Plans, Instructions to Bidders, Special and General Conditions, all specifications, Basis of Payment and the Contractor's Proposal, dated April 27, 1962, 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 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 prior 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 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 April 27, 1962 and the Basis of Payment, less 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 date:

Section A: _____

X X X X

Section B: _____

- (b) No extensions 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 rates hereunder:

Section A - Treatment Plant

\$100 per calendar day

Section B - Pumping Station, Interceptor Sewers and Pressure Line

\$ 50 per calendar day

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

CITY OF NEWBERG, OREGON

By

Roy M. Curtis
Roy M. Curtis, Mayor

Attest:

Myrland C. Gilbert
Myrland C. Gilbert, City Recorder

Approved as to Form:

Herbert Swift

Herbert Swift, City Attorney

GENE H. SETTERGREN

CONTRACTOR

By

Title:

Gene H. Settergren
Owner

Dated this 18th day of May, 1961.