STADELI Pump & Const Contract Copy FILE COPY

CITY OF NEWBERG
CITY RECORDER INDEX NO. 1074 C

(P)

CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF THE

WATER SUPPLY IMPROVEMENTS

SCHEDULE A
WELL PUMP STATION

SCHEDULE B
SUPPLY TRANSMISSION PIPELINE

SCHEDULE C
BRIDGE PIER REPAIR

CITY OF NEWBERG
OREGON

11/6/70
SEPTEMBER 1970

CORNELL, HOWLAND, HAYES & MERRYFIELD
Engineers and Planners
SEATTLE CORVALLIS BOISE PORTLAND

CITY OF NEWBERG
CITY RECORDER INDEX NO. 1074

ADDENDUM NO. 1
to the
CONTRACT DOCUMENTS
for the construction of the
WATER SUPPLY IMPROVEMENTS
SCHEDULE A - WELL PUMP STATION
SCHEDULE B - SUPPLY TRANSMISSION PIPELINE
SCHEDULE C - BRIDGE PIER REPAIR
CITY OF NEWBERG, OREGON

To All Planholders: 24 September 1970

Gentlemen: Project No. C5509.2

The following changes, additions, and/or deletions are hereby made a part of the Contract Documents for the construction of the Water Supply Improvements, Schedule A - Well Pump Station, Schedule B - Supply Transmission Pipeline, Schedule C - Bridge Pier Repair, dated September 1970, as fully and completely as if the same were fully set forth therein:

1. SPECIAL SPECIFICATIONS

a. Page 28, DRIVING MOTOR, Insulation. Delete "Class B" and substitute "Class F".

b. Page 28, DRIVING MOTOR, Temperature Rise. Delete "40 degrees C." and substitute "65 degrees C.".

2. PLANS

Drawing No. C5509-4, Sheet 4 of 6. See ONE LINE DIAGRAM and ELEVATION. Change well pump circuit breaker size from "175 amps" to "200 amps".

All bidders shall acknowledge receipt and acceptance of this Addendum No. 1 by signing in the space provided and submitting the signed Addendum with the bid. Bids submitted without this Addendum will be considered informal.

Very truly yours,

CORNELL, HOWLAND, HAYES & MERRYFIELD

Archie Meadows

Archie E. Meadows

Receipt acknowledged and conditions agreed to this 5 day of Oct 1970.

Stadelt Pump & Construction, Inc.
Bidder 622 N. Water St. Ph. - 873-6325
By Silverton, Oregon 97381

***

CITY OF NEWBERG

OREGON

CONTRACT DOCUMENTS

for the construction of the

WATER SUPPLY IMPROVEMENTS

SCHEDULE A - WELL PUMP STATION

SCHEDULE B - SUPPLY TRANSMISSION PIPELINE

SCHEDULE C - BRIDGE PIER REPAIR

****

Consisting of:
Form of Bid Bond
Advertisement for Bids
Form of Proposal
Form of Contract
Form of Performance and Payment Bond
Information for Bidders
Special Provisions
General Conditions
Special Specifications
Standard Specifications
Plans

****

Cornell, Howland, Hayes & Merryfield
Engineers-Planners-Economists
Corvallis, Oregon

September 1970

Project No. C5509.1

Copy No. 10

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TABLE OF CONTENTS (Cont'd.)

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that STADELI PUMP & CONSTRUCTION, INC. hereinafter called the Principal, and UNITED PACIFIC INSURANCE CO., a corporation duly organized under the laws of the State of WASHINGTON, having its principal place of business at TACOMA, in the State of WASHINGTON, and authorized to do business in the State of Oregon, as Surety, are held and firmly bound unto the CITY OF NEWBERG, OREGON hereinafter called the Obligee in the penal sum of Ten percent of the total amount bid -------- Dollars (10%), for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of this Bond is such that, whereas, the Principal herein is herewith submitting his or its Bid Proposal for Construction of Water Supply Improvements: Schedule A-Well Pump Station; Schedule B-Transmission Pipeline; and Schedule C-Bridge Pier Repair

said Bid Proposal, by reference thereto, being hereby made a part hereof.

NOW, THEREFORE, if the said Bid Proposal submitted by the said Principal be accepted, and the Contract be awarded to said Principal, and if the said Principal shall execute the proposed Contract and shall furnish the Performance Bond as required by the Bidding and Contract Documents within the time fixed by said Documents, then this obligation shall be void, if the Principal shall fail to execute the proposed Contract and furnish the Performance Bond, the Surety hereby agrees to pay to the Obligee the penal sum as liquidated damages.

Signed and sealed this 5th day of October, 1970.

STADELI PUMP & CONSTRUCTION, INC.
Principal

By W. B. Stadeli

UNITED PACIFIC INSURANCE CO.
Surety

By Richard D. Hartley
Attorney-in-Fact Richard D. Hartley

Countersigned: Silverton, Oregon
DICK HARTLEY INSURANCE
By
Resident Agent

(A certified copy of the Agent's power-of-attorney must be attached hereto.)

****

UNITED PACIFIC INSURANCE COMPANY
A MEMBER OF UNITED PACIFIC INSURANCE GROUP
HOME OFFICE: TACOMA, WASHINGTON 98401
FIDELITY AND SURETY DEPARTMENT

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

That the UNITED PACIFIC INSURANCE COMPANY, a corporation of the State of Washington, having its principal offices in the city of Tacoma, Washington, pursuant to authority granted by By-Law No. 37-A of its By-Laws, which reads as follows:

"The President, any Executive Vice-President, any other Vice-President, any Assistant Vice-President, or any Resident Vice-President of this Corporation, shall have authority to appoint in writing such attorneys-in-fact as the business of the Company may require, and to authorize such attorneys-in-fact, and each of them, to execute on behalf of the Company, any bonds, recognizances, stipulations, contracts of indemnity and other undertakings of like character, or to exercise any lesser number of said powers as hereinbefore set forth.

"Said appointments shall be attested by the Secretary or an Assistant Secretary of this Corporation under its seal. The signature of the Secretary or any Assistant Secretary to certified copies of such powers of attorney may be original or facsimile, and when the corporate seal is affixed thereto, any third party may rely on said certified copies of powers of attorney as the act and deed of this Corporation. The President, any Executive Vice-President, any other Vice-President, any Assistant Vice-President, or any Resident Vice-President may revoke any appointment made pursuant hereto, and revoke any and all authority conferred by any such appointment."

does hereby nominate, constitute and appoint RICHARD D. HARTLEY or WILMA BARR of SILVERTON, OREGON

its true and lawful Attorney-in-Fact, to make, execute, seal and deliver for and on its behalf, as surety, and as its act and deed,

ANY AND ALL BONDS AND UNDERTAKINGS OF SURETYSHIP.

The execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Company, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its office in Tacoma, Washington, in their own proper persons.

IN WITNESS WHEREOF, the UNITED PACIFIC INSURANCE COMPANY has caused these presents to be signed by its Executive Vice-President and its corporate seal to be hereto affixed, duly attested by its Assistant Secretary, this 26th day of June, 1970

UNITED PACIFIC INSURANCE COMPANY

Attest: s/ GERRY L. WHITE
Assistant Secretary

By s/ MORRIS E. BROWN (SEAL)
Executive Vice-President

STATE OF WASHINGTON
County of PIERCE } ss.

On this 26th day of June, 1970, personally appeared MORRIS E. BROWN

and GERRY L. WHITE, to me known to be the Executive Vice-President and Assistant Secretary, respectively, of UNITED PACIFIC INSURANCE COMPANY, and acknowledged that they executed and attested the foregoing instrument and affixed the seal of said corporation thereto, and that By-Law No. 37-A, set forth therein, is still in full force.

Witness my hand and seal hereto affixed the day and year first above written.

My Commission Expires January 15, 1974

s/ Bertha M. Barragar
Notary Public in and for the State of Washington
Residing at Tacoma

STATE OF WASHINGTON
County of PIERCE } ss.

I, GERRY L. WHITE Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the foregoing instrument is a true copy of a Power of Attorney duly and regularly issued by said Company, and that the same is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company at the City of TACOMA

this 5th day of October, 1970 Gerry L. White (SEAL)
Assistant Secretary

B-1027A General — Power of Attorney Rev. 11-66

ADVERTISEMENT FOR BIDS

Sealed proposals for the construction of the Water Supply Improvements, addressed to the Finance Officer, City of Newberg, Oregon, will be received in the Council Chamber until 7:30 p.m., Pacific Daylight Time, on the 5th day of October, 1970, and then will be publicly opened and read.

Bidders may bid any one of the following combinations of Schedules:

Schedules A, B, and C
Schedules A and B
Schedule C

Schedules A or B may not be bid separately.

Schedule A consists of a well pump station, complete, with 1200 gpm vertical turbine well pump, motor, electrical equipment, access road, and miscellaneous valves, piping, and appurtenances.

Schedule B consists of a water transmission pipeline which includes pipe, fittings, and appurtenances, with approximate pipeline lengths as follows:

Type	Size	Class	Length
Cast iron	8-inch	22	90 feet
Cast iron	12-inch	22	1,000 feet

Schedule C consists of repair to the bridge pier for the bridge which supports the existing supply transmission pipeline. The repair work is concerned with snag and debris removal and riprap fill.

Plans and Specifications may be examined in the office of M. C. Gilbert, Finance Officer, or at the office of Cornell, Howland, Hayes & Merryfield, Engineers-Planners-Economists, 1600 S.W. Western Boulevard, Corvallis, Oregon 97330. A copy of said Documents may be obtained at the Engineer's office at 1600 S.W. Western Boulevard, Corvallis, Oregon, upon a deposit of Fifty Dollars ($50.00) for each Document. The full amount of the deposit will be refunded if said Documents are returned in good condition within ten (10) days after bid opening.

Bidders must be prequalified in compliance with applicable parts of Chapter 279 of Oregon Revised Statutes. Prequalification forms, completely filled out, shall be mailed to Cornell, Howland, Hayes & Merryfield, 1600 S.W. Western Boulevard, Corvallis, Oregon, at least ten (10) days prior to the bidding date.

No bid will be received or considered by the public body or any officer of the public body unless the bid contains a statement by the Bidder as a part of his bid that the provisions required by ORS 279.350 shall be included in his Contract.

Each proposal must be submitted on the prescribed form and accompanied by a certified check or bid bond executed on the prescribed form payable to the City of Newberg, Oregon, in an amount not less than ten percent (10%) of the amount bid.

The successful Bidder will be required to furnish a bond for faithful performance of the Contract in the full amount of the Contract price.

The right is reserved to reject any or all proposals, to postpone the award of the Contract for a period not to exceed thirty (30) days, and to accept that proposal which is to the best interests of the City of Newberg, Oregon.

Dated this 8th day of September, 1970.

CITY OF NEWBERG, OREGON

By_____
M. C. Gilbert, Finance Officer

****

PROPOSAL

To: Mayor and City Council
City of Newberg
Newberg, Oregon

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Proposal are those named herein; that this Proposal is, in all respects, fair and without fraud; that it is made without collusion with any official of the Owner; and that the Proposal is made without any connection or collusion with any person making another proposal on this Contract.

The Bidder further declares that he has carefully examined the Contract Documents for the construction of the project; that he has personally inspected the site; that he has satisfied himself as to the quantities involved, including materials and equipment, and conditions of work involved, including the fact that the description of the quantities of work and materials, as included herein, is brief and is intended only to indicate the general nature of the work and to identify the said quantities with the detailed requirements of the Contract Documents; and that this Proposal is made according to the provisions and under the terms of the Contract Documents, which Documents are hereby made a part of this Proposal. The Bidder further declares that the provisions required by ORS 279.350 relating to prevailing wage rates shall be included in his Contract.

The Bidder further agrees that he has exercised his own judgment regarding the interpretation of subsurface information and has utilized all data which he believes pertinent from the Engineer, Owner, and other sources in arriving at his conclusions.

The Bidder agrees that if this Proposal is accepted, he will, within seven (7) calendar days after notification of acceptance, execute the Contract with the Owner in the form of Contract annexed hereto; and will, at the time of execution of the Contract, deliver to the Owner the Performance and Payment Bond required herein; and will, to the extent of his Proposal, furnish all machinery, tools, apparatus, and other means of construction and do the work and furnish all the materials necessary to complete the work in the manner, in the time, and according to the methods as specified in the Contract Documents and required by the Engineer thereunder.

The Bidder further agrees to begin work within ten (10) calendar days after the date of the execution of the Contract and to complete the construction, in all respects, of each schedule for which his Proposal is accepted within the number of calendar days after the date of execution of the Contract by the Owner as set forth below:

Schedules A and B	180 calendar days
Schedule C	* 180 calendar days

* Number of days to be filled in by Bidder.

All schedules will be let under one (1) contract.

In the event the Bidder is awarded the Contract and shall fail to complete the work within the time limits or extended time limits agreed upon for any of the work schedules, as more particularly set forth in the Contract Documents, liquidated damages shall be paid to the Owner at the rate of ONE HUNDRED DOLLARS ($100.00) per day for the late schedule or schedules until the work shall have been finished as provided by the Contract Documents. Liquidated damages will not be cumulative if more than one (1) schedule is late in completion. Sundays and legal holidays shall be excluded in determining days in default.

SCHEDULE A
WELL PUMP STATION

The Bidder agrees to accept as full payment for the construction of the Well Pump Station as defined under Schedule A, and as shown on the Plans, based on the undersigned's own estimate of quantities and costs, not including the cost of furnishing and installing the Vertical Turbine Pump and Driving Motor listed in Section A11A of the Special Specifications, the following lump sum of:

_____ Dollars

and _____ Cents $_____

To facilitate monthly progress payments, the following breakdown of the total lump sum bid for Schedule A is to be given, and it is agreed that these are the actual prices upon which said lump sum is based; and that, if so requested by the Engineer, the Contractor will substantiate any price or prices with further information.

BIDDER BREAKDOWN OF LUMP SUM BID

(The Bidder must submit with his Proposal the figures called for below.)

Section No.	Title	Amount
	Bond and Insurance	$_____
A2A.	Move In and Site Preparation	$_____
A2B.	Earthwork	$_____
A3A.	Concrete	$_____
A3B.	Reinforcing Steel	$_____
A5A.	Fabricated Metalwork	$_____

BIDDER BREAKDOWN OF LUMP SUM BID (Cont'd.)

Section No.	Title	Amount
A7A.	Roofing and Siding	$_____
A9A.	Painting	$_____
A15A.	Large and Special Valves	$_____
A15B.	Plumbing and Miscellaneous Piping Systems	$_____
A15C.	Cast Iron Pipe and Fittings	$_____
A16A.	Electrical	$_____
	TOTAL LUMP SUM FOR SCHEDULE A	$_____

The Bidder further proposes to furnish and install in accordance with the Special Specifications, bound herewith, the items of mechanical equipment specified in Section A11A. VERTICAL TURBINE PUMP AND DRIVING MOTOR, listed below. The equipment is to be furnished and installed in operating condition by the Bidder for the total price as shown under each respective item in the Proposal and is to be described by information furnished to the Engineer by the equipment manufacturer prior to bid opening.

The Bidder shall list separate price proposals from at least three (3) separate equipment manufacturers and include the cost of installation, complete. Selection of the equipment to be furnished will be made by the Owner.

Section A11A. VERTICAL TURBINE PUMP AND DRIVING MOTOR

One _____ 1200 gpm Vertical Turbine Pump & Motor
Name of Manufacturer Type or Model

for
_____ Dollars

and _____ Cents $_____

OR

One _____ 1200 gpm Vertical Turbine Pump & Motor
Name of Manufacturer Type or Model

for
_____ Dollars

and _____ Cents $_____

OR

One _____ 1200 gpm Vertical Turbine Pump & Motor

Name of Manufacturer _____ Type or Model

for

_____ Dollars

and _____ Cents $_____

TOTAL FOR SCHEDULE A
(Lump Sum, Plus Lowest
Priced Equipment Listed Above) $_____

(see next page)

SCHEDULE B
SUPPLY TRANSMISSION PIPELINE

The Bidder further proposes to accept as full payment for the work proposed under Schedule B hereinafter the amounts computed under the provisions of the Contract Documents and based on the following lump sum or unit price amounts, it being expressly understood that the unit prices are independent of the exact quantities involved. The Bidder agrees that the lump sum prices and the unit prices represent a true measure of the labor and materials required to perform the work, including all allowances for overhead and profit for each type and unit of work called for in these Contract Documents.

The amounts shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern.

Item	Quantity	Unit of Measure	Unit Price or Lump Sum Figures	Unit Price or Lump Sum in Writing	Total Amt.- Quan. x Unit Price or Lump Sum
B2A. TRENCH EXCAVATION AND BACKFILL					
Trench Excavation and Backfill, Class C	624	lin.ft.	$_____	_____	$_____
Trench Excavation and Backfill, Class D	20	lin.ft.	$_____	_____	$_____
Trench Excavation and Backfill, Class E	454	lin.ft.	$_____	_____	$_____

Item	Quantity	Unit of Measure	Unit Price or Lump Sum Figures	Unit Price or Lump Sum in Writing	Total Amt.- Quan. x Unit Price or Lump Sum
B2B. SURFACE RESTORATION					
Removal and Replacement of Asphalt Concrete Pavement	20	lin.ft.	$_____	_____	$_____
Rock Surfacing	10	cu.yds.	$_____	_____	$_____
B15A. CAST IRON PIPE AND FITTINGS					
8-Inch Cast Iron Pipe	87	lin.ft.	$_____	_____	$_____
12-Inch Cast Iron Pipe	1,011	lin.ft.	$_____	_____	$_____
Cast Iron Fittings	2,055	pounds	$_____	_____	$_____
Mechanical Couplings	24	diam.in.	$_____	_____	$_____
B15B. VALVES AND VALVE BOXES					
12-Inch Butterfly Valves and Valve Boxes	1	each	$_____	_____	$_____
				TOTAL FOR SCHEDULE B	$_____

SCHEDULE C
BRIDGE PIER REPAIR

The Bidder further proposes to accept as full payment for the work proposed under Schedule C hereinafter the amounts computed under the provisions of the Contract Documents and based on the following lump sum or unit price amounts, it being expressly understood that the unit prices are independent of the exact quantities involved. The Bidder agrees that the lump sum prices and the unit prices represent a true measure of the labor and materials required to perform the work, including all allowances for overhead and profit for each type and unit of work called for in these Contract Documents.

The amounts shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern.

Item	Quantity	Unit of Measure	Unit Price or Lump Sum Figures	Unit Price or Lump Sum in Writing	Total Amt.- Quan. x Unit Price or Lump Sum
C2A. MOVE IN AND SITE PREPARATION					
		lump sum	$ 3,000.00	Three thousand Dollars	$ 3,000.00
C2B. RIPRAP					
Riprap	750	tons	$ 10.98	Ten Dollars and Ninety-Eight Cents	$ 8,235.00
				TOTAL FOR SCHEDULE C	$ 11,235.00
				TOTAL FOR SCHEDULES A & B	$
				TOTAL FOR SCHEDULE C	$
				TOTAL FOR ALL SCHEDULES BID	$

It is agreed that if the Bidder is awarded the Contract for the work herein proposed and shall fail or refuse to execute the Contract and furnish the specified Performance and Payment Bond within seven (7) calendar days after receipt of notification of acceptance of his Proposal, then, in that event, the bid security deposited herewith according to the conditions of the Advertisement for Bids and Information for Bidders shall be retained by the Owner as liquidated damages; and it is agreed that the said sum is a fair measure of the amount of damage the Owner will sustain in case the Bidder shall fail or refuse to enter into the Contract for the said work and to furnish the Performance and Payment Bond as specified in the Contract Documents. Bid security in the form of a certified check shall be subject to the same requirements as a bid bond.

If the Bidder is awarded a construction Contract on this Proposal, the Surety who will provide the Performance and Payment Bond will be _____

United Pacific Insurance Company whose address is

_____ (Street), Tacoma (City), Washington (State).

The name of the Bidder who is submitting this Proposal is _____

Stadeli Pump & Construction, Inc. doing business at

622 N. Water Street (Street), Silverton (City), Oregon (State),

which is the address to which all communications concerned with this Proposal and with the Contract shall be sent.

The names of the principal officers of the corporation submitting this Proposal, or of the partnership, or of all persons interested in this Proposal as principals are as follows:

_____ _____

_____ _____

_____ _____

(If Sole Proprietor or Partnership)

In witness hereto the undersigned has set his (its) hand this _____ day of _____, 19___.

_____
Signature of Bidder

_____
Title

(If Corporation)

In witness whereof the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this 5th day of October, 1970.

Stadeli Pump & Construction Inc.
Name of Corporation

By /s/ Otto Stadeli

President
Title

Attest /s/ Edith E. Stadeli
Secretary

****

CONTRACT FOR CONSTRUCTION

THIS CONTRACT, made and entered into this 6th. day of November 1970, by and between the City of Newberg, Oregon, a municipal corporation, hereinafter called the "Owner," and Stadeli Pump & Construction, Inc.

of Silverton, Oregon
hereinafter called the "Contractor."

WITNESSETH:

Said Contractor, in consideration of the sum to be paid him by the said Owner and of the covenants and agreements herein contained, hereby agrees at his own proper cost and expense to do all the work and furnish all the materials, tools, labor, and all appliances, machinery, and appurtenances for construction of the Water Supply Improvements to the extent of the Proposal made by the Contractor on the 5th day of October, 1970, all in full compliance with the Contract Documents referred to herein.

The "Advertisement for Bids," the signed copy of the "Proposal" made by the Contractor on the 5th day of October, 1970, the fully executed "Performance and Payment Bond," the "Information for Bidders," the "Special Provisions," the "General Conditions," the "Specifications," and the "Plans," which consist of 6 sheets entitled "City of Newberg, Oregon, Water Supply Improvements," Drawing No. C5509-4, dated September 1970 are hereby referred to and by reference made a part of this Contract as fully and completely as if the same were fully set forth herein and are mutually cooperative therewith.

In consideration of the faithful performance of the work herein embraced, as set forth in these Contract Documents, and in accordance with the direction of the Engineer and to his satisfaction to the extent provided in the Contract Documents, the Owner agrees to pay to the Contractor the amount bid as adjusted in accordance with the Proposal as determined by the Contract Documents, or as otherwise herein provided, and based on the said Proposal made by the Contractor, and to make such payments in the manner and at the times provided in the Contract Documents.

The Contractor agrees to complete the work within the time limits specified herein and to accept as full payment hereunder the amounts computed as determined by the Contract Documents and based on the said Proposal.

The Contractor agrees to indemnify and save harmless the Owner from any and all defects appearing or developing in the materials furnished and the workmanship performed under this Contract for a period of one (1) year after the date of acceptance of the work in each schedule of the Contract by the Owner.

The provisions required by ORS 279.350 relating to prevailing wage rates are made a part of this Contract as completely as if the same were fully set forth herein.

It is agreed that the time limits for the completion of each schedule of the Contract, based upon the Proposal, shall be as follows:

Schedules A & B: the _____ day of _____, 19___.

Schedule C: the 5th day of May, 1971.

In the event that the Contractor shall fail to complete the work within the time limits or the extended time limits agreed upon for any of the work schedules, as more particularly set forth in the Contract Documents, liquidated damages shall be paid at the rate of ONE HUNDRED DOLLARS ($100.00) per day for the late schedule or schedules. Liquidated damages will not be cumulative if more than one (1) schedule is late in completion. Sundays and legal holidays shall be excluded in determining days in default.

IN WITNESS WHEREOF, we, the parties hereto, each herewith subscribe the same this 6 day of NOVEMBER, A.D., 1970.

CITY OF NEWBERG, OREGON

By Russell Belanger

Title Mayor

Stadeli Pump & Construction, Inc.
622 N Water St. Ph.-873-6325
Silverton, Oregon 97381
Contractor

By Otto B. Stadeli

Title Pres.

Approved as to form:

_____
City Attorney

****

PERFORMANCE AND PAYMENT BOND # B586299

KNOW ALL MEN BY THESE PRESENTS, that we ~~United Pacific~~ Stadeli Pump & Construction, Inc. ~~Insurance Company~~

as Principal, and ~~Stadeli Pump & Construction, Inc. of Silverton,~~ ~~Oregon~~ United Pacific Insurance Company

a corporation, duly authorized to do a general surety business in Oregon, as Surety, are jointly and severally held and bound unto the City of Newberg, Oregon

the Obligee herein, in the sum of Eleven thousand Two hundred Thirty-Five Dollars and No Cents (Dollars) ($ 11,235.00), for the payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns, firmly by these presents:

THE CONDITION OF THIS BOND IS SUCH THAT

WHEREAS, Stadeli Pump & Construction, Inc. (Contractor)

the Principal herein, on the 6th. day of November, 1970 entered into a Contract with the Obligee, which Contract Documents consist of the Advertisement for Bids, the Proposal, the Contract, the Performance and Payment Bond, the Information for Bidders, the Special Provisions, the General Conditions, the Specifications, and the Plans, all as hereto attached and made a part hereof, whereby said Principal undertakes to do all labor, furnish all plant and equipment, and furnish all material, in accordance with all the terms and conditions set forth in said Contract Documents; and to promptly make payment for all labor, services, material, and sums due the Workmen's Compensation Board, or equivalent, the Collector of Internal Revenue, and the Treasurer of the State of Oregon; and to save harmless the Obligee from any claim for damages or injury to property or persons arising by reason of said work, as set out more fully in said Contract Documents; and to do and perform all things in said Contract Documents required, in the time and manner and under the terms and conditions therein set forth; and in conformity with all laws, State and national, applicable thereto.

Now, therefore, if said Principal herein shall promptly pay all persons furnishing labor, services, and material, and Workmen's Compensation Insurance or equivalent, and Social Security and Unemployment Compensation, to him and to his subcontractor, or to their assigns, on or about said work; and shall, commencing with the date hereof and continuing for one (1) year after

[PUBLIC WORK] June '70

the complete performance of the Contract and the final acceptance of the work in the Contract, save harmless the Obligees, its officers and agents, from all claims therefor, or from any claim for damages or injury to property or persons arising by reason of said work; and shall, in the time and manner, and under the terms and conditions prescribed, well and faithfully do, perform, and furnish all matters and things as by them in said Contract undertaken, and as by law, State and National, prescribed, then this obligation shall be void; but otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that this Bond is subject to the following further conditions.

(a) All materialmen, and all persons who shall supply such laborers, mechanics, or subcontractors with material, supplies, or provisions for carrying on such work, shall have a direct right of action against the Principal and Surety on this Bond, second only to the right of the Obligee under this Bond, which right of action shall be asserted in proceedings instituted in the appropriate court of the State of Oregon, and insofar as permitted by the laws of Oregon, such right of action shall be asserted in a proceeding instituted in the name of the Obligee to the use and benefit of the person, firm, or corporation instituting such action and of all other persons, firms, or corporations having claims hereunder, and any other person, firm, or corporation having a claim hereunder shall have the right to be made a party to such proceeding (but not later than one (1) year after the complete performance of said Contract and final acceptance of the work in the Contract) and to have such claim adjudicated in such action and judgment rendered thereon.

(b) In no event shall the Surety be liable for a greater sum than the penalty of this Bond.

(c) The said Surety, for the value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

(d) The Principal herein shall faithfully and truly observe and comply with the terms of the Contract and shall well and truly perform all matters and things by him undertaken to be performed under said Contract upon the terms proposed therein and shall promptly make payments to all persons supplying labor or material for any prosecution of the work provided for in such Contract and shall not permit any lien or claim to be filed or prosecution against the obligees, on account of any labor or material furnished, and shall promptly pay all contributions or amount due the Workmen's Compensation Board or equivalent and all contributions or amounts due the State Employment Compensation Trust Fund incurred in the performance of said Contract, and shall also pay all sums of money withheld from the employees and payable to the State Tax Commission pursuant to ORS 316.711 and shall promptly, as due, make payment to any person, copartnership, association or corporation furnishing medical, surgical and hospital care or other needed

care and attention incident to sickness or injury to the employees of such Principal, pursuant to the laws of this State and any contract entered into pursuant thereto or collected or deducted from the wages of said employees pursuant to any law, contract, or agreement for the purpose of providing or paying for such services, and shall do all things required of said Principal by the laws of this State.

This Bond is given and received under the authority of ORS Chapter 279, the provisions of which hereby are incorporated into this Bond and made a part hereof.

IN WITNESS WHEREOF, the parties hereto have caused this Bond to be executed in quintuplicate, this 3rd day of November 1970.

Stadeli Pump & Construction Inc (SEAL)

by Otto B. Stadeli (SEAL)

_____ (SEAL)

_____ (SEAL)

Principal

Witnesses:

_____

_____

_____

United Pacific Insurance Co. (SEAL)

_____ (SEAL)

_____ (SEAL)

Surety

Attorney-in-Fact

Countersigned: Silverton, Oregon

Dick Hartley Insurance

By _____

Resident Agent

The Attorney-in-Fact (Resident Agent), who executes this Bond in behalf of the Surety Company, must attach a copy of his power-of-attorney as evidence of his authority.

To each executed original of this Bond there must be attached a complete set of the "Contract Documents," as the term is defined in the General Conditions, with all corrections, interlineations, signatures, etc., completely reproduced therein.

****

UNITED PACIFIC INSURANCE COMPANY
A MEMBER OF UNITED PACIFIC INSURANCE GROUP
HOME OFFICE: TACOMA, WASHINGTON 98401
FIDELITY AND SURETY DEPARTMENT

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

That the UNITED PACIFIC INSURANCE COMPANY, a corporation of the State of Washington, having its principal offices in the city of Tacoma, Washington, pursuant to authority granted by By-Law No. 37-A of its By-Laws, which reads as follows:

"The President, any Executive Vice-President, any other Vice-President, any Assistant Vice-President, or any Resident Vice-President of this Corporation, shall have authority to appoint in writing such attorneys-in-fact as the business of the Company may require, and to authorize such attorneys-in-fact, and each of them, to execute on behalf of the Company, any bonds, recognizances, stipulations, contracts of indemnity and other undertakings of like character, or to exercise any lesser number of said powers as hereinbefore set forth.

"Said appointments shall be attested by the Secretary or an Assistant Secretary of this Corporation under its seal. The signature of the Secretary or any Assistant Secretary to certified copies of such powers of attorney may be original or facsimile, and when the corporate seal is affixed thereto, any third party may rely on said certified copies of powers of attorney as the act and deed of this Corporation. The President, any Executive Vice-President, any other Vice-President, any Assistant Vice-President, or any Resident Vice-President may revoke any appointment made pursuant hereto, and revoke any and all authority conferred by any such appointment."

does hereby nominate, constitute and appoint RICHARD D. HARTLEY or WILMA BARR of SILVERTON, OREGON

its true and lawful Attorney-in-Fact, to make, execute, seal and deliver for and on its behalf, as surety, and as its act and deed,

ANY AND ALL BONDS AND UNDERTAKINGS OF SURETYSHIP.

The execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Company, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its office in Tacoma, Washington, in their own proper persons.

IN WITNESS WHEREOF, the UNITED PACIFIC INSURANCE COMPANY has caused these presents to be signed by its Executive Vice-President and its corporate seal to be hereto affixed, duly attested by its Assistant Secretary, this 26th day of June, 19 70

UNITED PACIFIC INSURANCE COMPANY

Attest: s/ GERRY L. WHITE
Assistant Secretary

By s/ MORRIS E. BROWN (SEAL)
Executive Vice-President

STATE OF WASHINGTON }
County of PIERCE } ss.

On this 26th day of June, 19 70, personally appeared MORRIS E. BROWN and GERRY L. WHITE, to me known to be the Executive Vice-President and Assistant Secretary, respectively, of UNITED PACIFIC INSURANCE COMPANY, and acknowledged that they executed and attested the foregoing instrument and affixed the seal of said corporation thereto, and that By-Law No. 37-A, set forth therein, is still in full force.

Witness my hand and seal hereto affixed the day and year first above written.

My Commission Expires January 15, 19 74

s/ Bertha M. Barragar
Notary Public in and for the State of Washington
Residing at Tacoma

STATE OF WASHINGTON }
County of PIERCE } ss.

I, GERRY L. WHITE Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the foregoing instrument is a true copy of a Power of Attorney duly and regularly issued by said Company, and that the same is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company at the City of TACOMA this 3rd day of November, 19 70

Gerry L. White (SEAL)
Assistant Secretary

B-1027A General — Power of Attorney Rev. 11-66

1. General Description of the Project. A general description of the work to be done is contained in the Advertisement for Bids. The scope is indicated on the accompanying Plans and specified in applicable parts of these Contract Documents.

2. Contract Documents. The Contract Documents under which it is proposed to execute the work consist of the material bound herewith. These Contract Documents are intended to be mutually cooperative and to provide all details reasonably required for the execution of the proposed work. Any person contemplating the submission of a proposal and being in doubt as to the meaning or intent of said Contract Documents should request of the Engineer, in writing, an interpretation thereof. Any interpretation or change in said Contract Documents will be made only in writing, and a copy of such interpretation or change will be mailed or delivered to each person receiving a set of the Documents. The Owner will not be responsible for any other explanation or interpretations of said Documents.

3. Plans. When the Plans are photographic reductions of the original tracings, the amount of reduction is indicated by a note on the Plans. Full-scale prints of reduced Plans may be obtained for the amount stated in the Special Provisions.

Jul.'70

4. Type of Proposal.

a. Unit Price. When the Proposal for the work is to be submitted on a unit price basis, unit price proposals will be accepted on all items of work set forth in the Proposal, except those designated to be paid for as a lump sum. The estimate of quantities of work to be done is tabulated in the Proposal and, although stated with as much accuracy as possible, is approximate only and is assumed solely for the basis of calculation upon which the award of Contract shall be made. Payment to the Contractor will be made on the measurement of the work actually performed by the Contractor as specified in the Contract Documents. The Owner reserves the right to increase or diminish the amount of any class of work as may be deemed necessary, unless otherwise specified in the Special Provisions.

b. Lump Sum. When the Proposal for the work is to be submitted on a lump sum basis, a single lump sum price shall be submitted in the appropriate place. The total amount to be paid the Contractor shall be the amount of the lump sum Proposal as adjusted for additions or deletions resulting from changes in construction. The Bidder shall furnish, in the space provided in the Proposal, a breakdown of his lump sum bid.

c. Lump Sum with Equipment Selected By Owner. When the Proposal for the work is to be submitted on a lump sum basis with equipment to be selected by the Owner, a lump sum price shall be submitted in the appropriate place and separate price proposals shall be submitted for listed items of equipment as produced by different manufacturers and shall include the cost of installation. The lump sum Proposal shall not include these listed items or cost of their installation. The total amount to be paid the Contractor

shall include the price bid for the listed items of equipment to be furnished as selected by the Owner, plus the amount of the lump sum Proposal, as adjusted for additions and deletions resulting from changes in construction. Bidder shall provide a breakdown of the lump sum as specified hereinbefore in b.

5. Preparation of Proposals. All blank spaces in the Proposal form must be filled in, in ink, in both words and figures where required. No changes shall be made in the phraseology of the forms. Written amounts shall govern in cases of discrepancy between the amounts stated in writing and the amounts stated in figures.

Any proposal shall be deemed informal which contains omissions, erasures, alterations, or additions of any kind, or prices uncalled for, or in which any of the prices are obviously unbalanced, or which in any manner shall fail to conform to the conditions of the published Advertisement for Bids.

The Bidder shall sign his Proposal in the blank space provided therefor. Proposals made by corporations or partnerships shall contain names and addresses of the principal officers or partners. If the Proposal is made by a corporation, it must be acknowledged by one of the principal officers thereof; if made by a partnership, by one of the partners.

6. Submission of Proposals. All proposals must be submitted at the time and place and in the manner prescribed in the Advertisement for Bids. Proposals must be made on the prescribed Proposal forms, bound herewith, and submitted intact with the Contract Documents. Each proposal must be submitted in a sealed envelope, so marked as to indicate its contents without being opened, and addressed in conformance with the instructions in the Advertisement for Bids. The Bidder is wholly responsible to see that his Proposal is submitted at the time and place named for the opening of bids.

7. Telegraphic Modification or Withdrawal of Proposal. Any bidder may modify his bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time. The telegraphic communication should not reveal the bid price but should state the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened.

Any proposal may be withdrawn prior to the scheduled time for the opening of proposals either by telegraphic or written request, or in person. No proposal may be withdrawn after the time scheduled for opening of proposals, unless the time specified in Paragraph 12 of this Information for Bidders shall have elapsed.

8. Bid Security. Proposals must be accompanied by a certified check or cashiers check drawn on a bank in good standing, or a Bid Bond issued by a surety company authorized to issue such bonds in the State of Oregon, in an amount not less than ten percent (10%) of the total amount of the Proposal submitted. This check or Bid Bond shall be given as a guarantee that if awarded the Contract, the successful Bidder will execute the attached Contract and furnish a properly executed Performance Bond in the full amount of the Contract price within the time specified.

If the Bidder elects to furnish a Bid Bond, he shall use the Bid Bond form bound herewith, or one conforming substantially to it in form and content.

The Owner reserves the right to retain the bid security of the three (3) lowest bidders until the successful Bidder has signed and delivered the Contract and furnished a one hundred percent (100%) Performance Bond. Upon failure of the successful Bidder to sign and deliver said Contract and Performance Bond within the specified time, the next lowest bid may be accepted at the Owner's discretion, whereupon the above instructions and requirements will apply to the said second bidder.

Bid security in the form of a certified check or cashiers check will be returned promptly after the canvass of bids, except those of the three (3) lowest bidders, which will be retained and returned within seven (7) days after the Contract has been executed or other disposition made in accordance with the provisions stated herein.

9. Prequalification of Bidders for Public Work. Bidders for public work in Oregon must be prequalified in conformance with Oregon Law ORS, Chapter 279. A prequalification form is bound inside the front cover of the Documents, and must be completed by the prospective Bidder and submitted to the Owner at least ten (10) days prior to the bid opening date. The form shall be detached and filled out by the prospective Bidder and mailed to the office designated in the Advertisement for Bids. Prequalification forms should not be submitted with the bid.

10. Conditions of Work. Each bidder must inform himself of the conditions relating to the execution of the work, and it is assumed that he will inspect the site and make himself thoroughly familiar with all the Contract Documents. Failure to do so will not relieve the successful Bidder of his obligation to enter into a Contract and complete the contemplated work in strict accordance with the Contract Documents.

Each bidder must inform himself on all laws and statutes, both Federal and State, relative to the regular execution of the work, the employment of labor, protection of public health, the protection of private property, fire protection regulations, access to the work, and similar requirements.

11. Payments. Monthly payments for the work performed will be made by the Owner as specified in the General Conditions, unless otherwise modified in the Special Provisions.

12. Award of Contract. Within thirty (30) calendar days after the opening of proposals, the Owner will accept one of the proposals or will act in accordance with Paragraph 13 of this Information for Bidders. The acceptance of the Proposal will be by notice, in writing, mailed or delivered to the office designated in the Proposal.

13. Basis of Award. The award will be made by the Owner on the basis of that Proposal from the lowest responsible Bidder which, in the Owner's sole and absolute judgment, will best serve the interest of the Owner. When projects are paid for in part by Federal aid, the award will be made on the basis of that Proposal submitted by the responsible Bidder submitting the lowest acceptable Proposal.

The Owner reserves the right to accept or reject any or all proposals, and to waive any informalities and irregularities in said proposals.

14. Execution of Contract. The successful Bidder shall, within seven (7) days after receiving notice of award, execute the Contract hereto attached.

15. Performance Bond. The successful Bidder shall file with the Owner at the time of execution of the Contract, a Performance Bond of the form bound herewith in the full amount of the Contract price, as security for the faithful performance of the Contract and the payment of all persons supplying labor and materials for the construction of the work, and to cover all guarantees against defective workmanship or materials, or both, for a period of one (1) year after the date of final acceptance of the work by the Owner. The surety company furnishing this bond shall have a sound financial standing and a record of service satisfactory to the Owner and shall be authorized to do business in the State of Oregon.

The Attorney-in-Fact (Resident Agent) who executes this Performance Bond in behalf of the surety company must attach a copy of his power-of-attorney as evidence of his authority. A notary shall acknowledge the power as of the date of the execution of the surety bond which it covers.

16. Failure to Execute Contract and Furnish Bond. The Bidder who has a Contract awarded to him and who fails to promptly and properly execute the Contract and furnish the bond shall forfeit the bid security that accompanied his bid, and the bid security shall be retained as liquidated damages by the Owner; and it is agreed that this said sum is a fair estimate of the amount of damages the Owner will sustain in case the Bidder fails to enter into a Contract and furnish bond as hereinbefore provided. Bid security deposited in the form of a certified check or cashiers check shall be subject to the same requirement as a Bid Bond.

17. Time of Completion. The time of completion of the work to be performed under this Contract is the essence of the Contract. Delays and extensions of time may be allowed in accordance with the provisions of the General Conditions. The time allowed for the completion of the work is stated in the Proposal.

SPECIAL PROVISIONS

The Contractor's attention is directed to GENERAL REQUIREMENTS, Section 1A of the Special Specifications, containing other directions pertinent to the project.

SPECIFICATION FORMAT. "Command" type sentences are used in the Contract Documents; these refer to and are directed to the Contractor.

LOCATION AND PLANS.

LOCATION. The location of the work is shown on Drawing No. C5509-4 Sheet 1 of 6 of the Plans.

PLANS. The Plans for the construction of the Water Supply Improvements consist of 6 sheets, each entitled "City of Newberg, Oregon, Water Supply Improvements," and dated September 1970.

REVISIONS TO INFORMATION FOR BIDDERS. The Information for Bidders is hereby revised as follows:

General. On Pages 1, 2, 3, and 4 wherever the words "Performance Bond" are used, delete the words and substitute "Performance and Payment Bond."

Page 1, after 3. Plans, insert the following:

3.a. Full-Scale Plans Available. The Plans bound in the Documents are photographic reductions of the original tracings. Full-scale Plans are available from Cornell, Howland, Hayes & Merryfield, 1600 S.W. Western Boulevard, Corvallis, Oregon 97330, at a cost of Eight Dollars ($8.00) per set, Four Dollars ($4.00) of which will be refunded if Plans are returned within ten (10) days after bidding date.

Page 3, Article 9. Prequalification of Bidders for Public Work. The Bidder's prequalification form is to be mailed to the Corvallis office of the Engineer as designated in the Advertisement for Bids.

REVISIONS TO THE GENERAL CONDITIONS. The General Conditions are hereby revised as follows:

Page 4, Article C-6. Lines and Grades. Add the following:

The Engineer will establish the center lines of principal structures, roads, pipelines, and facilities, and set bench marks convenient for the Contractor's use as necessary to establish the basic layout. All labor and stakes for these base lines and bench marks will be provided by the Owner. It will be the Contractor's responsibility to lay out the work from the lines set by the Engineer and to transfer elevations from bench marks. Where new construction

connects to existing facilities, the Contractor shall check and establish the exact location prior to construction of the facilities.

The Contractor shall provide a competent man in his employ during normal working hours to assist the Engineer, when required, in checking lines and elevations in the Contractor's layout and for measuring quantities for payment purposes as the work proceeds. The Contractor shall cooperate with the Engineer so that the checking and measuring may be accomplished with the least interference to the Contractor's operations.

Page 5, Article D-2. Performance Bond. Change to read: "D-2. Performance and Payment Bond" in all places.

Page 7, Article D-3. Insurance. At end of Article add the following:

D-3.g. Builders All Risk Insurance. Contractor shall purchase and maintain "Builders All Risk" insurance, coverage for the Contract period, and such insurance shall include coverage for loss caused by earthquake, landslide, and flood. In addition, the policy shall include coverage for damage resulting from faulty workmanship. The insurance shall be equal to one hundred percent (100%) of the Contract amount.

Insurance will be evidenced by the original policy or a certified copy thereof. The named insured shall include the Contractor, the Owner, and the Engineer as agent of the Owner, as their respective interests may appear.

Page 8, Article D-10. Safety Precautions. Add the following:

In addition to the above provisions, the Contractor shall comply with the following requirements:

a. Comply with the safety standards provisions of applicable laws, building and construction codes, and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, except where these are in conflict with State laws, in which case the more stringent requirement shall be followed.

b. The Contractor shall exercise due caution in the use of the bridge deck for the storage of materials and use of equipment to do the work of Schedule B. He shall make his own determination of the safe use of the deck and supporting members for his temporary use and shall be fully responsible for the satisfactory repair of any damage caused by his operations.

Page 12, Article E-7. Delays and Extension of Time. Add the following:

In addition to the conditions for extension of time as set forth in Article E-7 of the General Conditions, no extension of time will be considered for weather conditions known to have previously occurred in the area in which the work is being performed, unless the total precipitation during any two (2) month period exceeds the recognized normal for these months by twenty percent (20%) or more as determined by the U.S. Weather Bureau Climatological Data.

Page 15, Article F-2. Extra Work. At the end of the Article add the following:

F-2.d. Claims. In any case where the Contractor deems extra compensation is due him for work or materials not clearly covered in the Contract or not ordered by the Engineer as an extra as defined herein, the Contractor shall notify the Engineer, in writing, of his intention to make claim for such compensation before he begins the work on which he bases the claim. If such notification is not given or the Engineer is not afforded proper facilities by the Contractor for keeping strict account of actual cost, then the Contractor hereby agrees to waive the claim for such extra compensation. Such notice by the Contractor, and the fact that the Engineer has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim. In case the claim is found to be just, it shall be allowed and paid for as an extra as provided herein for extra work, or it shall be allowed and paid under a supplemental agreement to be entered into between the parties to the Contract.

F-2.e. Notice of Claim for Delay. If the Contractor intends to file a claim for additional compensation for a delay caused by the Owner at a particular time, he shall file a Notice of Claim with the Engineer within seven (7) days of the beginning of the occurrence. The Notice of Claim shall be in duplicate, in writing, and shall state the circumstances and the reasons for the claim, but need not state the amount. No claim for additional compensation will be considered unless a Notice of Claim has been filed with the Engineer in writing, as stated above.

Page 16, Article F-4. Final Payment. At the end of the Article add the following:

F-4.a. No Waiver of Rights. Neither the inspection by the Owner, through the Engineer or any of his employees, nor any order by the Owner for payment of money, nor any payment for, or acceptance of, the whole or any part of the work by the Owner or Engineer, nor any extension of time, nor any possession taken by the Owner or its employees, shall operate as a waiver of any provision of this Contract, or any power herein reserved to the Owner, or any right to damages herein provided; nor shall any waiver of any breach in this Contract be held to be a waiver of any other or subsequent breach.

SUBSTITUTION OF MATERIALS. All workmanship, equipment, materials, and articles incorporated in the work are to conform to the Specifications. Whenever any material, article, device, product, fixture, form, type of construction, or process is indicated or specified by patent or proprietary name, by name of manufacturer, or by catalog number, such Specifications shall be deemed to be used for the purpose of establishing a standard of quality and facilitating the description of the material or process desired. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design, and shall be deemed to be followed by the words "or as approved" or "approved equal." The Contractor may, in such case, submit complete data to the Engineer for consideration of another material, type, or process, and if the Owner's approval is obtained (in writing), purchase and use the item, type, or process, which shall be substantially equal in every respect to that so indicated or specified. The Owner will be the sole judge of the substituted article or material. No substitute materials shall be used unless approved in writing.

NO PERSONAL LIABILITY OF PUBLIC OFFICIALS. In carrying out any of the provisions hereof in exercising any authority granted by the Contract, there will be no personal liability upon any public official, it being understood that in such matters they act as agent and representative of the Owner.

ARBITRATION. Any controversy arising out of or relating to this Contract, or the breach thereof shall be settled by arbitration in accordance with the Rules of the American Arbitration Association and judgment upon the award rendered by the arbitrator or arbitrators may be entered in any Court having jurisdiction thereof.

The Contractor shall not delay the work because arbitration proceedings are pending unless he shall have written permission from the Engineer to do so. Such delay shall not extend beyond the time when the arbitrators shall have opportunity to determine whether the work shall continue or be suspended pending decision by the arbitrators of such a dispute. Any demand for arbitration shall be in writing and shall be delivered to the Engineer and any adverse party either by personal delivery or by registered mail addressed to the last known address of each within ten (10) days of receipt of the Engineer's decision, and in no event after final payment has been made and accepted, subject, however, to any express stipulation to the contrary in the Contract Documents.

TERMINATION BECAUSE OF A NATIONAL EMERGENCY. If work on this project is terminated by order of a competent Governmental authority because of a national emergency, the Owner or the Contractor, each at his option, with or without the consent of the other, may, upon seven (7) days' written notice, stop work or terminate the Contract. The Contractor shall recover payment from the Owner for all work executed, but in no event shall the Contractor be allowed any sum or sums in addition to those above specified, except that a reasonable profit may be allowed upon the work actually executed. In no event shall the Contractor be allowed any damages or any anticipated profits whatsoever.

MANUFACTURERS OF OWNER-SELECTED EQUIPMENT LIABLE FOR COMPLIANCE WITH SAFETY REQUIREMENTS. Certain equipment is to be Owner-selected and/or approved as stated in the Contract Documents. In selecting and/or approving equipment for installation in the project, the Owner assumes no responsibility for injury or claims resulting from failure of the equipment to comply with applicable National, State, and local safety codes or requirements, or the safety requirements of a recognized agency, or failure due to faulty design concepts, or defective workmanship and materials. Equipment manufacturers will be held responsible for compliance with the requirements included herein.

LOWEST ACCEPTABLE PROPOSAL. The lowest acceptable Proposal will be determined on the basis of the lowest total of the lump sum or unit price bids plus the lowest prices for each item of equipment to be selected. The lowest acceptable Proposal will be determined on the basis of the total of Schedules A and B from one Bidder. Schedule C will be evaluated separately on the basis of the lowest bid for Schedule C. The Owner reserves the right, before a contract is executed, to select for installation any manufacturer's equipment listed regardless of price, as will best suit the interests of the Owner, and the Contract amount will be adjusted accordingly.

If the items of equipment to be selected are obviously unbalanced and, in the opinion of the Engineer, are not realistic prices for the particular equipment, the Engineer may request additional information to substantiate the prices or reject the bid as provided in the Information for Bidders.

If, at the time this Contract is to be awarded, the lowest bid, as determined above, exceeds the amount of funds then estimated by the Owner as available to finance the Contract, the Owner may reject all bids.

Revised June 1970

Bureau of Labor
Public Contracts Wage Administrator
1400 S. W. Fifth
State Office Building
Portland, Oregon

Prevailing Journeyman Wage Rates in Oregon for Basic Building Trades (as determined by the Labor Commissioner pursuant to ORS 279.348 to 279.356)

The following prevailing journeyman wage rates apply to the basic construction trades -- Carpenters, Piledrivers, Cement Masons, Ironworkers, Laborers, Operating Engineers, and Teamsters; applicable to all counties in the State of Oregon for the effective period indicated.

BUILDING AND CONSTRUCTION TRADES — Effective 5-1-70 to 6-1-71

CARPENTERS

Group I — $6.03

Carpenters (journeymen), including but not limited to Acoustical & Drywall applicators
Automatic Nailing Machine Operators (all types)
Form Strippers (in accordance with Int. Agree.)
Manhold Builders (Concrete Form Construction)
Riggers, Burners, and Welders
Saw Filers, Instrument Men and Fiberglas Specialists

Group II — $6.155

Caulkers (Boat construction)
Floor Layers, Finishers
(The laying of all hardwood flooring, nailed and mastic set, parquet and wood-type tiles, and block floors, the sanding and finishing of floors, the preparation of old and new floors where the materials mentioned above are to be installed.)
Insulators (Fiberglass and similar irritating materials)
Working on Charred Material (Building construction only)
Working on Swinging, Hanging Nonrigid Scaffolding, Bos'n Chairs, or suspended from a rope or cable or from a safety belt.
(Men working on scaffolding attached to form panels or forms which are hanging or swinging are entitled to premium pay so long as the forms are hanging; after such panels are firmly attached to make them rigid, premium pay is no longer applicable)
Stationary Power Saw Operators

Foremen — $6.53

Apprentice Rates

1st	6-mo.	period	65%	of	Journeyman	rate	5th	6-mo.	period	85% of Journeyman rate
2nd	"	"	70%		"	"	6th	"	"	90% " "
3rd	"	"	75%		"	"	7th &			
4th	"	"	80%		"	"	8th	"	"	95% " "

Overtime - All work performed before and/or after any scheduled shift hours, and all work performed on Saturdays, Sundays and holidays shall be paid at double the straight time hourly rate.

CARPENTERS FRINGE BENEFTS

H & W	Pension	Vacation	Apprentice Fund	Industry Fund
$.25	.25	.25	.03	.01

PILEDRIVERS — Effective 5-1-70 to 6-1-71

Piledrivermen, Bridge, Dock & Wharf Builders	$6.13
Piledrivermen Riggers	6.13
Burnermen and Welders	6.13
Instrument Men	6.13
Boom Men	6.23
Foremen	6.63

Overtime - All work performed before and/or after any scheduled shift hours, and all work performed on Saturdays, Sundays and holidays shall be paid at double the straight time hourly rate.
15¢ premium allowance working with creosote material.

PILEDRIVERS FRINGE BENEFITS

H & W	Pension	Vacation	Apprentice Fund	Industry Fund
$.25	.25	.25	.03	.01

MILLWRIGHTS — Effective 5-1-70 to 6-1-71

Millwrights and Machine Erectors (Journeyman Riggers, Burners and Welders)	$6.28
Instrument Men	6.28
Foreman	6.78

MILLWRIGHTS FRINGE BENEFITS

H & W	Pension	Vacation	Apprentice Fund	Industry Fund
$.25	.25	.25	.03	.01

CEMENT MASONS — Effective 8-1-70 to 8-1-71

Journeyman Cement Mason	$5.91
Journeyman Mastic Worker, Composition Worker, Gunite Man, Power Machinery Operator	6.035

Overtime - Double time for overtime shall be paid for all overtime after ten (10) hours per day Monday through Friday and double time for all Saturday work. Time and one-half if notified seven days in advance for Saturday work; double time for Sundays and holidays.
Foreman - 25% above Journeyman rate

CEMENT MASONS' FRINGE BENEFITS

H & W	Pension	Apprenticeship and Training	Industry Fund
$0.30	0.25	.09	.01

IRON WORKERS — Effective 7-21-70 to 7-21-71

Structural Ironworkers	$6.83
Ornamental Ironworkers	6.83
Machinery Mover, Machinery Erector	6.83
Riggers	6.83
Signal Men	6.83
Welders and Burners	6.83
Fence Erectors	6.83
Sheeters	6.83
Reinforcing Ironworkers	6.72

Foreman - 3 men or less - not less than 30¢/hr. over Journeyman rate
4 men or more - not less than 55¢/hr. over Journeyman rate
Overtime - Double time
Apprentice - 1st year 80% of Journeyman Ironworker rate
2nd year 90% of Journeyman Ironworker rate
3rd year 95% of Journeyman Ironworker rate

IRONWORKERS' FRINGE BENEFITS

H & W	Pension	Apprenticeship
$.43	.27	.01

HOISTING AND PORTABLE ENGINEERS' WAGE RATES

Group #	Effective 6-1-70 to 6-1-71
1	$5.66
2	5.78
3	5.90
4	6.04
5	6.08
6	6.14

HOISTING AND PORTABLE ENGINEERS' WAGE RATES - contd.

Group #	Effective 6-1-70 to 6-1-71
7	6.22
8	6.30
9	6.38
10	6.42
11	6.46
12	6.50
13	6.60
14	6.74
15	6.92
16	7.08
17	7.24
18	7.40
19	7.56

HOISTING AND PORTABLE ENGINEERS' FRINGE BENEFITS

H & W	Pension	Vacation	Industry Fund
$.35	.40	.10	.03

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION

Group	Asphalt
6	Asphalt Plant Operator, (Assistant to Engineer required)
1	Plant Oiler
3	Plant Fireman
3	Pugmill Operator
8	Diesel - Electric engineer, Plant
3	Truck-mounted Asphalt Spreader, with screed
4	Screed Operator
5	Curb Machine Operator, mechanical berm, curb and/or curb and gutter
6	Asphalt Paver Operator, (Screed man required)
7	Roller Operator, asphalt or finish
	Blade
2	Blade Operator, pulled type
12	Blade Operator
13	Blade Operator, finish (Working with either red or blue tops)
13	Blade Operator, electronically controlled by wire or laser beams
13	Blade Operator, multiengine
16	Auto Grader (i.e. CMI) or "Trimmer" Operator (grade checker required)

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Bulldozers
9	Bulldozer Operator
9	Drill Cat Operator
9	Side-Boom Cat Operator
10	Bulldozer Operator, twin engine. (TC 12 and similar type)
16	Tandem Bulldozer Operator, Quad-nine and similar type
10	Cable - Plow Operator
	Compactors, Self-Propelled
4	Compactor Operator, including vibratory
5	Wagner pactor Operator or similar type (without blade)
9	Compactor Operator, with blade
10	Compactor Operator, multiengine
	Compressors
3	Compressor Operator, any power, under 1,000 cu.ft. total capacity
4	Compressor Operator, over 1,000 cu.ft. total capacity
	Concrete
1	Plant Oiler
3	Mixer Box Operator, concrete plant
4	Concrete Mixer Operator, single drum, under five (5) bag capacity
5	Batch Plant Material Control Operator
7	Concrete Mixer Operator, single drum, five (5) bag capacity and over (Assistant to Engineer required)
8	Batch Plant and/or Wet Mix Operator, one and two drum (Assistant to Engineer required)
9	Concrete Cooling Machine Operator
12	Batch Plant and/or Wet Mix Operator, three (3) units or more (Assistant to Engineer required)
11	Mixer Mobile Operator
1	Assistant Conveyor Operator
3	Concrete Conveyor Operator
7	Beltcrete Operator
7	Pumpcrete Operator
7	Cement Pump Operator, Fuller-Kenyon and similar
4	Combination Mixer and Compressor Operator, gunite work
7	Grouting Machine Operator
7	Concrete Pump Operator
3	Cement Hog Operator
3	Concrete Saw Operator, self-propelled unit
3	Wire Mat Machine Operator, or Brooming Machine Operator
3	Concrete Curing Machine Operator, self-propelled

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Concrete - contd.
4	Screed Operator
6	Maginnis Internal Full Slab Vibrator Operator
6	Concrete Finishing Machine Operatory, Clary, Johnson, Bidwell, Burgess bridge deck or similar type
6	Curb Machine Operator, mechanical berm, curb and/or curb and gutter
6	Concrete Joint Machine Operator
6	Concrete Planer Operator
6	Cast-in-place Pipe Laying Machine Operator
7	Tower Mobile Operator
6	Concrete Paving Machine Operator (Assistant to Engineer required)
6	Concrete Finishing Machine Operator
6	Concrete Spreader Operator
13	Concrete Paving Road Mixer Operator
16	Automatic Concrete Slip Form Paver Operator (Assistant to Engineer required)
5	Power Jumbo Operator setting slip forms, etc., in tunnels
5	Slip Form Pumps, power driven hydraulic lifting device for concrete forms.
16	Concrete Canal Liner Operator (Assistant to Engineer required)
	Crane
1	Oiler
2	Truck Crane Oiler-driver, 25 ton capacity or over
2	Fireman, all equipment
2	A-Frame Truck Operator, single drum
7	A-Frame Truck Operator, double drum
2	Tugger or Coffin Type Hoist Operator, any power
7	Boom Truck Operator
5	Hoist Operator, single drum
12	Hoist Operator, two drum
12	Hoist Operator, three (3) or more drums
4	Helicopter Hoist Operator
5	Elevator Operator
13	Bridge Crane Operator, locomotive, gantry, overhead
9	Chicago Boom and similar types
9	Lift Slab Machine Operator
9	Boom Type Lifting Device, five (5) ton capacity or less
9	Cherry Picker or similar type crane-hoise, five (5) ton capacity or less
13	Derrick Operator, under one-hundred (100) ton. [Two (2) operators required when swing control is remote from hoist]
13	Hoist Operator, stiff leg, Guy Derrick or similar type, fifty (50) ton and over
13	Cableway Operator, up to twenty-five (25) ton

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Crane - contd.
16	Cableway Operator, twenty-five (25) ton and over
11	Crane Operator, twenty-five (25) ton and under (Assistant to Engineer required) (except for rough terrain)
13	Crane Operator, over twenty-five (25) ton and including forty (40) ton. (Assistant to Engineer required)
16	Crane Operator, over forty (40) ton and including one-hundred (100) ton (Assistant to Engineer required)
17	Crane Operator, over one-hundred (100) ton and including two-hundred (200) ton (Assistant to Engineer required)
18	Crane Operator, over two-hundred (200) ton (Assistant to Engineer required)
13	Tower Crane Operator
16	Whirley Operator, eighty (80) ton and under (Assistant to Engineer required)
17	Whirley Operator, over eighty (80) ton and including one-hundred fifty (150) ton (Assistant to Engineer required)
18	Whirley Operator, one-hundred fifty (150) ton and over (Assistant to Engineer required)
19	Helicopter Operators, when used in erecting work
	Crusher
1	Crusher Oiler
1	Crusher Feederman
8	Generator Operator
8	Diesel - Electric Engineer
9	Grizzley Operator
9	Crusher Plant Operator (Assistant to Engineer and Feederman required)
	Drilling
2	Drill Helper
2	Auger Oiler
7	Churn Drill and Earth Boring Machine Operator (Assistant to Engineer)
9	Drill Doctor
9	Boring Machine Operator (Assistant to Engineer)
10	Driller - Percussion, Diamond, Core, Cable, Rotary and similar types (Assistant to Engineer required)
	Floating Equipment
1	Deckhand
4	Fireman
2	Boatman
8	Diesel - Electric Engineer
13	Piledriver Operator (not crane type) (Deckhand required)

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Floating Equipment - contd.
13	Floating Clamshell, etc., Operator, under one (1) cu.yd. (Fireman or Diesel - Electric Engineer required)
16	Floating Clamshell, etc. Operator, three (3) cu.yd. and over (Fireman or Diesel - Electric Engineer required)
10	Jack Operator, elevating barges
	Barge Operator, self-unloading (Assistant to Engineer required)
13	Floating Crane (Derrick Barge) Operator, less than thirty (30) ton (Assistant to Engineer required)
16	Floating Crane (Derrick Barge) Operator, thirty (30) ton but less than eighty (80) ton (Assistant to Engineer)
17	Floating Crane (Derrick Barge) Operator, eighty (80) ton but less than one-hundred fifty (150) ton (Assistant to Engineer and Deckhand required)
18	Floating Crane, one-hundred fifty (150) ton but less than two-hundred fifty (250) ton (Assistant to Engineer and Deckhand required)
19	Floating Crane, two-hundred fifty (250) ton and over (Assistant to Engineer and Deckhand required)
	Forklift
1	Self-propelled Scaffolding Operator, construction job site
2	Fork Lift or Lumber Stacker Operator, construction job site
3	Ross Carrier Operator, construction job site
4	Fork Lift Operator, over five (5) ton
15	Rock Hound Operator
4	Lull Hi-Lift Operator or similar type [twenty (20) ft. or over]
	Generators
8	Diesel - Electric Engineer (Generator Operator)
	Heating Plant
2	Temporary Heating Plant Operator
9	Surface Heater and Planer Operator
	Hydraulic Hoes
7	Hydraulic Backhoe Operator, wheel type 3/8 cu.yd. and under with or without front end attachements 2-1/2 cu.yd. and under (Ford, John Deere, Case, type)
9	Hydrualic Backhoe Operator, track type 3/8 cu.yd.
	NOTE: Over 3/8 cu.yd. takes Shovel classification rate

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Loaders
3	Bucket Elevator Loader Operator, Barger Greene and similar types
6	Loaders, rubber-tired type, 2-1/2 cu.yd. and under
7	Elevating Grader Operator, tractor towed requiring operator or grader
8	Belt Loaders, Kolman and Ko Cal types
9	Loader Operator, front end and overhead, 2-1/2 cu.yd. and under 4 cu.yd.
13	Elevating Grader Operator, operated by tractor operator, Sierra, Euclid or similar types
15	Loader Operator, 4 cu.yd. but less than 6 cu.yd.
16	Loader Operator, 6 cu.yd. but less than 8 cu.yd.
16	Loader Operator, 8 cu.yd. but less than 12 cu.yd.
17	Loader Operator, 12 cu.yd. and over
12	Elevating Loader Operator, Athey and similar types
	Oilers
1	Oiler
2	Truck Crane Oiler - Driver, 25 ton or over
2	Auger Oiler
1	Guard Rail Punch Oiler
4	Service Oiler (Greaser)
2	Grade Oiler, required to check grade
2	Grade Checker
	Piledrivers
	NOTE: Crane rates apply when driving or pulling piling.
12	Piledriver Operator (not crane type) (Assistant to Engineeer required)
	Pipeline - Sewer Water
2	Tar Pot Fireman
2	Tar Pot Fireman (power agitated)
3	Hydraulic Pipe Press Operator
4	Hydra Hammer or similar types
4	Pavement Breaker Operator
9	Pipe Cleaning Machine Operator
9	Pipe Doping Machine Operator
9	Pipe Bending Machine Operator
9	Pipe Wrapping Machine Operator
9	Boring Machine Operator (Assistant to Engineer)
13	Back Filling Machine Operator (Assistant to Engineer required)

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Pumps
1	Pump Operator, under 4"
3	Pump Operator, any power, 4" and over
3	Hydrostatic Pump Operator
4	Pump Operator, more than 3 any size
7	Pot Rammer Operator
	Railroad Equipment
1	Brakeman
1	Oiler
3	Motorman
4	Locomotive Operator, under 40 tons (Assistant to Engineer required)
3	Ballast Jack Tamper Operator
7	Ballast Regulator Operator
7	Ballast Tamper Multipurpose Operator
7	Track Liner Operator
7	Tie Spacer Operator
7	Shuttle Car Operator
7	Locomotive Operator, 40 tons and over (Assistant to Engineer required)
1	Switchman
	Remote Control
19	Remote Controlled Earth Moving Equipment (no one operator shall operate more than two pieces of earth-moving equipment at one time)
	Repairmen, H. D.
2	H. D. Repairman Helper
2	Welders Helper
1	Parts Man (Tool Room)
8	Diesel - Electric Engineer (Plant or Floating)
9	Bolt Threading Machine Operator
9	Drill Doctor (Bit Grinder)
9	H. D. Mechanic
9	H. D. Welder
10	Combination H. D. Mechanic-Welder, when dispatched and/or when required to do both
10	Welder - Certified, when dispatched and/or required
9	Machine Tool Operator
	Rubber-Tired Scrapers
12	Rubber-Tired Scraper Operator, single engine, single scraper

Group	Rubber-Tired Scrapers - contd.
12	Self-Loading, paddle wheel ladder type
12	Rubber-Tired Scraper Operator, twin engine
12	Rubber-Tired Scraper Operator, with push-pull attachments
14	Rubber-Tired Scraper Operator, with tandem scrapers
16	Rubber-Tired Scraper Operator, with tandem scrapers, multiengine
	Shovel, Dragline, Clamshell, Backhoe, Skooper, etc., Operator
1	Oiler
1	Guard Rail Punch Oiler
2	Grade Oiler, (required to check grade)
2	Grade Checker
2	Fireman
8	Diesel-Electric Engineer
9	Stationary Drag Scraper Operator
11	Shovel, Dragline, Clamshell, Hoe, etc., Operator, under 1 cu.yd. (Assistant to Engineer required)
11	Gradeall Operator, under 1 cu.yd. (Assistant to Engineer required)
16	Shovel, etc., 3 cu.yd. but less than 5 cu.yd. (Assistant to Engineer required)
13	Gradeall, 1 cu.yd. and over (Assistant to Engineer required)
17	Shovel, etc., 5 cu.yd. and over (Assistant to Engineer required)
	Signalman
3	Bell Boy, Phones, etc., Operator
2	Helicopter Radioman (ground)
	Surfacing (Base) Material
2	Roller Operator, rock
4	Roller Operator, oiling, CTB.
3	Tamping Machine Operator, mechanical self-propelled
3	Hydrographic seeder Machine Operator, straw, pulp or seed
6	Rock Spreader, self-propelled
12	Blade Mounted Spreaders, Ulrich and similar types
5	Chip Spreading Machine Operator
5	Lime Spreading Operator, construction job site
	Sweepers
3	Broom Operator, self-propelled, construction job site
5	Sweeper Operator (Wayne type) self-propelled, construction job site

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group	Tractor - Rubber-Tired
5	Tractor Operator, rubber-tired 50 H.P. Flywheel and under
9	Tractor Operator, rubber-tired over 50 H.P. Flywheel
9	Tractor Operator, rubber-tired with boom attachment
10	Rubber-Tired Dozers and Pushers (Michigan, Cat, Hough type)
	Trenching Machines
1	Oiler
2	Grade Oiler (required to check grade)
5	Trenching Machine Operator, maximum digging capacity 3 ft. depth (any assistance in the operation shall be performed by any assistant to Engineer)
9	Trenching Machine Operator, maximum digging capacity over 3 ft. depth (Grade Oiler required)
13	Back Filling Machine Operator (Assistant to Engineer)
16	Wheel Excavator, under 750 cu.yd. per hour (Grade Oiler required)
17	Canal Trimmer (Grade Oiler required)
18	Wheel Excavator, over 750 cu.yd. per hour (Two operators and at least one Grade Oiler required)
18	Band Wagons (in conjuction with wheel excavator)
	Tunnel
11	Mucking Macine Operator
12	Shield Operator
3	Air Filtration Equipment Operator
	Welding Machines
3	Welding Machine Operator
	Underwater Equipment
19	Underwater Equipment Operator, remote or otherwise, when used in construction work

Rev: Jul. '70

Foreman

Fifty cents (50¢) per hour above highest paid classification under his supervision.

Underground Work

Premium pay of forty cents (40¢) per hour above the classification rate applicable for any and all work performed underground, including operating, servicing, and repairing of equipment. Such premium pay shall be paid for the entire shift worked.

HOISTING AND PORTABLE ENGINEERS' GROUP CLASSIFICATION - contd.

Group Working Suspended

Twenty-five cents (25¢) premium pay above the classification rate per hour shall be paid any employee who works suspended by a rope or cable and shall apply for the full shift.

1. All attachment towed, unless otherwise listed, take the rate of Power Unit towing.
2. Measurements are S.A.E. Rating.
3. All tonnage is maximum safe lifting capacity.
4. Crane rates apply when driving or pulling piling.
5. Listing of machine classifications in groups is for convenience of finding and in no way does it restrict any machine and/or classification.
6. Assistant to Engineer classification may include any of the following: Brakeman, Deckhand, Oiler, Truck Crane Oiler, Guard Rail Punch Oiler, Auger Oiler, Plant Oiler, Switchman, Signalman, H. D. Repairman Helper, Welders Helper, Crusher Feederman, Assistant Conveyor Operator, Grade Oiler, Fireman, Drill Helper.

NOTE: (Working with other Crafts) --- All operators, oilers, and firemen working for two (2) hours or more with another craft with a better overtime rate, subsistence and/or travel-transportation, the operator, oiler or fireman will receive the better conditions in these items for any day or part thereof. Working with riggers or signalmen shall be considered working with another craft.

LABORERS - Heavy, Highway, Utility and Building Construction Work

Group I — Effective 6-1-70 to 6-1-71

Includes General Laborers and the following: $4.85
Asphalt Plant Laborers
Asphalt Spreaders
Batch Weighmen
Broomers
Brush Burners and Cutters

LABORERS - Heavy, Highway, Utility and Building Construction Work - contd.

Group I - contd. Effective 6-1-70 to 6-1-71

Car and Truck Loaders	$4.85
Carpenter Tender	
Change-House Man or Dry Shack Man	
Choker Setters	
Clean Up Laborers	
Concrete Laborers	
Crusher Feeders	
Culvert, Hand Labor	
Curing, Concrete	
Demolition, Wrecking, and Moving Laborers	
Driller Helpers	
Dumpers, road oiling crew	
Dumpmen (for grading crew)	
Elevator Feeders	
Fence Builder (Including Guard Rail, Median Rail, Reference Post, Guide Post, Right-of-Way Marker)	
Fine Graders	
Flagmen, Traffic	
Form Strippers (not swinging stages)	
Landscaping or Planting Laborers	
Leverman on Aggregate Spreader (Flaharty and similar types)	
Loading Spotters	
Material Yard Man (including electrical)	
Powderman Helper	
Pittsburgh Chipper Operator or similar types	
Railroad Track Laborers	
Ribbon Setters (including steel forms)	
Riprap Man (hand placed)	
Road Pump Tender	
Sewer Labor	
Signalman	
Skipmen	
Slopers	
Spraymen	
Stake Chaser-Stake Setter-Grade Checker	
Stockpiler	
Timber Faller and Bucker (hand labor)	
Toolroom Man (at job site)	
Tunnel Bull Gang (above ground)	
Weigh Man-Crusher Aggregate (when used)	

Group II Effective 6-1-70 to 6-1-71

Applicator (including Pot Tender for same), applying protective material by hand or nozzle on utility lines or storage tanks on project	$5.00
Burners	
Choker Splicer	

LABORERS - Heavy, Highway, Utility and Building Construction Work - contd.

Group II - contd. Effective 6-1-70 to 6-1-71

Clary Power Spreader and similar types	$5.00
Clean Up Nozzlemen-Greencutter (concrete Rock, etc.)	
Concrete Power Buggyman	
Demolition and Wrecking Charred Materials	
Gunite Nozzleman Tender	
Gunite or Sand Blasting Pot Tender	
Handlers or Mixers of all insulating material of an irritating nature (including cement and lime)	
Power Tool Operators, includes but not limited to:	
Jackhammer	
Chipping Guns	
Paving Breakers	
Vibrators (less than 4" in diameter)	
Post Hole Digger, Air, Gas or Electric	
Vibrating Screed	
Tampers	
Ribbon Setter, head	
Riprap Man (head, hand placed)	
Sand Blasting (wet)	
Sewer Timberman	
Timber Buckers and Fallers, Brush Cutters (power saw)	
Tunnel-Muckers, Brakemen, Concrete Crew, Bull Gang (underground)	

Group III Effective 6-1-70 to 6-1-71

Asphalt Rakers	$5.15
Bit Grinder	
Drill Doctor	
Drill Operators, Air Tracks, Cat Drills, Wagon Drills, Rubber-Mounted Drills, and other similar types	
Concrete Saw Operator	
Gunite Nozzleman	
High Scalers, Strippers and Drillers (cover work in swinging stages, chairs or belts under extreme conditions unusual to normal drilling, blasting, barring-down, or sloping and stripping)	
Powdermen	
Power Saw Operators (bucking and falling merchantable logs)	
Pumpcrete Nozzleman	
Sand Blasting (dry)	
Sewer Pipe Layers	
Track Liners, Anchor Machines, Ballast Regulators, Multiple Tampers, Power Jacks	
Tugger Operator	
Tunnel--Chuck Tenders, Nippers, and Timbermen	
Vibrators (4" and larger)	

LABORERS - Heavy, Highway, Utility and Building Construction Work - contd.

Group III - contd.	Effective 6-1-70 to 6-1-71
Water Blaster	$5.15
Welder	
Tunnel Miners	
Tunnel Powdermen	

Any Laborers working in live sewers shall receive $5.00 per day in addition to his regular pay.

Group IV	Effective 6-1-70 to 6-1-71
Tunnel Miners	$5.30
Tunnel Powderman	

LABORERS FRINGE BENEFITS

H & W	Pension	Vacation	Training	Industry Fund
$.35	.40	.10	.02	.03

TEAMSTERS - Building and Highway and Heavy Construction Work

	Effective 6-1-70 to 6-1-71
A-Frame or Hydra-lift Truck w/load bearing surface	$5.53
Battery Rebuilder	5.48
Bus or Man-haul Driver	5.48
Concrete Buggies (power operated)	5.48
Drivers & Helpers handling sacked cement add 15¢ per hour	
Dump Truck, side, end and bottom dumps, incl. semitrucks and trains or combinations thereof:	
6 cu.yd. & under	5.48
Over 6 cu.yd. & inc. 10 cu.yd.	5.58
Over 10 cu.yd. & inc. 20 cu.yd.	5.78
Over 20 cu.yd. & inc. 30 cu.yd.	5.88
Over 30 cu.yd. & inc. 40 cu.yd.	5.98
Over 40 cu.yd. & inc. 50 cu.yd.	6.08
Over 50 cu.yd. & inc. 60 cu.yd.	6.25
Over 60 cu.yd. & inc. 70 cu.yd.	6.35
Over 70 cu.yd. & inc. 80 cu.yd.	6.45
Over 80 cu.yd. & inc. 90 cu.yd.	6.55
Over 90 cu.yd. & inc. 100 cu.yd.	6.65
Dumpsters or similar equipment - all sizes	5.68
Flaherty Spreader Driver or Leverman	5.63
Lift Jitneys, Fork Lifts - all sizes - used in loading, unloading and transporting material on job site	5.48
Loader and/or Leverman on concrete dry batch plant, manually operated	5.48
Low Bed Equipment, Flat Bed Semitrailer, Truck and Trailer or Doubles transporting equipment or wet or dry materials	5.63

TEAMSTERS - Building and Highway and Heavy Construction Work - contd.

Effective 6-1-70 to 6-1-71

Lubrication Man, Fuel Truck Driver, Tiremen, Wash Rack, Steam Cleaner Combination	5.53
Lumber Carrier Driver-straddle carrier--used in loading, unloading and transporting of materials on job site	5.63
Oil Distributor Driver or Leverman	5.63
Pilot Car	5.48
Slurry Truck Driver or Leverman	5.58
Solo Flat Bed and Misc. Body Trucks 0-10 tons	5.48
Transit Mix and Wet or Dry Mix Trucks:	
5 cu.yd. and under	5.58
Over 5 cu.yd. & inc. 7 cu.yd.	5.68
Over 7 cu.yd. & inc. 9 cu.yd.	5.78
Over 9 cu.yd. & inc. 11 cu.yd.	5.88
Over 11 cu.yd. & inc. 13 cu.yd.	5.98
Over 13 cu.yd. & inc. 15 cu.yd.	6.08
Team Drivers	5.53
Tireman, full-time basis	5.58
Truck Helper	5.48
Truck Mechanic-welder-body repairman	5.78
Truck Mechanic Helper	5.48
Warehouseman (warehouse parts, tool men and parts chaser, checkers and receivers)	5.48
Water Wagons (rated capacity)	
Up to 1600 gallons	5.48
1600 to 3000 gallons	5.58
3000 to 5000 gallons	5.63
5000 to 7000 gallons	5.78
7000 to 10,000 gallons	5.88
10,000 to 15,000 gallons	5.98
Winch Truck--takes classification of truck on which winch is mounted	

TEAMSTERS FRINGE BENEFITS

H & W	Pension	Vacation	Industry Fund
$.30	.30	.05	.02

ORS 279.316 Condition concerning hours of labor.

Every public contract shall also contain a condition that no person shall be employed for more than eight hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, and in such cases the laborer shall be paid at least time and a half pay for all overtime in excess of eight hours a day and for work performed on Saturday and on any legal holiday specified in ORS 187.010, except Veterans Day. However, when specifically agreed to under a written labor-management negotiated labor agreement, a laborer may be paid at least time and a half pay for work performed on Veterans Day or on any legal holiday specified in ORS 187.020.
(Amended by 1967 c.167 §1)

ORS 279.334 Maximum hours of labor on public contracts.

In all cases where labor is employed by the state, county, school district, municipality, municipal corporation, or subdivision, through a contractor, no person shall be required or permitted to labor more than eight hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, in which event, the person or persons so employed for excessive hours shall receive at least time and a half pay for all overtime in excess of eight hours a day, and for work performed on Saturday and on any legal holiday specified in ORS 187.010, except Veterans Day. However, when specifically agreed to under a written labor-management negotiated labor agreement, a laborer may be paid at least time and a half pay for work performed on Veterans Day or on any legal holiday specified in ORS 187.020. This section shall not apply to labor performed in the prevention or suppression of fire under contracts and agreements made pursuant to the authority of the State Forester or State Board of Forestry, under ORS 477.406.
(Amended by 1963 c.241 §1; 1967 c.167 §2)

ORS 187.010 Legal holidays; acts deferred to next business day.

(1) The following days are legal holidays in this state:
(a) Each Sunday.
(b) New Year's Day on January 1.
(c) Memorial Day on May 30.
(d) Independence Day on July 4.
(e) Labor Day on the first Monday in September
(f) Veterans Day on November 11.
(g) Thanksgiving Day on the fourth Thursday in November.
(h) Christmas Day on December 25.
If any of such holidays, other than Sunday, at any time fall on Sunday, the succeeding Monday shall be a holiday in that year.
(2) Any act authorized, required or permitted to be performed on a holiday as designated in this section may be performed on the next succeeding business day; and no liability or loss of rights of any kind shall result from such delay.
(Amended by 1955 c.4 §1)

ORS 187.020 Additional legal holidays.

In addition to those specified in ORS 187.010, the following days are legal holidays in this state:
(1) Lincoln's Birthday on February 12.
(2) Washington's Birthday on February 22.
(3) Every day on which an election is held throughout the state.
(4) Every day appointed by the President of the United States or by the Governor as a holiday.
If any of such holidays at any time fall on Sunday, the succeeding Monday shall be a holiday in that year.

Prevailing Journeyman Wage Rates in Oregon
for Specialty Building Trades

as determined by the Commissioner of Labor
pursuant to ORS 279.348 thru 279.356, and
ORS 369, 1969

The following prevailing journeyman wage rates, including fringe benefits, apply to the specialty construction trades in Newberg, Oregon, and vicinity, as of 6 July 1970, and for the effective period designated by the Commissioner of Labor:

Craft Classification	Minimum Rate Per Hour Including Fringe Benefits
Electrical Workers	
Journeymen	$7.04
Painters	
Journeymen Brush	6.085
High	6.875
Plumbers	
Journeymen	7.34
Roofers	
Journeymen	5.79
Sheet Metal Workers	
Journeymen	6.75

In the event it is necessary to employ workmen in a classification not listed, the Contractor shall make application to the Commissioner of Labor for the determination of the prevailing wage rate for such workmen. If a dispute arises as to what is the prevailing wage rate for any class of workmen, and, if the dispute cannot be settled by the parties involved, it may be referred to the Commissioner of Labor, State of Oregon, for final determination.

In some cases the minimum wage rates for certain crafts are not available at this time. The Contractor, in making a bid, hereby agrees to pay not less than the minimum wage rates established by the governmental agency having jurisdiction over the wage rates for these crafts.

The Owner does not guarantee that labor can be procured for the wages set forth in the above Prevailing Journeyman Wage Rates. The rates of wages listed are minimum only, below which the Contractor cannot pay, and they do not constitute a representation that labor can be procured for the minimum listed.

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OREGON

PUBLIC WORKS CONTRACTOR WAGE CERTIFICATION

NAME AND ADDRESS OF CONTRACTOR OR SUBCONTRACTOR	DATE OF CERTIFICATION
	CERTIFICATE FOR PERIOD ENDING

DESCRIPTION AND LOCATION OF WORK

INSTRUCTIONS:

1. Oregon Law (ORS 279.348 - 279.356) specifies that no payment may be made on public work contracts unless the contractor or subcontractor, or surety, provides a certificate stating the hourly rate of wages paid to the workmen; and also certifying that such rate is not below the prevailing rates for the locality as determined by the Commissioner of the Bureau of Labor. This form is required in making such certification.
2. Submit this completed form in duplicate before the first payment, each time the prevailing wage rate changes, and before the final payment. (Note: Prevailing rates generally change on July 1 of each year.)
3. List below each craft employed by you and the hourly rate paid. It is not necessary to list each employe. Supervisory and office personnel or other workmen on regular monthly or per diem salary need not be listed.
4. Complete the affidavit on this form and have it notarized.

TRADE OR OCCUPATION CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFITS PAYMENTS				
		H&W	PENSIONS	VAC. & HOLIDAY	APP. OR TR.	OTHERS

ADDITIONAL SPACE ON BACK

TRADE OR OCCUPATION CLASSIFICATION	BASIC HOURLY WAGE	FRINGE BENEFITS PAYMENTS				
		H&W	PENSIONS	VAC. & HOLIDAY	APP. OR TR.	OTHERS

APPRENTICE NAME	TRADE	PERIOD	BASIC HOURLY WAGE	H&W	PENSIONS	VAC. & HOLIDAY	APP. OR TR.	OTHERS

OVERTIME PROVISIONS

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

AFFIDAVIT

Being first duly sworn, I hereby certify that the hourly rate of wages shown on this form was paid each classification of workmen employed by me (my principal) upon the public work project specified above. I further certify that no workmen employed by me (my principal) upon said public work has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the contract for said public work. I have read this statement and certificate and know the contents thereof and the same is true to my knowledge.

SIGNATURE | TITLE

☐ CONTRACTOR ☐ SUBCONTRACTOR ☐ CONTRACTOR'S SURETY ☐ SUBCONTRACTOR'S SURETY

SUBSCRIBED AND SWORN TO BEFORE ME

NOTARY PUBLIC

DATED | COMMISSION EXPIRES

A. DEFINITIONS

A-1. Contract Documents. The "Contract Documents" consist of the Advertisement for Bids, the Proposal, the Contract, the Performance Bond, the Information for Bidders, the Special Provisions, the General Conditions, the Specifications, and the Plans, including all modifications thereof incorporated into the Documents before their execution. These form the Contract.

A-2. Owner, Contractor, Bidder. The "Owner," "Contractor," and "Bidder" are those named as such in the Contract Documents.

A-3. Engineer. Wherever the word "Engineer" occurs in these Contract Documents, the word shall signify the firm of Cornell, Howland, Hayes & Merryfield, which has been designated by the Owner to be the Engineer for the work.

A-4. Written Notice. The term "Written Notice" shall signify a written communication delivered in person or by certified or registered mail to the individual, or to a member of the firm, or to an officer of the corporation for whom it is intended. Certified or registered mail shall be addressed to the last business address known to him who gives the notice.

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A-5. Work. The word "Work" within these Contract Documents shall include all material, labor, tools, and all appliances, machinery, transportation, and appurtenances necessary to perform and complete the Contract, and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item described or indicated and as required by good practice to provide a complete and satisfactory system or structure.

B. CONTRACT DOCUMENTS

B-1. Intent of Contract Documents. The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intent of the Documents is to include all work (except specific items to be furnished by the Owner), necessary for completion of the Contract. Materials or work described in words which so applied have a well-known technical and trade meaning shall be held to refer to such recognized standards.

B-2. Discrepancies and Omissions. Any discrepancies or omissions found in the Contract Documents shall be reported to the Engineer immediately. The Engineer will clarify discrepancies or omissions, in writing, within a reasonable time.

In resolving inconsistencies among two (2) or more sections of the Contract Documents, precedence shall be given in the following order:

Contract
Special Provisions
General Conditions
Special Specifications
Plans
Standard Specifications

Figure dimensions on Plans shall take precedence over scale dimensions; detailed Plans shall take precedence over general Plans.

B-3. Alterations. The Owner, without invalidating the Contract, may order extra work or make changes by altering, adding to, or deducting from the work, the Contract being adjusted accordingly. All such work shall be executed under the conditions of the original Contract, except as specifically adjusted at the time of ordering such change.

In giving instructions, the Engineer may order minor changes in the work not involving extra cost and not inconsistent with the purposes of the structure; but otherwise, except in an emergency endangering life or property, extra work or deductions from the work shall be performed only in pursuance of a written order from the Owner, signed or countersigned by the Engineer, or a written order from the Engineer stating that the Owner has authorized the deduction, extra work, or change; and no claim for additional payment shall be valid unless so ordered.

If the work is reduced by alterations, such action shall not constitute a claim for damages based on loss of anticipated profits.

B-4. Verification and Warranty. The Contractor shall determine the nature and location of the work, the general and local conditions, and all other matters which can in any way affect the work under this Contract. Failure to make an examination necessary for this determination shall not release the Contractor from the obligations of this Contract. The Contractor warrants that no verbal agreement or conversation with any officer, agent, or employee of the Owner, either before or after the execution of this Contract, has affected or modified any of the terms or obligations herein contained.

B-5. Copies to be Kept on the Work. The Contractor shall keep one (1) copy of the Contract Documents on the work, in good order, available to the Engineer and to his representatives.

B-6. Copies to be Furnished. The Engineer will furnish to the Contractor, on request and free of charge, six (6) copies of the Contract Documents and six (6) sets of full-size Plans or a sepia of the tracings. Additional copies of Contract Documents or Plans may be obtained on request by paying the actual cost of reproducing the Contract Documents or Plans.

B-7. Ownership of Drawings. All Plans, Drawings, Specifications, and copies thereof furnished by the Engineer are his property. They are not to be used on other work and, with the exception of the signed Contract set, are to be returned to him on request at the completion of the work. All models are the property of the Owner.

C. THE ENGINEER

C-1. Authority of the Engineer. The Engineer shall be the Owner's representative during the construction period. His authority and responsibility shall be limited to the provisions set forth in these Contract Documents. The Engineer shall have the authority to reject all work and materials and to stop the work whenever such rejection and/or stoppage may be necessary to insure execution of the Contract in accordance with the intent of the Contract Documents.

C-2. Duties and Responsibilities of the Engineer. The Engineer shall make periodic visits to the site of the project to observe the progress and quality of the work and to determine, in general, if the work is proceeding in accordance with the intent of the Contract Documents. He shall not be required to make comprehensive or continuous inspections to check quality or quantity of the work, and he shall not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the work. Visits and observations made by the Engineer shall not relieve the Contractor of his obligation to conduct comprehensive inspections of the work and to furnish materials and perform acceptable work, and to provide adequate safety precautions, in conformance with the intent of the Contract.

The Engineer shall make decisions, in writing, on all claims of the Owner or the Contractor arising from interpretation or execution of the Contract Documents. Such decision shall be necessary before the Contractor can receive additional money under terms of the Contract. Changes in work or extra work ordered by the Engineer shall be made in compliance with Article B-3 of the General Conditions.

One or more inspectors may be assigned to observe the work and to act in matters of construction under this Contract. It is understood that such inspectors shall have the power to issue instructions and make decisions within the limitations of the authority of the Engineer. Such inspection shall not relieve the Contractor of his obligations to conduct comprehensive inspections of the work and to furnish materials and perform acceptable work, and to provide adequate safety precautions, in conformance with the intent of the Contract.

C-3. Rejected Material. Any material condemned or rejected by the Engineer or his authorized inspector because of nonconformity with the Contract Documents shall be removed at once from the vicinity of the work by the Contractor at his own expense, and the same shall not be used on the work.

C-4. Unnoticed Defects. Any defective work or material that may be discovered by the Engineer before the final acceptance of work, or before final payment has been made, or during the guarantee period, shall be removed and replaced by work and materials which shall conform to the provisions of the Contract Documents. Failure on the part of the Engineer to condemn or reject bad or inferior work or materials shall not be construed to imply acceptance of such work or materials.

C-5. Right to Retain Imperfect Work. If any part or portion of the work done or material furnished under this Contract shall prove defective and not in accordance with the Plans and Specifications, and if the imperfection in the same shall not be of sufficient magnitude or importance as to make the work dangerous or undesirable, or if the removal of such work will create conditions which are dangerous or undesirable, the Owner shall have the right and authority to retain such work but shall make such deductions in the final payment therefor as may be just and reasonable.

C-6. Lines and Grades. Lines and grades shall be established as provided in the Special Provisions. The Contractor shall make every effort to notify the Engineer at least three (3) days in advance of the time when the line and grade will be needed. The Contractor will not be allowed extensions of time because of delays caused by insufficient line and grade. All stakes, marks, and other information shall be carefully preserved by the Contractor; and in cases of their careless or unnecessary destruction or removal by him or his employees, such stakes, marks, and other information shall be replaced by the Engineer at the Contractor's expense. The Contractor shall be responsible for the transfer to the structure of the lines and grades as set by the Engineer.

C-7. Shop Drawings. The Contractor shall submit, in quadruplicate, to the Engineer for his review, such shop drawings and/or catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) required for the construction. Drawings shall be submitted in sufficient time to allow the Engineer not less than ten (10) regular working days for examining the drawings.

These drawings shall be accurate, distinct, and complete, and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract drawings and Specifications.

Unless otherwise approved by the Engineer, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the drawings, or other approved means, that he (the Contractor) has checked the shop drawings, and that the work shown is in accordance with Contract requirements and has been checked for dimensions and relationship with work of all other trades involved. The practice of submitting incomplete or unchecked shop drawings for the Engineer to correct or finish will not be acceptable; and shop drawings which, in the opinion of the Engineer, clearly indicate that they have not been checked by the Contractor will be considered as not complying with the intent of the Contract Documents and will be returned to the Contractor for resubmission in the proper form.

When the shop drawings have been reviewed by the Engineer, two (2) sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the drawing may be rejected and one (1) set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the drawings, in quadruplicate, unless otherwise directed by the Engineer. No changes shall be made by the Contractor to resubmitted shop drawings other than those changes indicated by the Engineer.

The review of such drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details and space requirements, or for deviations from the Contract drawings or Specifications, unless the Contractor has called attention to such deviations in writing by a letter accompanying the drawings and the Engineer approves the change or deviations in writing at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, the Contractor shall state in his letter whether or not such deviations involve any deduction or extra cost adjustment.

C-8. Detail Drawings and Instructions. The Engineer will furnish, with reasonable promptness, additional instructions by means of drawings or otherwise, if, in the Engineer's opinion, such are required for the proper execution of the work. All such drawings and instructions will be consistent with the Contract Documents, true developments thereof, and reasonably inferable therefrom.

D. THE CONTRACTOR AND HIS EMPLOYEES

D-1. Subcontracting. The Contractor shall, as soon as practicable after the execution of the Contract, notify the Engineer, in writing, of the names of the subcontractors proposed for the principal parts of the work and for such others as the Engineer may direct, and shall not employ any that the Engineer may within a reasonable time object to as lacking the capability to properly perform work of the type and scope specified.

The Contractor agrees that he is 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.

Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the Owner.

D-2. Performance Bond. The Contractor shall furnish a surety bond of the form included herewith, in an amount at least equal to the total amount of the Proposal, as security for the faithful performance of the Contract and the payment of all persons supplying labor and materials for the construction of the work, and to cover all guarantees against defective workmanship or materials, or both, for a period of one (1) year after the date of final acceptance of the work by the Owner. Said bond shall be issued by a surety company authorized to issue such bonds in the State of Oregon and must, in all respects, be satisfactory and acceptable to the Owner.

D-3. Insurance. The Contractor shall provide the insurance coverage designated hereinafter and pay all costs.

a. Contractor's and Subcontractor's Insurance. The Contractor shall not commence work under this Contract until he has obtained all the insurance required hereunder and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on

his subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Approval of the insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder.

b. Compensation and Employer's Liability Insurance. The Contractor shall take out and maintain during the life of this Contract the statutory Workmen's Compensation and Employer's Liability Insurance for all of his employees to be engaged in work on the project under this Contract and, in case any such work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work.

c. Public Liability and Property Damage Liability Insurance. The Contractor shall take out and maintain during the life of this Contract such Public Liability and Property Damage Liability Insurance and Automobile Public Liability and Property Damage Liability Insurance as shall protect him, the Owner, the Engineer, and any subcontractor performing work covered by this Contract from claims for damages for personal injury, including accidental death, as well as from claims for property damage, which may arise from operations under this Contract, whether such operations be by himself or by any subcontractor or by anyone directly or indirectly employed by either of them, and the amounts of such insurance shall be not less than:

(1) Public Liability Insurance in an amount not less than One Hundred Thousand Dollars ($100,000.00) for injuries, including wrongful death to any one person, and subject to the same limit for each person in an amount not less than Three Hundred Thousand Dollars ($300,000.00) for each occurrence.

(2) Property Damage Liability Insurance in an amount not less than One Hundred Thousand Dollars ($100,000.00) for damages for each occurrence.

The Contractor's Public Liability Insurance and Property Damage Liability Insurance shall provide the primary coverage on all claims arising out of the performance of the Contract, and shall name the Owner, its officers, agents, and employees, and the Engineer as additional named insureds therein.

d. State Highway Department Insurance Coverage. When the construction is to be accomplished within the right-of-way of the Oregon State Highway Department or on lands over which they have direct or indirect control, the Contractor's Liability Insurance Policy shall contain the following endorsement:

"The State of Oregon, the State Highway Commission and members thereof, its officers, agents, and employees are hereby included as named insureds in the herein numbered policy, except as to claims against the primary named insured for injury to their persons or damage to any of its or their property.

"Cancellation of this endorsement or of the policy to which it is attached may be effected by agreement of the parties hereto, or by the company or the primary named insured giving not less than thirty (30) days' notice in writing and by certified mail to the Director of Permits, Room 121, State Highway Building, Salem, Oregon; said notice to commence to run from the date notice is actually received at said office.

"The limits of liability of the company for the operations of the insured in construction operations on the right-of-way of State Highways shall be as follows:

Bodily Injury Liability ----	Each Person ------	$100,000
	Each Accident ----	$300,000
Property Damage Liability --	Each Occurrence --	$100,000

"Limits provided herein are the minimum limits required by the Oregon State Highway Commission and shall in no way be considered a reduction in limits as originally provided in this policy."

e. Fire Insurance. Fire insurance coverage shall be provided as set forth in the Special Provisions.

f. Certificates of Insurance. Before commencing work under this Contract, Contractor shall furnish the Owner with certificates of insurance specified herein showing the type, amount, class of operations covered, effective dates, and date of expiration of policies, and containing substantially the following statement:

"The insurance covered by this certificate will not be cancelled or materially altered, except after ten (10) days' written notice has been received by the Owner."

D-4. Permits and Licenses. The Contractor shall keep himself fully informed of all local ordinances, State and Federal laws in any manner affecting the work herein specified. He shall at all times comply with said ordinances, laws, and regulations, and protect and indemnify the Owner and its officers and agents against any claim or liability arising from or based on the violation of any such laws, ordinances, or regulations. All permits, licenses, and inspection fees necessary for prosecution and completion of the work shall be secured and paid for by the Contractor, unless otherwise specified.

D-5. Superintendence. The Contractor shall keep on the work, during its progress, competent supervisory personnel. The Contractor shall give efficient supervision to the work, using his best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques, and procedures, and for providing adequate safety precautions and coordinating all portions of the work under the Contract.

D-6. Reception of Engineer's Directions. The superintendent, or other duly authorized representative of the Contractor, shall represent the Contractor and all directions given to him by the Engineer shall be binding. Such directions of major importance will be confirmed in writing. Any direction will be so confirmed in each case on written request from the Contractor.

D-7. Sanitation. Sanitary conveniences shall be erected and maintained by the Contractor at all times while men are employed on the work; and the use of such sanitary conveniences shall be strictly enforced. The location of such conveniences shall be approved by the Engineer.

D-8. Employees. The Contractor shall employ only competent, skillful men to do the work; and whenever any person shall appear to be incompetent or to act in a disorderly or improper manner, such person shall be removed from the work.

D-9. Requirements of Oregon Law for Public Contracts. When the Contract Documents concern public works of the State or any County, municipality, or political subdivision created by its laws, the applicable statutes of the State of Oregon shall apply. For this reason Sections 279.310 through 279.356 of the Oregon Revised Statutes, as amended or superseded, including the latest additions and revisions, are incorporated by reference as parts of these Contract Documents.

These sections define the requirements of Oregon law for public contracts:

a. Concerning payment of laborers and materialmen, contributions to Workmen's Compensation Board, preventions of liens, payment of withholding taxes.

b. Concerning the maximum hours of labor, payment of not less than the prevailing rate of wages, payment of medical care and attention to employees, certification of wages by contractors and subcontractors, liability to workmen for violation of minimum wage rate requirements.

c. Concerning payment of claims by public officers, termination of Contract because of a national emergency, conditions concerning the forfeiture of Contract.

It is understood and agreed that all parties to this Contract shall determine the contents of these applicable statutes and comply with their provisions throughout the performance of the Contract.

D-10. Safety Precautions. The Contractor shall take all necessary precautions for the safety of employees on the work and shall comply with all applicable provisions of Federal, State, and municipal safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where the work is being performed. The Contractor shall, without further order, provide and maintain at all times during the progress or temporary suspension of the work, suitable barricades, fences, signs, signal lights, and flagmen as are necessary or required to insure the safety of the public and those engaged in the work. The operations of the Contractor, for the protection of persons, and the guarding against hazards from machinery and equipment, shall meet the requirements of the applicable State laws and the current safety regulations as set forth in the Oregon Safety Codes adopted and published by the Workmen's Compensation Board, Salem, Oregon.

The Contractor shall be solely and completely responsible for condition of the premises on which the work is performed and for safety of all persons and property on the site during performance of the Contract. This requirement shall not be limited to normal working hours, but shall apply continuously. The Contractor shall conform with all governing safety regulations.

D-11. Protection of Property.

a. Protection of Work and Property. The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this Contract. He shall at all times safely guard and protect his own work, and that of adjacent property (as provided by law and the Contract Documents) from damage. All passageways, guard fences, lights, and other facilities required for protection by State or municipal laws and regulations and local conditions, must be provided and maintained.

b. Responsibility of Contractor to Act in Emergency. In case of an emergency which threatens loss or injury of property, and/or safety of life, the Contractor shall act, without previous instructions from the Owner or Engineer, as the situation may warrant. He shall notify the Engineer thereof immediately thereafter. Any compensation claimed by the Contractor, together with substantiating documents in regard to expense, shall be submitted to the Owner through the Engineer and the amount of compensation shall be determined by agreement or arbitration.

D-12. Materials and Appliances. Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary for the execution and completion of the work.

Unless otherwise specified, all materials shall be new, and both workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

D-13. Access for Inspection. The Contractor shall furnish, without extra charge, the necessary test pieces and samples, including facilities and labor for obtaining the same, as requested by the Engineer. When required, the Contractor shall furnish certificates of tests of materials and equipment made at the point of manufacture by a recognized testing laboratory.

The Engineer and his representatives shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide facilities for such access and for inspection, including maintenance of temporary and permanent access.

If the Specifications, the Engineer's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give timely notice of its readiness for inspection. Inspections to be conducted by the Engineer will be promptly made, and where practicable, at the source of supply. If any work should be covered up without approval or consent of the Engineer, it shall, if required by the Engineer, be uncovered for examination at the Contractor's expense.

Re-examination of questioned work may be ordered by the Engineer; and, if so ordered, the work shall be uncovered by the Contractor. If such work be found in accordance with the Contract Documents, the Owner will pay the cost of re-examination and replacement. If such work be found not in accordance with the Contract Documents, the Contractor shall correct the defective work at no additional cost to the Owner.

D-14. Royalties and Patents. The Contractor shall pay all royalty and license fees, unless otherwise specified. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner and the Engineer harmless from loss on account thereof.

D-15. Indemnity. The Contractor shall indemnify, save harmless, and defend the Owner and the Engineer from and against all costs, expenses, and losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description made, brought, or recovered against the Owner by reason of any act or omission of the Contractor, his agents or employees, in the execution of the work or in guarding the same.

D-16. Taxes and Charges. The Contractor shall withhold and pay any and all withholding taxes, whether State or Federal; and pay all Social Security charges and also all State Unemployment Compensation charges; and pay or cause to be withheld, as the case may be, any and all taxes, charges, or fees or sums whatsoever, which are now or may hereafter be required to be paid or withheld under any laws.

D-17. Unforeseen Difficulties. The Contractor shall protect his work and materials from damage due to the nature of the work, the elements, carelessness of other contractors, or from any cause whatever until the completion and acceptance of the work. All loss or damages arising out of the nature of the work to be done under these Contract Documents, or from any unseen obstruction or defects which may be encountered in the prosecution of the work, or from the action of the elements shall be sustained by the Contractor.

D-18. Contractor's Right to Stop Work or Terminate Contract. If the work should be stopped under an order of any court or other public authority for a period of three (3) months, through no act or fault of the Contractor or of anyone employed by him; or if the Engineer should fail to issue any estimate for payment within fifteen (15) days after it is due; or if the Owner should fail to pay the Contractor within thirty (30) days after the time specified in Article F-1 of these General Conditions any sum certified by the Engineer, then the Contractor may, upon fifteen (15) days' written notice to the Owner and the Engineer, stop work or terminate this Contract and recover from the Owner payment for all work executed and any loss sustained upon any plant or material and reasonable profit, unless said default has been remedied within said time.

D-19. Correction of Defective Work After Final Acceptance. All work, including the design of mechanical and electrical components of equipment and/or design of packaged control systems which are furnished as a component of equipment, shall be guaranteed for a period of one (1) year against defects in materials and workmanship. The Contractor hereby agrees to make, at his own expense, all repairs or replacements necessitated by defects in materials or workmanship supplied by him that become evident within one (1) year after the date of final acceptance of the work. The Contractor also agrees to hold the Owner harmless from liability of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written orders for same from the Owner. If the Contractor fails to make the repairs and replacements promptly, the Owner may do the work, and the Contractor and his Surety shall be liable for the cost thereof. Any additional requirements for the project relative to correction of defective work after final acceptance are set forth in the Special Provisions.

E. PROGRESS OF THE WORK

E-1. Beginning of the Work. Before work shall be started and materials ordered, the Contractor shall meet and consult with the Engineer relative to materials, equipment, and all arrangements for prosecuting the work.

E-2. Schedules and Progress Reports. Prior to starting the construction, the Contractor shall furnish the Engineer for his approval, if requested, a schedule or schedules of expected progress of the work under the Contract

showing approximately the dates on which each part or division of the work is expected to be started and finished. The progress schedules shall be submitted regularly and shall cover a time period satisfactory to the Engineer. The Contractor shall also forward to the Engineer, if requested, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the work under the Contract in the shops and in the field, stating the existing status, rate of progress, estimated time of completion, and cause of delay, if any.

E-3. Prosecution of the Work. It is expressly understood and agreed that the time of beginning, rate of progress, and time of completion of the work are of the essence of this Contract. The work shall be prosecuted at such time, and in or on such part or parts of the project as may be required, to complete the project as contemplated in the Contract Documents and the approved construction schedule.

If the Contractor desires to carry on work at night or outside the regular hours, he shall give timely notice to the Engineer to allow satisfactory arrangements to be made for inspecting the work in progress.

E-4. Assignment. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other; nor shall the Contractor assign any monies due or to become due to him hereunder without the previous written consent of the Owner.

E-5. Owner's Right to Do Work. If the Contractor should, in the opinion of the Engineer, neglect to prosecute the work properly or should neglect or refuse at his own cost to take up and replace work as shall have been rejected by the Engineer, then the Owner shall notify the surety company of the condition, and after ten (10) days' written notice to the Contractor and the surety company, or without notice if an emergency or danger to the work or public exists, and without prejudice to any other right which the Owner may have under the Contract, take over that portion of the work which has been improperly executed and make good the deficiencies and deduct the cost thereof from the payments then or thereafter due the Contractor.

E-6. Owner's Right to Transfer Employment. If the Contractor should be adjudged a bankrupt; or if he should make a general assignment for the benefit of his creditors; or if a receiver should be appointed on account of his insolvency; or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials; or if he should fail to make prompt payment to subcontractors or for material or labor; or persistently disregard laws, ordinances, or the instructions of the Engineer; or otherwise be guilty of a substantial violation of any provision of the Contract or any laws or ordinance; then the Owner, if sufficient cause exists to justify such action, may without prejudice to any other right or remedy, and after giving the Contractor and Surety seven (7) days' written notice, transfer the employment for said work from the Contractor to the Surety. Upon receipt of such notice, such Surety shall enter upon the premises and take possession of all materials, tools, and appliances thereon for the purpose of completing the work included under this Contract and employ, by contract or otherwise, any

person or persons to finish the work and provide the materials therefor without termination of the continuing full force and effect of this Contract. In case of such transfer of employment to such Surety, the Surety shall be paid in its own name on estimates according to the terms hereof without any right of the Contractor to make any claim for the same or any part thereof. In lieu of the foregoing, if the Owner so elects, he may terminate the employment of the Contractor and take possession of the premises and of all materials, tools, and appliances thereon and finish the work by whatever method he may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the expense of completing the Contract, including compensation for additional managerial and administrative services, shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner.

E-7. Delays and Extension of Time. If the Contractor be delayed at any time in the progress of the work by any act or neglect of the Owner or the Engineer, or of any employee of either; or by any separate contractor employed by the Owner; or by changes ordered in the work; or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties, or any causes beyond the Contractor's control which justifies the delay, then the date for completion of the work shall be extended. Within a reasonable period after the Contractor submits to the Engineer a written request for an extension of time, the Engineer will present his written opinion to the Owner as to whether an extension of time is justified; and, if so, the number of days extension due the Contractor. The Owner will make the final decision on all requests for extension of time.

No such extension shall be made for delay occurring more than seven (7) days before claim therefor is made in writing to the Engineer. In the case of a continuing cause of delay, only one claim is necessary.

E-8. Liquidated Damages. Should the Contractor fail to complete the work, or any part thereof, in the time agreed upon in the Contract or within such extra time as may have been allowed for delays by extensions granted as provided in the Contract, the Contractor shall reimburse the Owner for the additional expense and damage for each calendar day, Sundays and holidays excluded, that the Contract remains uncompleted after the Contract completion date. It is agreed that the amount of such additional expense and damage incurred by reason of failure to complete the work is the per diem rate stipulated in the Contract. The said amounts are hereby agreed upon as liquidated damages for the loss to the Owner on account of expense due to the employment of engineers, inspectors, and other employees after the expiration of the time of completion, and on account of the value of the operation of the works dependent thereon. It is expressly understood and agreed that this amount is not to be considered in the nature of a penalty, but as liquidated damages which have accrued against the Contractor; and the Owner is authorized to deduct the amount of such damages from any monies due the Contractor for work performed or material furnished under this Contract; and the Contractor and his Sureties shall be liable for any excess.

E-9. Other Contracts. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their

materials and the execution of their work and shall properly connect and coordinate his work with theirs.

If any part of the Contractor's work depends, for proper execution or results, upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results. His failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other contractor's work after execution of his work.

E-10. Use of Premises. The Contractor shall confine his equipment, the storage of materials, and the operation of his workmen to limits shown on the Plans or indicated by law, ordinances, permits, or directions of the Engineer, and shall not unreasonably encumber the premises with his materials. The Contractor shall provide, at his own expense, the necessary rights-of-way and access to the work which may be required outside the limits of the Owner's property.

The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

E-11. Use of Completed Portions. The Owner shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work, or such portions, may not have expired, but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of the work, or delays the completion of the work, the Contractor shall be entitled to extra compensation or an extension of time, or both. The Contractor's attention is directed to Articles E-7 and F-2.

E-12. Cutting and Patching. The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon or reasonably implied by the Plans. Any defective work or material, performed or furnished by the Contractor, that may be discovered by the Engineer before the final acceptance of the work or before final payment has been made shall be removed and replaced or patched, in a manner as approved by the Engineer, at the expense of the Contractor.

E-13. Cleaning Up. The Contractor shall, at all times, at his own expense, keep property on which work is in progress and the adjacent property free from accumulations of waste material or rubbish caused by employees or by the work. Upon completion of the construction, the Contractor shall, at his own expense, remove all temporary structures, rubbish, and waste materials resulting from his operations.

F. PAYMENT

F-1. Partial Payment. On or about the last two (2) ays of each calendar month, the Engineer will make an estimate of the value of the work satisfactorily completed, including acceptable material delivered. The amount of said

estimate, after deducting ten percent (10%) as provided hereinafter and all previous payments, shall be due and payable to the Contractor not more than ten (10) days after the last day of said month, except where the Owner is a municipality whose laws require the approval of each payment by a council or similar body; in which case, the amount of said estimate shall become due and payable ten (10) days after the first meeting in the following month scheduled for approval of such payments.

When the Contract price for public work exceeds Twenty-Five Thousand Dollars ($25,000.00), the Owner will deduct ten percent (10%) of all progress payments for the work completed until five percent (5%) of the total Contract price has been retained. No additional retainage will be withheld unless otherwise provided in the Special Provisions. The amount retained as provided above will be withheld by the Owner until completion of the Contract to insure faithful completion of the work under the terms of the Contract Documents.

To receive partial payment for materials delivered, but not incorporated in the work, it shall be necessary for the Contractor to submit to the Engineer at least seven (7) days prior to the end of said month a list of such materials, with costs supported by invoices of suppliers. Proper storage and protection shall be provided by the Contractor. Final payment shall be made only for materials actually incorporated in the work and, upon acceptance of the work, all materials remaining for which advance payments had been made shall revert to the Contractor, unless otherwise agreed, and partial payments made for these items shall be deducted from the final payment for the work.

Monthly partial payments shall be conditional upon prosecution of the work in accordance with the provisions of the Contract and, on contracts for any public work in the State of Oregon except Federal projects, upon filing with the Owner by the Contractor the Wage Certification Form required by ORS Chapter 279, 1963, as amended.

Nothing contained in this article shall be construed to affect the right, hereby reserved, to reject the whole or any part of the aforesaid work should such work be later found not to comply with the provisions of the Contract Documents. All estimated quantities of work for which progress payments have been made are subject to review and correction on the final estimate. Payment by the Owner and acceptance by the Contractor of progress payments based on periodic estimates of quantities of work performed shall not, in any way, constitute acceptance of the estimated quantities used as the basis for computing the amounts of the progress payments.

F-2. Extra Work. Any work necessary or required to carry out the intent of these Contract Documents by changes clearly not indicated in the Contract Documents or which cannot reasonably be implied from the intent and meaning of the Contract Documents shall be considered as extra work. Payment for any ordered extra work or changes shall be determined by:

a. Unit prices used in the Contract Documents or agreed upon for the extra work or changes; or

b. Lump sum agreement, in writing, between the Contractor and the Owner; or

c. Force Account Work. If the method of payment cannot be agreed upon prior to the beginning of the work, and the Owner or the Engineer directs that the work be done on a force account basis, then the Contractor shall furnish labor, equipment, and materials at costs and rates in effect at the time the work is accomplished plus percentage allowances as designated hereinafter:

	Items of Cost on Which Payments Will Be Allowed	Percentage Allowance**
(1)	Payroll, for jobsite personnel*	15%
(2)	Delivered costs of materials and supplies actually used on the designated work.	10%
(3)	Rental on each piece of equipment, not owned by the Contractor, having a value in excess of $100 actually used on the work.	15%
	Rental on each piece of equipment, owned by the Contractor, having a value in excess of $100 actually used on the work.	15%
	(Rental rates shall not exceed those of the State Highway Department for comparable equipment.)	
(4)	Subcontractors' bills (if any).	10%

For equipment rented on a day or hour basis, rental will be allowed for only those days or hours during which the equipment is in actual use. The rentals allowed for equipment will in all cases be understood to cover all fuel, supplies, repairs, and renewals, and no further allowances will be made for those items unless specific agreement to that effect is made.

If the latter method of payment is used, a breakdown of the Contractor's costs involved in any approved extra work shall be submitted to the Engineer within thirty (30) days after said extra work has been performed.

No payment will be made for extra work billed and submitted to the Engineer after the thirty (30) day period has expired. No extra work shall be performed by the Contractor, except in an emergency endangering life or property, unless in pursuance of a written order, as provided in Article B-3 of these General Conditions.

* Including documented actual wages and fringe benefits, labor insurance, taxes, and any other labor burdens.
**Includes all other overhead and profit.

F-3. Release of Liens or Claims. The Contractor shall submit, by a means acceptable to the Owner, evidence that provisions have been made to satisfy all liens or claims growing out of lawful demands for materials, labor, and incidentals in connection with the work before the final payment or any part of the retained percentage shall become due. Such means may include, but are not limited to, one or more of the following:

a. Receipts in full for all items out of which a lien or claim could arise.

b. Complete release of all liens and claims.

c. Affidavit by Contractor that receipts or releases account for all labor, materials, or incidentals used in the work.

d. A bond to indemnify Owner against any lien or claim.

If any lien or claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a lien or claim, including all costs and a reasonable attorney's fee.

F-4. Final Payment. Upon completion of the work, the Contractor shall notify the Engineer, in writing, that he has completed his part of the Contract and shall request final payment. If the work has been completed to the intent of the Contract Documents, the Engineer shall recommend acceptance of the completed work and submit a final estimate of the amount due the Contractor under this Contract. Upon approval of this final estimate by the Owner and compliance with provisions in Article F-3 of these General Conditions, and other provisions as may be applicable, the Owner shall pay to the Contractor all monies due him under the provisions of these Contract Documents.

On contracts for public works, final payment of the retained percentage will not be made until the Contractor has also furnished the Wage Certification required by ORS Chapter 279, 1963, as amended.

SPECIAL SPECIFICATIONS

Foreword: The Contractor shall furnish all labor, materials, and equipment necessary or required to complete the work, in all respects, as shown on the Plans or as hereinafter specified, or both. The numbering system employed in these Special Specifications is used throughout the Contract Documents. Each section is divided, where applicable, into A, Scope; B, Materials; C, Workmanship; and D, Payment. This method is employed to facilitate the work of the Contractor in preparing his Proposal, and in following the Special Specifications during the construction.

When references to the following capitalized abbreviations are made, they refer to Specifications, Standards, or Methods of the respective national association. Abbreviations listed herein but not mentioned in the Special Specifications shall be disregarded.

AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturer's Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Moving and Conditioning Association
ANSI (USAS) (ASA)	American National Standards Institute References to USA and ASA Standards shall be deemed to refer to Standards of the American National Standards Institute. There is no change in the index identification on previously printed current ASA or USA Standards or their technical content, and they shall be considered to be ANSI Standards regardless of the designation.
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
AWPA	American Wood Preservers' Association
CBMA	Certified Ballast Manufacturers Association
DFPA	Division for Product Approval of the American Plywood Association
Fed. Spec.	Federal Specifications
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IPCEA	Insulated Power Cable Engineers Association
JIC	Joint Industry Conferences of Hydraulic Manufacturers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NLMA	National Lumber Manufacturers Association

Rerun: July '70

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OECI	Overhead Electrical Crane Institute
RLM	RLM Standards Institute, Inc.
SSPC	Steel Structures Painting Council
TEMA	Tubular Exchanger Manufacturer's Association
UBC	Uniform Building Code
UL	Underwriters' Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau

The numbers and letters following the abbreviations denote the Association's serial designation for the Specification or Standard to which reference is made. Unless a particular issue is designated, all references to the above Specifications, Standards, or Methods shall, in each instance, be understood to refer to the issue in effect (including all amendments) on the date of the Advertisement for Bids or the Invitation for Bids.

Standard Specifications, when referred to herein, except the above, are found at the end of the Special Specifications.

1A. GENERAL REQUIREMENTS (ALL SCHEDULES)

The Contractor's attention is directed to the SPECIAL PROVISIONS, which contain other special requirements that are pertinent to this project.

The submission of a Proposal shall be conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of the Contract Documents.

SUBSURFACE INFORMATION. No test pits or test holes have been dug, but the Owner has drilled wells and test wells in the area. The Contractor shall examine the site and make his own investigation.

The Engineer and Owner will make available to all prospective bidders, upon request prior to receipt of proposals, all information that they may have as to subsurface conditions and surface topography at the work site. Such information is offered as supplementary information only. Neither the Engineer nor the Owner assumes any responsibility for the completeness or interpretation of such supplementary information.

UNDERGROUND UTILITIES. Known utilities and structures expected to be adjacent to or encountered in the work are shown on the Plans. It is expected that there may be some discrepancies and omissions in the locations and quantities of utilities and structures shown. Those shown are for the convenience of the Contractor only, and no responsibility is assumed by either the Owner or the Engineer for their accuracy or completeness.

TEMPORARY WATER. No water is available at the project site. The Contractor shall make his own arrangements to obtain suitable water and shall pay all costs. Connection can be made to the existing raw water transmission line through arrangements with the Owner. The Contractor shall furnish all connections, waterline, and pumping required for use of this source.

TEMPORARY ELECTRIC POWER. No electric power is presently available at the site. Make arrangements for electrical power for use during the construction period until final acceptance by the Owner, and pay all costs for same.

SEQUENCE OF OPERATIONS. Plan the construction work and carry out with a minimum of interference with the operation of the existing facilities. Prior to starting the construction, confer with the Engineer and Water Superintendent and develop an approved construction schedule which will permit the supply system to function as normally as practical during the construction period. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions, and it shall be the obligation of the Contractor to do this work at such times at no additional cost to the Owner. Do not make connections between existing piping and new piping until necessary inspection and tests have been completed on the new work and it is found to conform in all respects to the requirements of the Plans and Specifications.

SANITARY FACILITIES. The Contractor shall provide one or more chemical toilets of approved type, as required, and shall maintain the facility in a

proper sanitary condition at all times. The chemical toilet shall be of watertight construction so that no contamination of the area can result from its use. The facilities provided shall conform to code requirements and be acceptable to the Engineer and sanitary authorities. Upon completion of the work, the sanitary facilities shall be removed and the area restored to its original condition.

LAND MONUMENTS. The Contractor shall preserve or replace all existing Federal, State, City, County, and private land monuments, unless they are within 6 feet of the trench center line. When these monuments are within the distance specified, the Contractor shall notify the Engineer at least 2 weeks in advance of the proposed construction in order that the Engineer will have ample opportunity to reference these monuments for later replacement by the Contractor.

Replaced or reset monuments shall be of acceptable type and quality, placed in a manner consistent with recognized engineering and surveying practices.

ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS. Authorized representatives of the Federal Water Quality Administration, Oregon State Department of Environmental Quality, Oregon State Board of Health, or other health agency and local government officials shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and for inspection.

GENERAL CONSTRUCTION RESPONSIBILITIES AND PROCEDURES.

PUBLIC SAFETY AND CONVENIENCE. Comply with all rules and regulations of the City, State, and County authorities regarding the closing of public streets or highways to use of public traffic. No road shall be closed to the public except by express permission of the Engineer. Conduct the work so as to assure the least possible obstruction to traffic and normal commercial pursuits. Protect all obstructions within traveled roadways by approved signs, barricades, and lights where necessary or ordered by the Engineer for the safety of the public. The convenience of the general public and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

The Contractor shall use every reasonable precaution to safeguard the persons and property of the public. It shall be the sole responsibility of the Contractor to furnish, place, and maintain those barricades, barriers, lights, flares, danger signals, and watchmen as are necessary to protect persons and property. All barricades and obstructions shall be protected at night by signal lights which shall be suitably distributed and kept burning from sunset to sunrise.

Protect stored materials, cultivated crops, and other items located adjacent to the proposed pipelines.

The Contractor shall leave his night emergency telephone number or numbers with the Police Department, so that the contact may be made easily at all times in case of barricade and flare trouble or other emergencies.

PROGRESS OF CONSTRUCTION. It is the intent of these Contract Documents that the work shall proceed in a systematic manner so that a minimum of inconvenience will result to the adjacent property owners in the course of construction. It is, therefore, necessary to confine operations to as small a length of work area as is feasible. Except under permission of the Engineer, at no time shall the trenching equipment be farther than 200 feet ahead of the pipe-laying crew. Backfill the trench so no section of approved pipe is left open longer than 24 hours, except by permission of the Engineer. Completely backfill and clean up after each section of pipe has been inspected and approved.

The Engineer reserves the right to withhold line and grade when, in his opinion, excessive trench is being opened ahead of the pipe laying or when backfilling behind the pipe laying is not proceeding satisfactorily.

Cleanup of all construction debris, excess excavation, excess materials, and complete restoration of all ditches, culverts, signposts, and similar items shall be completed immediately following the installation of the pipeline.

SITE ACQUISITION. The Contractor shall confine his construction operations to within the property lines or County right-of-way limits or make special arrangements with the property owners for the additional area required. Any damage to private property, either inside or outside the limits of the property or permits provided by the Owner, shall be the responsibility of the Contractor as specified herein. Before final payment will be authorized by the Engineer, the Contractor will be required to furnish the Owner with written releases from property owners where side agreements or special easements have been made by the Contractor or where the Contractor's operations, for any reason, have not been kept within the property or right-of-way obtained by the Owner.

INTERFERING STRUCTURES. Take necessary precautions to prevent damage to existing structures whether aboveground or underground. An attempt has been made to show major structures on the Plans. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed.

Protect all underground and aboveground existing structures from damage, whether or not they lie within the limits of the property or easements obtained by the Owner. Notify the Engineer of any damaged underground structure, and make acceptable repairs or replacements before backfilling takes place.

Power poles less than 2 feet from the trench center line will be removed or protected at no cost to the Contractor. Protect all other poles from damage. If interfering power poles, telephone poles, guy wires, or anchors are encountered, notify the Engineer at least 48 hours in advance of construction operations to permit the necessary arrangements with the affected utility company for protection or relocation of the interfering structure.

The Contractor shall be solely and directly responsible to the Owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the carrying out of the work to be done under the Contract.

Neither the Owner nor its officers or agents shall be responsible to the Contractor for damages as a result of the location of the underground utilities being other than that shown on the Plans or for the existence of underground utilities not shown on the Plans.

The Contractor shall replace, at his own expense, any and all other existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents or ordered by the Engineer.

FIELD RELOCATION. During the progress of construction, it is expected that minor relocations of the line may be necessary. Such relocations shall be made only by direction of the Engineer. Unforeseen obstructions encountered as a result of such relocations will not be subjects for claims for additional compensation by the Contractor to any greater extent than would have been the case had the obstructions been encountered along the original location.

SITE RESTORATION AND CLEANUP. At all times during the work, keep the premises clean and orderly, and upon completion of the work, leave the project free of rubbish or excess materials of any kind.

During construction, stockpile the excavated trench materials so as to do the least damage to adjacent grassed areas, regardless of whether these are on private property, City, State, or County rights-of-way. Remove all excavated materials from grassed and planted areas; and leave these surfaces in a condition equivalent to their original condition and free from all rocks, gravel, boulders, or other foreign material. All existing drainage ditches and culverts shall be reopened and graded and natural drainage restored. Restore culverts broken or damaged to their original condition and location.

Upon completion of the project, all areas used by the Contractor in connection with the work shall be finished as follows: Project site and storage areas properly cleared of all temporary structures, rubbish, and waste materials and properly graded to drain and blend in with the abutting property; any waste area obtained by the Contractor for deposit of waste materials shall be finished to properly drain and blend with the surrounding terrain. Clean all dirt, gravel, or other foreign material from the County road near the well sites, using brooms and hand labor where necessary.

IRRIGATION AND DRAINAGE DITCHES. Arrange the work so that construction will not interfere with the irrigation of cultivated lands near the well site.

Following the backfill of the trenches, restore all irrigation and storm drain ditches destroyed, damaged, or otherwise modified during construction to a condition equivalent, in the opinion of the Engineer, to the condition of the ditch before construction. Ditches so reconstructed shall be built in their original locations.

REMOVAL OF ROCK FROM FINISHED SURFACES. All loose rock and boulders larger than 2-inch diameter occurring on the surface of road shoulders as a result of the Contractor's operations shall be removed and disposed of by the Contractor. Removal shall be by mechanical means and supplemented by hand labor where necessary. All loose material larger than 2-inch diameter shall be removed prior to application of any required rock surfacing.

OPERATION OF VALVES IN WATER SYSTEM PROHIBITED. At no time undertake to close off any lines or open valves or take any other action which would affect the operation of the existing water supply system, except as specifically required by the Plans and Specifications and after approval is granted by the Owner. Request approval well in advance of the time that the interruption of the existing service is required.

RESPONSIBILITY FOR DAMAGE TO EXISTING STRUCTURES. Where any existing structures or facilities which are intended to remain are damaged by the Contractor during demolition or construction, the Contractor shall promptly repair or replace the damaged portion or facility at no additional cost to the Owner.

STORAGE OF MATERIALS. Materials shall be so stored as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and/or they shall be placed under cover. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the owner or lessee.

PAYMENT. The work specified in this section shall be considered incidental to the project cost, and the expense shall be included in the lump sum bid or unit price bids, as applicable.

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SCHEDULE A

WELL PUMP STATION

SCHEDULE A
WELL PUMP STATION

A2A. MOVE IN AND SITE PREPARATION

A. SCOPE. This section covers the work necessary to move in the equipment, set up facilities, and prepare the site for construction, complete.

B. MATERIALS. Provide all materials, suitable and in adequate quantity, required to accomplish the work as specified herein.

C. WORKMANSHIP.

GENERAL. Set up construction facilities in a neat and orderly manner within area adjacent to the proposed construction at location of choice subject to Engineer's approval. Accomplish all required work in accordance with applicable portions of these Specifications or as approved by the Engineer. Confine operations to the work area within the property and easement lines.

SANITARY PRECAUTIONS. Observe normal sanitary precautions to prevent contamination of the project area. Do not dump waste oil and similar materials on the ground or in the ditches or the river. Upon completion of the project, remove all temporary facilities, complete, and clean up the construction area to the satisfaction of the Engineer.

LAYING OUT THE WORK. Stake out the work accurately from the lines established by the Engineer and from information on the Plans. Establish grades and set batter boards and reference points as required. Make all layouts with suitable instruments. Have available on the job, as required, an accurate instrument for checking grades and elevations. Establish all elevations from the bench marks indicated or furnished by the Engineer. Maintain and protect the batter boards until they are no longer required for construction or checking by the Engineer.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A2B. EARTHWORK

A. SCOPE. This section covers the work necessary for the earthwork, complete.

B. MATERIALS.

SUBSURFACE AND SITE INFORMATION. The drilled well and a number of test wells indicate subsurface materials at several locations. The Engineer and Owner will make available to all prospective bidders, upon request, prior to the receipt of Proposals, all information that they may have as to subsurface conditions and surface topography at the work site. Investigations conducted by the Engineer of subsurface conditions were for the purpose of groundwater investigation and well design, and neither the Owner nor the Engineer assumes any responsibility whatever in respect to the sufficiency or accuracy of the subsurface investigations thus made, or of the logs of test wells, or of other investigations, or of the interpretations made thereof. There is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur. The groundwater elevations shown are expected to vary with the seasons.

Information derived from inspection of logs of test wells, of topographic maps, or from Plans showing location of utilities and structures will not relieve the Contractor from any risk, or from properly examining the site and making such additional investigations as he may elect, or from properly fulfilling all the terms of the Contract Documents.

The submission of a Proposal shall be conclusive evidence that the Bidder has investigated the site and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of the Contract Documents.

EARTH BACKFILL. Excavated material free from roots, trash, and other deleterious materials.

CRUSHED GRAVEL FOR BACKFILL UNDER FOOTINGS AND CONCRETE SLABS. 3/4-inch minus, clean, hard, crushed gravel or crushed rock, free from foreign material uniformly graded from coarse to fine and containing sufficient fines for proper compaction. Crushed gravel or crushed stone shall conform to the applicable State Highway Standard for such material.

BASE MATERIAL FOR ROAD AND PARKING AREA. Pit-run or bar-run gravel with maximum size of 3 inches, free from roots and foreign materials. Material shall conform to the quality requirements of the State Highway Department Specification for such material.

SURFACE ROCK FOR ROAD AND PARKING AREA. 3/4-inch minus, hard, crushed rock or crushed gravel, with 50 percent retained on a No. 4 sieve. Material shall be free from roots and other foreign materials, and conform to the quality requirements of the State Highway Department Specification.

WATER FOR COMPACTION. Furnish as required.

COMPACTION EQUIPMENT. Compaction equipment shall be of suitable type and adequate to obtain the densities specified and approved. Provide manually operated mechanical tampers also as required and approved.

C. WORKMANSHIP.

EXCAVATION FOR ROAD AND PARKING AREA. Remove topsoil to a depth of 3 inches from areas to be cut or filled. Dispose of topsoil. Excavate to the lines and grades indicated. The method used by the Contractor to perform the excavation is optional, except that no heavy machinery shall be operated within structures without approval of the Engineer. Use excavated material other than topsoil for fill as required.

ACCESS ROAD AND PARKING.

PREPARATION OF SUBGRADE. After the excavation has been completed, shape subgrade to line, grade, and cross section. Roll subgrade with an approved roller until the top 6 inches is compacted to 95 percent of maximum density at optimum moisture content as determined by AASHO T 99. Remove all soft or otherwise unsuitable material disclosed by the rolling and replace with suitable material from the excavation, as directed. Fill holes and depressions, which develop under the roller, to the required grade and cross sections with material from the excavation.

BASE AND SURFACE COURSES. Spread over the entire area to be surfaced in a manner to prevent segregation of size and to such depth that, when compacted, the thickness shall be 6 inches and the surface grade shall be as shown. Roll a power roller weighing at least 5 tons, until the course is uniformly compacted and its surface is smooth. The rolled surface shall conform to the grade and slope shown.

STRUCTURAL EXCAVATION. Excavation is unclassified. Excavate for structures to the lines and grades shown or as required to accomplish the construction. Perform all excavation regardless of the character, nature, or condition of the material encountered. The method used by the Contractor is optional, except that no heavy machinery shall be operated within 5 feet of existing structures or newly completed construction without the approval of the Engineer. Excavation that cannot be done without endangering the present or new structures shall be done with hand tools.

LIMITS OF EXCAVATION. Excavate to the required depths and widths with proper allowance made for forms, working space, gravel base, and similar items. Allowances shall be made in excavations for the placing of the final topsoil when required. Every effort shall be made to carry excavation for bottoms of footings and slabs no deeper than the elevation shown on the Plans. All excavation carried below the grade lines shown on the Plans or established by the Engineer shall be replaced with thoroughly compacted gravel at the Contractor's expense, except excavations under footings which shall be filled up with concrete of equal strength to that of the footing. If cuts below grade are made, they shall be corrected by similarly cutting adjoining areas and creating a smooth transition. The Contractor shall bear all costs for correcting overexcavated areas.

REMOVAL OF WATER. Excavations and trenches shall be kept free of water by equipment furnished and operated by the Contractor. Remove all water during periods when concrete is being deposited, when pipe is being laid, or other work is being done, during the placing of backfill, unless water settling is required; and at such other times as required for efficient and satisfactory construction. Furnish adequate dewatering equipment and operate such equipment to keep the water level down to permit the construction. Dispose of water pumped out of the excavations and trenches in a manner that will not damage adjacent property.

BACKFILL.

PREPARATIONS FOR PLACING BACKFILL. Do not backfill around concrete structures until the concrete has obtained a compressive strength equal to 2/3 of the specified compressive strength. Remove all form materials and trash from the excavation before placing any backfill. Obtain the Engineer's approval of concrete work and conditions prior to backfilling.

Do not operate any heavy earth-moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material unless approved by the Engineer. Compact backfill adjacent to concrete walls by water settling or with pneumatic tampers or other approved equipment that will not damage the structure.

GRAVEL BACKFILL UNDER FOOTINGS AND SLABS. Grade and prepare natural ground to receive CRUSHED GRAVEL FOR BACKFILL, and obtain Engineer's approval prior to placing backfill. Provide a minimum 6-inch depth under concrete footings and slabs. Compact to 100 percent of maximum density at optimum moisture content as determined by AASHO T 99, Method D. Finished surface shall be at the proper elevation for the concrete.

EARTH BACKFILL AROUND STRUCTURES. Place EARTH BACKFILL in all areas not designated to be gravel. Deposit material from the excavation in horizontal layers not exceeding a loose thickness of 6 inches and compact each layer to 90 percent of maximum density at optimum moisture content as determined by AASHO T 99, Method A, before placing the next layer. Material shall be at optimum moisture content for compaction. All material shall be free of roots, vegetable matter, and trash and rocks larger than 4 inches in diameter. Bring backfill to the proper grade to allow for placing of topsoil or gravel surfacing when required. The Contractor may water settle the backfill in lieu of the compaction specified upon approval of the Engineer of the method to be used and provisions for correcting any subsequent settlement.

TRENCH EXCAVATION AND BACKFILL.

EXCAVATION. Trench excavation shall be performed as required for the installation of utilities and appurtenances.

REMOVAL OF WATER. Removal of water shall be accomplished as specified hereinbefore.

SITE GRADING. All earthwork shall be performed accurately to the lines and grades established by the Engineer, it being understood that, within reasonable limits of variation, the lines and grades established by the Engineer will be in conformity with those indicated on the Plans.

DISPOSAL OF EXCESS EXCAVATION. Dispose of all excess excavated materials from the work not required for backfill or fills. The Contractor shall make his own arrangements for the disposal of the excavated material and shall bear all costs and retain any profit incidental to such disposal.

SETTLEMENT. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year guarantee period in accordance with the General Conditions will be considered to be caused by improper compaction methods and shall be corrected at no additional cost to the Owner. Any structures damaged by excessive settlement shall be restored to their original condition by the Contractor, also, at no additional cost to the Owner.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A3A. CONCRETE

A. SCOPE. This section covers the work necessary for the concrete, complete.

B. MATERIALS.

STANDARD SPECIFICATIONS. Materials shall conform to the Standard Specifications for Reinforced Concrete, bound herewith, except as modified hereinafter.

The item numbers that follow refer to the item numbers of the Standard Specifications, and the changes or additions modify and supplement the respective paragraphs.

B-1. Cement. Type I or Type III for use at the Contractor's option when high-early-strength concrete is desired.

B-2. Water. See Section GENERAL REQUIREMENTS.

B-5.a. Dry-Pack Grout. Nonshrinking type not required.

B-6. Steel Reinforcement. Covered in separate section.

B-7. Forms. New plywood or steel for exposed surfaces. Used plywood permitted only if condition acceptable to Engineer, or forms are lined with commercial hardboard.

Cardboard column forms, if used, shall be Seamless Sonotube Fibre Forms, manufactured by Sonoco Products Company, or as approved.

B-8. Concrete Admixtures. Use Pozzolith in all concrete. Do not use Pozzolith high-early in any concrete.

B-9. thru B-18. Not required.

C. WORKMANSHIP.

STANDARD SPECIFICATIONS. Conform to the Standard Specifications for Reinforced Concrete, bound herewith, except as modified hereinafter.

The item numbers which follow refer to the item numbers in the referenced Standard Specifications, and the changes or additions modify and supplement the respective paragraphs.

C-1.b. Proportions. Delete as written and substitute the following:

Before beginning any concrete work, have the concrete mix designed and proper proportions of the various ingredients determined as specified.

Mix design shall be prepared at the Contractor's expense by a recognized inspection and testing laboratory approved

by the Engineer and shall show the expected strengths and corresponding slumps and all ingredient weights and other physical properties necessary to check the design mix. Mix design shall be checked by the laboratory by the preparation of trial batches from each of which 4 standard test cylinders shall be cast, cured, and tested, as specified for the job concrete. Certified copies of all laboratory reports, stating whether the items reported pass Specifications, shall be sent promptly to the Engineer directly from the testing laboratory.

Do not place concrete until mix designs have been approved by Engineer. If mix designs in current use conform to Table I requirements, said mix designs may be submitted to the Engineer in lieu of the specified laboratory mix design and testing of cylinders from the test batches, along with copies of certified laboratory results on test cylinders utilizing the mix design submitted.

TABLE I

Design mix to meet the following requirements:

Min. compressive field strength at 28 days	3,000 psi
*Cement factor (sacks per cubic yard) min.	6.0
Max. water per sack of cement (gals.)	5-1/2
Fine aggregate, percentage total aggregate by weight (range)	35-45
Slump range (inches)	2-4
Max. size coarse aggregate (inches)	1-1/2
Entrained air (% by volume) (range)	3-5

(Strength determinations will be made as specified under C-8.) Field strength shall be assumed as equal to 85 percent of the strength of laboratory-cured cylinders.

*The Contractor may decrease (at his option) the cement factor by 1/2 sack of cement (5-1/2 sacks total) by adding 0.25 pound Pozzolith 3L per sack of cement in the 3,000 psi mix.

C-2.b. Volumetric Measurements. Volumetric measurements will not be permitted.

C-3.g. Air-Entraining Admixture. Use air-entraining admixture for all concrete, unless exception is approved or directed by the Engineer.

C-4. Forms. Pour all concrete foundations and walls against plywood or steel forms, except those surfaces that will be covered with backfill in the completed structure. Forms for surfaces that will be covered with backfill may be constructed of dressed matched boards.

C-5. Not required.

C-6. Covered in another section.

C-7.a. General. Thoroughly wet the gravel backfill below the base slab prior to placing concrete.

C-9.b. Patching. Use ordinary grout for patching.

C-9.d. Ordinary Wall Finish. Give all concrete surfaces poured against forms, not specifically indicated as receiving a Class I finish, an ordinary wall finish as specified.

C-9.e.(1). Rubbed Wall Finish, Class I. Give a Class I finish to all exposed exterior surfaces aboveground.

C-9.f.(1). Monolithic Finish. Give all concrete slabs a monolithic finish as specified herein.

C-9.f.(2). thru C-9.f.(5). Not required.

C-9.g. thru C-9.h. Not required.

C-11. and C-14. Not required.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A3B. REINFORCING STEEL

A. SCOPE. This section covers the reinforcing steel, complete.

B. MATERIALS. All reinforcing steel shall conform to the specifications for reinforcing steel, as set forth in the Standard Specifications for Reinforced Concrete, bound herewith.

C. WORKMANSHIP.

SUBMISSION OF SHOP DRAWINGS. Prior to cutting or fabrication of any reinforcing, submit bending lists and placing drawings to the Engineer for review in accordance with the provisions of the General Conditions. Bending lists and placing drawings shall indicate the number provided and location for all bars, including straight bars.

FABRICATION AND PLACEMENT. Store, handle, fabricate, and place reinforcing steel in conformance with the Plans, approved shop drawings, Standard Specifications for Reinforced Concrete, bound herewith, and the WCRSI Manual of Standard Practice for Reinforced Concrete Construction, current edition. Tying of bars shall be done in conformance with CRSI Recommended Practice for Placing Reinforcing Bars (current edition), except as modified in the Specifications or on the Plans and as approved. Where the referenced Standards are at variance, the higher Standard shall apply.

Where it is necessary to cut bars for pipe or openings in the structural members, place an equivalent area of steel around the pipe or opening and extend on each side sufficiently to develop bond on each bar, unless otherwise shown. Minimum lap shall be 24 bar diameters.

If it is desired to locate construction joints at points not shown, do so subject to approval of the Engineer, and detail the reinforcing steel accordingly. The extra cost of steel to provide splices at these additional construction joints shall be at no additional cost to the Owner.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A5A. FABRICATED METALWORK

A. SCOPE. This section covers the work necessary for fabricated metalwork complete.

B. MATERIALS. Unless otherwise indicated, all materials shall conform to the latest issue of the following ASTM Specifications:

Item	ASTM Specification
Bolts, Nuts, Anchor Bolts, and Rods	A 307
Steel Plates	A 36, A 283
Structural Steel	A 36

GENERAL. The miscellaneous metalwork indicated on the Plans, or as may be required to secure the various parts together and provide a complete installation, shall be included under this section. The tabulation or listing of items herein is not intended to be all-inclusive, and it shall be the Contractor's responsibility to provide all metalwork shown, specified, or which can reasonably be inferred as necessary to complete the project.

STEEL ANCHOR BOLTS AND FASTENINGS. 1/2-inch minimum diameter with hex nuts, or as shown. Bolts and nuts shall be galvanized or cadmium-plated.

MACHINE ANCHOR BOLTS. For equipment with motors 3 hp or greater, fabricate as shown, or galvanize DECO concrete insert anchor assembly, as manufactured by Decatur Engineering Company, Decatur, Illinois. Size of fastening stud and anchor bolts as required by equipment manufacturer. Length - not less than 9 inches.

EXPANSION ANCHORS. Phillips Red Head self-drilling flush anchors for installation with power hammer, or Phillips Red Head stud anchors, as approved.

STRUCTURAL STEEL SUPPORTS AND BUILDING FRAMING. Provide all structural steel supports and framing of the sizes and weights shown. All connections shall be welded unless otherwise shown.

STEEL CHECKERED PLATE. Thickness shown, minimum 1/4 inch conforming to Federal Specification QQ-F-461, Class 1. Galvanize after fabrication.

FASTENERS. All bolts, inserts, and miscellaneous steel fasteners shall be proper size and type. Fasteners for embedment in concrete shall be galvanized, unless otherwise indicated.

STEEL LADDER. Fabricate the steel ladder with channel rails and 3/4-inch diameter rod rungs, complete, as shown. Punch rails and pass rungs through the rails and weld on the outside. Fabricate brackets for fastening the ladder to the slabs of flat bar stock and plate and weld to the ladder. Ladder shall conform to the applicable requirements of the State basic safety code or other regulatory authority. Hot-dip galvanize ladder after fabrication.

SIDEWALK DOOR. Bilco Type Q-4 or approved galvanized steel, size as shown, as manufactured by Bilco Company, New Haven, Connecticut, complete with snap lock with removable handle. Provide acceptable auxiliary hasp for padlocking deterent to vandalism.

PIPE HANGERS. Adjustable swivel ring, solid- or split-ring type, Grinnell Figure 101 or Figure 104, or as approved. Galvanize or cadmium plate all hangers and rods. Align hangers parallel to pipes.

CULVERT. Pipe shall be galvanized corrugated metal, conforming to AASHO M 36. Provide manufacturer's standard coupling bands and accessories with same protective coating as pipe. Pipe shall be 12-inch diameter, 16-gauge.

MISCELLANEOUS FABRICATED METAL. The following additional items of fabricated items are listed for the benefit of the Contractor, but no guarantee is given as to the completeness of the list. The Contractor shall make his own final determination of the items required.

Vent Filter Support
Plate Flange
Welded Steel Flange
Cover Plate and Support Frame
Rods

C. WORKMANSHIP.

SUBMISSION OF SHOP DRAWINGS. Prior to ordering any fabricated or manufactured metalwork, submit to the Engineer for review complete shop drawings and erection diagrams of the work, in accordance with requirements of the General Conditions. Execute the work in accordance with the shop drawings appropriately stamped by the Engineer.

FABRICATION. Workmanship and finish of all metalwork specified under this section shall be of the highest grade and equal to the best practice of modern shops for the respective work. Exposed surfaces shall have smooth finish and sharp, well-defined lines. Provide all necessary rabbets, lugs, and brackets so that the work can be assembled in a neat, substantial manner. Conceal fastenings where practical. Drill metalwork and countersink holes as required for attaching hardware or other materials. Fabricate materials as specified. Weld connections except where bolting is directed. Items requiring special fabrication methods are mentioned herein; fabrication of all other items shall be of equal quality. Methods of fabrication not otherwise specified or shown shall be adequate for the stresses and as directed by the Engineer.

WELDING. The technique of welding employed, appearance and quality of weld made, and the methods of correcting defective work shall conform to Codes for Arc and Gas Welding in Building Construction of the AWS and to AISC Specifications. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign material, except that mill scale which will withstand vigorous wire brushing may remain. A light film of linseed oil may likewise be disregarded. No welding shall be done when the temperature of the base metal is lower than zero degrees F. Finished members shall be true to line and free from twists.

INSTALLATION OF FABRICATED METALWORK. Install in accordance with the Plans and these Specifications. Perform field welding and erection work by skilled mechanics. Install fabricated metalwork plumb or level as applicable. The completed installation shall, in all cases, be rigid, substantial, and neat in appearance. Erect structural steel in accordance with the applicable portions of AISC Code of Standard Practice, except as modified. Install commercially manufactured products in accordance with manufacturer's recommendations as approved.

INSTALLATION OF CULVERTS. Install culverts where shown on the Plans. Culverts shall be carefully bedded and backfilled in the proper zone as directed by the Engineer. Pipe shall be installed and connections made as recommended by the manufacturer.

ANCHOR BOLTS. Place all anchor bolts accurately with templates at the time the concrete is poured, except where expansion anchors are designated or approved by the Engineer.

GALVANIZING. Ferrous metalwork to be galvanized is indicated or specified. All closed or blind pipe sections shall be properly vented to permit the escape of gases. Provide 1/4-inch drilled holes in all closed or blind sections of pipe to vent gases or as otherwise required by the galvanizer. Galvanize all bolts, nuts, washers, and similar fastenings. Materials used for galvanizing and methods of application shall conform to ASTM A 384, A 385, A 386, and A 123. Hot-dip galvanize all items indicated to be galvanized after fabrication, except that parts bolted together shall be galvanized before final assembly.

PAINTING. Painting shall conform to Section PAINTING.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A7A. ROOFING AND SIDING

A. SCOPE. This section covers the work necessary for furnishing and installing the roofing and siding, complete.

B. MATERIALS.

CORRUGATED ROOFING AND SIDING. Johns-Manville corrugated Transite sheets, 1-1/2" x 4.2" configuration, 3/8" inch thickness, asbestos-cement, complying with ASTM C 221, or as approved. Furnish with neoprene rubber gaskets at lap joints and necessary fasteners based on manufacturer's recommendations. Color shall be Stone Gray.

C. WORKMANSHIP.

CORRUGATED ROOFING AND SIDING. Roof deck and wall sheets shall be fastened square and plumb to frame supports in accordance with manufacturer's specifications. Neoprene rubber gaskets shall be installed between roof sheets to allow the center sheet to be removable. The finished roof and walls shall be complete with all accessories and shall be free of buckles and irregularities. Provide a special removable section in the roof for removal of the pump from overhead. Removable section to be provided with sufficient lap for waterproof installation and fastenings that permit removal and replacement without damage.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A9A. PAINTING

A. SCOPE. This section covers the work necessary for the painting, complete.

It is the intent that all new, interior and exterior exposed metal surfaces be painted, including all piping and appurtenances in the well pit, whether specifically mentioned or not, except as modified herein.

SURFACES NOT TO BE PAINTED. The following surfaces are not to be painted:

Material with undamaged factory finish other than those noted
Chromium plate
Stainless steel
Aluminum shapes
Monel metal
All concrete
Roofing and siding
Items specified for galvanizing in Section FABRICATED METALWORK

B. MATERIALS.

GENERAL. All materials shall conform to the requirements hereinafter specified. The term "paint" as used herein includes all protective coatings and incidental materials as required.

In some cases materials have been designated by a proprietary name to indicate the type and quality of material desired. Materials of other manufacturers may be substituted upon approval of the Engineer. In all cases the material used as a prime coat shall be a product recommended or approved by the manufacturer of the paint to be used as a finish coat.

No paints, other than those specified or approved, shall be brought on the jobsite. Oils, thinners, and driers delivered to the jobsite shall be only those approved for use by the paint manufacturer. No paint shall be reduced, nor shall faster drying be induced by the addition of any product designed for such purposes, except as recommended by the paint manufacturer and approved by the Engineer.

PAINT DELIVERY AND STORAGE. All materials for painting shall be delivered to the jobsite in unopened containers that plainly show at the time of use, the designated name, formula, color, date of manufacture, manufacturer's directions, and name of manufacturer. Paints shall be stored in a suitable protected area. Paint material shall be kept sealed or covered when not in use.

COLORS. The colors to be used on the project are to be selected by the Engineer.

FERROUS METAL. The words "ferrous metal" shall be understood to include wrought iron, cast iron, malleable iron, and all steel except stainless steel.

ABBREVIATIONS.

MDFT = Minimum dry film thickness.
DFT = Dry film thickness.

METAL.

Shop Prime Coat	1 brush coat Koppers Pug Primer, or as approved; MDFT 1.5 mils.
Spot Prime	1 brush coat Koppers Pug Primer, or as approved; MDFT 1.5 mils.
Finish Coat	1 brush coat Koppers Toxex 810 heavy, MDFT 2.0 mils; 1 brush coat Toxex 800 Enamel, MDFT 1.0 mil; TOTAL DFT complete system, 4.5 mils.

GALVANIZED METAL CONDITIONER.

Conditioner	1 brush coat Koppers Metal Conditioner, or as approved.

MECHANICAL AND ELECTRICAL EQUIPMENT. Paint all mechanical equipment, including piping, except electrical control cabinets and electrical motor with paint combination specified for METAL. Control cabinets and motor shall be painted if factory finish is damaged during transit or installation.

MISCELLANEOUS MATERIALS. Provide all miscellaneous materials required to perform the work in a satisfactory manner. All materials shall be products of accepted manufacturers, of the highest quality, and completely suited for the intended use.

C. WORKMANSHIP.

GENERAL. It is the intent of these Specifications that all trades employed on the jobsite will leave the surfaces of their work in such a condition that only minor cleaning, sanding, and filling is required by the painting trade.

It is the responsibility of the Contractor and the painting trade to see that all surfaces are prepared in accordance with the printed directions and recommendations of the paint manufacturer whose product is to be applied to a given surface. All surface preparation and paint application shall conform to the printed specifications and recommendations of the paint manufacturer as approved and to the highest standards of the trade.

SURFACE PREPARATION.

GENERAL. Before beginning application of any coating, the surface shall be thoroughly inspected and any defects which would cause a paint failure or result in any unsightly surface shall be brought to the attention of the Engineer in writing. If the Contractor elects to ignore an unsuitable

surface condition and applies his coating(s), he will be held responsible for any resulting unsatisfactory surface finish, and will be required to refinish the work at his own expense.

Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring any adjacent surfaces. Cleaning and painting shall be so programmed that dust and other contaminants from the cleaning process will not fall on wet or newly painted surfaces. Protect working parts of all mechanical and electrical equipment from damage during surface preparation and painting process.

CLEANING FERROUS METAL. All workmanship for metal surface preparation shall be in strict conformance with the following Steel Structures Painting Council Specifications:

Solvent Cleaning	SP 1
Hand Tool Cleaning	SP 2
Power Tool Cleaning (Wire Brush)	SP 3
White Metal Blast Cleaning	SP 5
Commercial Blast Cleaning (as specified in Para. 2.2 using a dry abrasive in accordance with Para. 3.1.3.1)	SP 6
Brush Off Blast Cleaning	SP 7
Near-White Blast Cleaning	SP 10

Wherever the words "solvent cleaning," "hand tool cleaning," "wire brushing," or "blast cleaning," or similar words of equal intent are used in these Specifications or in paint manufacturers' specifications, they shall be understood to refer to the applicable SSPC Specifications listed above.

Hand tool clean areas that cannot be cleaned by power tool cleaning in conformance with SSPC-SP 2. Protect all electric motors and other equipment from abrasive materials. Remove all loose materials from the cleaning operation by brush or industrial vacuum cleaner prior to the application of the primer.

Coat all power tool cleaned or blasted surfaces within 6 hours of cleaning and in no case permit the surface to begin rusting before priming.

SHOP PRIMING OF FERROUS METAL. All ferrous metal not specified for shop galvanizing, including equipment, is to be commercial blasted and given a shop primer as specified under applicable section. Surfaces of equipment that would be damaged by blasting shall be properly protected.

Field cleaning prior to field coating shall include, but not be limited to, removal of all moisture, oil, grease, soil, dust, foreign matter, rust, loose mill scale, loose paint, and welding flux residues. Cleaning shall be by power tool methods supplemented by solvent and hand tool cleaning. Equivalent commercial blast cleaning will be considered as an alternate.

FACTORY-PAINTED SURFACES. All damaged factory-painted surfaces that are to be repainted shall have all rust spots, bare spots, and abraded areas properly cleaned before touch-up with primer specified. Cleaning shall be done in such a manner that all objectionable materials are removed from the surfaces. The edges of the existing paint shall be sanded to feather them so that the prime coat and finish coats will blend in with existing paint and produce a smooth surface.

APPLICATION OF PAINT. Paint manufacturers whose products are specified herein have very definite recommendations for the preparation of surfaces and application of their products and these recommendations are to be followed as specified. Manufacturer's written instructions for applying each type of paint or protective coating shall be furnished the Resident Inspector before application is begun. Apply all coatings in strict accordance with the paint manufacturer's recommendations, as approved by the Engineer. Sufficient time shall be allowed between coats to assure thorough drying of previously applied paint. All prime coats shall be applied by brush and the coating thoroughly worked into the surface.

Shop and field painting of metal surfaces shall conform to SSPC-PA 1, Shop, Field, and Maintenance Painting. Units to be bolted together in the field shall be cleaned and painted prior to assembly.

Where 2 successive coats of the same color paint are to be applied, the first coat shall be of a slightly different shade to differentiate it from the second coat. Undercoats shall be tinted to approximate final color.

Paint shall not be applied in extreme heat nor in dust- or smoke-laden air, nor in damp or humid weather. Work shall be free from runs, bridges, shiners, laps, or other imperfections due to faulty workmanship. The Contractor shall assume all responsibility for preventing settling of dust or any other improper condition while paint is setting and to repair any damaged coats at no additional cost to the Owner.

Paint coverage per gallon shall not exceed the area recommended by the manufacturer; and the coverage shall be reduced when, in the opinion of the Engineer, a reduction is necessary to insure satisfactory protection to surfaces, uniform color and surface appearance. Where the paint manufacturer provides a dry film thickness (DFT) per coat, the thickness shall not be less than that recommended by the manufacturer or as specified herein.

Dry film thicknesses will be checked by the Owner with a magnetic thickness gauge, and edges and surfaces will be checked with an electric holiday detector. Paint films found to have holidays or to be less than the specified thickness shall be given such additional coats as are necessary to assure a continuous film of the specified thickness.

Material delivered to the job with a shop prime coat shall be touched-up as required to recoat all abraded areas prior to receiving any additional coating.

CLEANUP OF WORK AREA. All cloths and cotton waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint spots, oil, or stains upon adjacent surfaces and floors shall be completely removed; and the entire job left clean and acceptable.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

A11A. VERTICAL TURBINE PUMP AND DRIVING MOTOR

A. SCOPE. This section covers the work necessary for furnishing and installing the vertical turbine pump and driving motor and appurtenances, complete.

INFORMATION TO BE FURNISHED. At least 7 days prior to the bid opening, pump manufacturers quoting equipment for consideration in this project shall submit to the Engineer the information required by the data sheets at the end of this section. Data shall be submitted in duplicate. Equipment items will be selected by the Owner at the time of award of the Contract. Data sheets for the equipment selected will become a part of the Contract Documents as fully as if the same were completely set forth herein. The selection of the pumps at the time of award of the Contract shall not relieve the Contractor from responsibility for meeting the requirements of this Specification nor shall it relieve the Contractor from responsibility of errors and/or omissions in the submitted information and data sheets. Any deviation or exception of the equipment from the requirements specified shall be indicated in writing at the time of submittal of the information.

An extra set of blank pump data sheets, perforated for removal, is bound in the front of the Documents for the bidders' easy reproduction.

DEFINITIONS.

TOTAL HEAD. Total head shall be the distance from the center line of the pump discharge flange to the water level in the suction well, plus the pressure in feet measured at the discharge flange plus the velocity head in feet at the discharge flange.

EFFICIENCY. Efficiency shall be total overall efficiency for motor, pump, connecting shaft, and piping between water level and discharge flange covering the operating points given.

DIMENSIONAL DRAWINGS. Furnish dimensional drawings showing outline dimensions, column section lengths, overall sizes and weights. The drawings shall show dimensions of pump components, i.e., the motor, drive head, column section, and similar information. These dimensions shall be such as to permit the pumps to be installed in the locations shown without modification of the installation design, except that minor dimensional changes in the pump or pump support bases may be made, if necessary, to accommodate specific units.

Information submitted by pump manufacturers on the Pump Data Sheets and suitability for the installation will be used as a basis for selection of equipment.

MANUFACTURER'S REPRESENTATIVE. The pump manufacturer shall furnish the services of a qualified representative to supervise the installation and field testing of pump equipment. A qualified manufacturer's representative shall be one who has had at least 2 years' experience in the installation of the types of pumps specified on this job.

At completion of the pump installation, the manufacturer's representative shall issue a certificate showing:

That the handling of pump equipment was satisfactory to the manufacturer.

The installation is as specified and is acceptable to the manufacturer.

The warranty or guarantee is in full effect with no qualifications or reservations.

B. MATERIALS.

PUMP DESCRIPTION. The pump shall be of the vertical turbine type conforming to AWWA E101, except as herein modified.

Capacity	1200 gpm
Total Head	215 feet at 1200 gpm
Speed	1800 rpm maximum
Lubrication	Water-lubricated
Pump Shaft Material	Stainless steel
Pump Bearing Material	Bronze
Line Shaft Bearings	Rubber with bronze retainers
Impellers	Bronze or Meehanite
Bowls	Enameled cast iron
Discharge Head	8-inch diameter, flanged Belowground as shown
Column, Steel	8-inch minimum outside diameter, Schedule 40 pipe
Line Shaft Material	SAE 1040 steel
Suction Case	To be provided without strainers
Total Length	To be arranged to provide for installation as shown

PUMP CHARACTERISTICS. The pump shall have a continuous rising head capacity curve. The pump shall be supported from the motor base as shown with a seal at the well head.

DRIVING MOTOR. Driving motor shall be designed for full-voltage starting. The pump with its driving motor and thrust bearing shall be an integrated unit approved by the pump manufacturer.

Type	a-c squirrel cage
Rating	460-volt, 3-phase, 60-cycle
Speed	To match the respective pump
Horsepower	The motor's rated capacity shall not be exceeded at any head-capacity point from zero to maximum pump output and shall be not less than 100 bhp
Enclosure	Drip-proof
Insulation	Class B
Temperature Rise	NEMA standard temperature rise above 40 degress C. ambient at full load and speed
Service Factor	1.15
Duty Cycle	Continuous
Lubrication	Grease-lubricated
Guide Bearing	Oil-bath lubricated
Thrust Bearings	Oil-bath lubricated
Shaft	Vertical hollow with nonreverse ratchet
Heater	To be provided to maintain the windings at 15 degrees C. above ambient temperature when pump is not running
	Wattage as recommended by the motor manufacturer
Standard Specification	NEMA Design B
Locked Rotor Current	NEMA Code F (maximum)

THRUST BEARINGS. Thrust bearings shall be oil-bath lubricated or as recommended by the manufacturer and approved. The bearings shall be so designed that their rated life with the pumps operating at their guarantee points is not less than 40,000 hours. Rated life shall be determined in accordance with the standards of the Antifriction Bearing Manufacturer's Association.

BASEPLATE. Furnish standard baseplate to be installed under motor base.

WATER LEVEL MEASURING DEVICE.

DETECTOR GAUGE. Provide a suitable Bourdon type gauge to sense water level in the well. The gauge dial shall be calibrated in feet of depth to the bottom of the airline. This depth shall be plainly marked on the gauge face and the face shall also be marked to read directly in increments of depth from surface plate to water surface.

DETECTOR GAUGE LINE. The detector gauge line shall be 3/8-inch polyethylene tubing with the lower end to the depth as shown and the upper end attached with an adapter into the vent line as shown, such that an air source and gauge may be attached to the outer side at the opening for determining water level. Hand pump, air valve, and fittings shall also be supplied.

C. WORKMANSHIP.

INSTALLATION. Install the pump in accordance with the pump manufacturer's directions and these Specifications. The pump installation shall be supervised by a manufacturer's representative and the installation approved by this representative prior to operating the pump.

Handle carefully and protect the pump and appurtenances to avoid damaging the equipment. If the pump and column are laid down, support them with blocks to prevent damage. Install pumps with the shaft plumb. Level by means of steel wedges (steel plates and steel shims). Wedge taper shall not be greater than 1/4 inch per foot. Use double wedges to provide a level bearing surface for the pump base. Secure each pair of wedges in their final positions with one tack weld on each side after leveling is complete. Accomplish wedging so that there is no change of level or springing on the foundation when the foundation bolts are tightened. Install the pumps so that connection may be made to the suction and discharge headers without any springing or otherwise forcing either the pump or the header. Carefully fit and coat all bolt threads with lubricant to facilitate future removal. After the pump has been set in position and wedged to the proper elevation, caulk the space between the bottom of the pump baseplate and the concrete foundation with a dry, tamped-in mixture of sand and cement. The mortar mixture shall consist of 1 part cement, 1 part sand, and 1 part nonshrinking aggregate with only sufficient water to make a dry, crumbling mass. When the mixture is pressed tightly together into a ball with the hands, there should not be sufficient water in the mixture to stain the hands; and when such ball is broken, it should crumble. Tamp or rod this dry mixture solidly into the space between the machinery foundation and the concrete. A backing board or stop shall be provided at the back side of this space against which the dry mixture can be tamped. The arrangement of the column shall be straight and vertical when the installation is complete.

DISINFECTION. Care shall be taken to prevent the entrance into the well of dirt or other contamination during the operation of installing the pump. The pump bowls, column, and airline shall be thoroughly washed; first with clear water, and then with a 50 ppm chlorine solution immediately before being placed into the well. The inside of the well casing above the water surface

shall also be thoroughly washed with the 50 ppm chlorine solution before installing the pump into the well. Pour additional chlorine solution into the well in such volume and strength to result in a concentration of at least 50 parts per million of free available chlorine in all parts of the well. Allow the chlorine to stay in the well for 24 hours after the pump has been installed. Then pump the chlorine out of the well and to waste.

TESTING.

FIELD TEST. Prior to acceptance of the installed pump, demonstrate proper operation of the pump at the guarantee point, at which time data shall be taken on the total head, flow, and horsepower requirements of the pump. Furnish all instruments and labor as required for this procedure. The Owner will furnish electrical power for the test.

BALANCE OF VIBRATION. The rotating parts of the pump and its driving motor shall be statically and dynamically balanced before final assembly. The driving motor alone shall operate without vibration in excess of the limits stated in the latest revision of NEMA MG 1. The complete unit, consisting of the motor and the pump, connected and in normal operation, shall not develop amplitudes of vibration exceeding limits recommended by the 12th edition of Hydraulics Institute Standards for centrifugal pumps handling clean liquids.

TEST FAILURES. Units failing the field tests shall be corrected and retested. If pump fails the second test, the unit will be rejected and the Contractor shall furnish a unit that will perform as specified.

AIRLINE. The airline shall be carefully installed and shall be secured to the pump column and/or bowl assembly at 5-foot maximum intervals.

D. PAYMENT. Payment for furnishing and installing the pump, motor, and accessories; testing; and service of the manufacturer's erection supervisor shall be the amount stated in the Contractor's Proposal for the particular equipment selected by the Owner for installation in this project.

(See next page for Pump Data Sheets)

(Perforated Pump Data Sheets are bound in front of the Fly Sheet for the bidders' easy reproduction)

PUMP DATA SHEET NO. 1

VERTICAL SHAFT TURBINE PUMP

Bidder's Name _____ Date _____

PUMP DATA
rpm
Manufacturer
Model Number
Number of Stages
Nominal Size of Bowls
Max. OD of Bowls
Overall Length Bowl Sec.
Pump Shaft Diameter
Pump Shaft Material
No. of Pump Bearings
Pump Bearing Material
Description of Pump Bearings
Pump Bowl Catalog Number
Pump Bowl Material
Pump Bowl Lining
Impeller Type (Open, Closed)
Impeller Number
Impeller Material
Type Lubrication
hp Demand at Guar. Point

COLUMN SHAFT DATA
Column Size
Type Column Couplings
Line Shaft Size
Line Shaft Insert Material
Line Shaft Coupling Material
No. Line Shaft Bearing Spacers
Line Shaft Bearing Materials
Line Shaft Bearing Description
Line Shaft Bearing Spider Material

DISCHARGE HEAD
Manufacturer
Model Number
Guide Bearing Material
Guide Bearing Lubrication
Guide Bearing Type
Weight

THRUST BEARING
Manufacturer
Manufacturer's Number
Maximum Total Thrust at Guarantee Point
Rating Life in Hours

MOTOR
Manufacturer
Model No. and Type
Nominal hp
Power Factor at Guar. Point
Weight
Overall Efficiency at Guar. Point
Heater Rating - Watts
Maximum Diameter

(Perforated Pump Data Sheets are bound in front of the Fly Sheet for the bidders' easy reproduction)

PUMP DATA SHEET NO. 2

1200 GPM VERTICAL TURBINE PUMP

Bidder's Name_____ Date_____

Discharge quantity at guar. point

Total head at guar. point in feet

Total overall efficiency at guar. point - percent

Power factor at guar. point

The following data are the actual performance characteristics of the pump proposed for installation as specified, but the quantity, head, horsepower, and efficiency at points other than the guarantee point proposed are not guaranteed.

Operating Characteristics:

Quantity gpm	Total Head Feet	hp Demand by Pump	Overall Efficiency - % (Wire to Water)
0 (shutoff)			
250			
500			
750			
1,000			
1,200 (guarantee)			
1,500			

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A15A. LARGE AND SPECIAL VALVES

A. SCOPE. This section covers the work necessary for furnishing and installing the large and special valves, complete.

B. MATERIALS.

COMBINATION AIR RELEASE VALVE. Combination air release valve shall have cast iron body and cover and stainless steel float. Float guides, bushings, and lever pins shall be stainless steel or bronze. Valve shall be APCO No. 145C, American Valve and Primer Corporation, Chicago, Illinois.

CHECK VALVE. Eight-inch diameter, globe type silent check valve. Ends shall be drilled 125-pound in conformance with ASA A21.10. Valves shall be Williams-Hager No. 636, or as approved.

BUTTERFLY VALVE. Butterfly valve shall comply in all respects with AWWA C504, short body type. The valve shall be Class 150B. Manufacturers requesting approval shall furnish an affidavit stating this compliance and indicating the material options which are to be furnished. Short body valve installation shall be as shown. Valve shall be furnished with manual operator.

MANUAL OPERATOR. Operator shall be manual with handwheel, complying with AWWA C504. Operator shall be capable of developing torques listed in Table I of AWWA C504 for Class 150B.

C. WORKMANSHIP.

GENERAL. Before installation, carefully clean valves of all foreign material; adjust stuffing boxes; and inspect valves in open and closed positions. Install valves in accordance with the applicable portions of these Specifications. Unless otherwise indicated, install valves with the stem vertical. Mount horizontal valves in such a manner that adequate clearance is provided for operation. Installation practices shall conform to manufacturer's recommendations.

Prior to joining flanged valves the flange faces shall be thoroughly cleaned. After cleaning, insert the gasket and tighten the nuts preogressively and uniformly. If flanges leak under pressure, loosen the nuts, reseat or replace the gasket, retighten the nuts, and retest the joint. Joints must be watertight at test pressures before acceptance.

Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved methods. Apply approved joint compound to threads prior to making joint. Joints shall be watertight at test pressures before acceptance.

TESTING. All joints shall be tested under static or normal operating pressures, whichever is greater. Joints shall show no visible leakage under test. Repair joints that show signs of leakage prior to final acceptance.

STERILIZATION. Sterilize valves at the same time the pipelines to which they are attached are sterilized.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

A15B. PLUMBING AND MISCELLANEOUS PIPING SYSTEMS

A. SCOPE. This section covers the work necessary for the plumbing and miscellaneous piping systems, complete.

B. MATERIALS.

GENERAL. Submit catalog information for all equipment to be installed, regardless of whether or not it is the same manufacturer listed in the Specification.

Where specific manufacturers' equipment is listed, it is only to establish the type, quality, and configuration required. Other manufacturers will be considered in accordance with the procedure described in the Special Provisions.

PIPING SYSTEMS.

WATER. Standard weight, galvanized steel, ASTM A 120, with galvanized malleable screwed fittings, Federal Specification WW-P-521. Unions shall be galvanized malleable screwed.

WASTE AND DRAINS. 1-1/2 inches and smaller shall be standard weight galvanized steel, ASTM A 120, with galvanized cast iron screwed drainage fittings, Federal Specification WW-P-491.

WELL VENT. Standard weight, galvanized steel, ASTM A 120, with galvanized malleable screwed fittings, Federal Specification WW-P-521. PVC piping, where shown, shall be Type 1, Grade 1, conforming to ASTM D 1784 and ASTM D 1785, Schedule 80, with Schedule 80 fittings.

CHECK VALVES. Three inches and smaller, 125-pound w.o.g., bronze wye pattern, swing check, bronze disc, Crane No. 36, or as approved.

GAUGE COCKS. Bronze, Crane No. 744, or as approved.

SOLENOID VALVE. Three-way, 3/4-inch, Automatic Switch Company, Catalog No. 8316C45, watertight, normally closed, or as approved. Suitable for maximum operating pressure of 200 psig, and operation on 120-volt, single-phase power.

FD-1. FLOOR DRAIN. Zurn Z-500 or as approved, bottom outlet, size as shown, with galvanized body and grate.

PRESSURE GAUGE. Marshalltown Figure No. 23, range 0 to 100 psi, 3-1/2-inch dial, 1/4-inch bottom male connection.

VENT FILTER. Cambridge Absolute self-contained filter, Model IHS-50, with glass asbestos media, aluminum separators, and 3/4-inch exterior fire-resistant plywood frame, as manufactured by Cambridge Filter Corporation. Filter shall provide 99.97 percent efficiency on 0.3 micron particles.

C. WORKMANSHIP. The Plans are, in general, diagrammatic; submit any changes in the location of the piping deemed advisable to the Engineer for approval before proceeding with the change.

Coordinate piping installation with piping provided under other items of the work to provide a neat and workmanlike installation with piping run plumb and true with building lines. The Plans do not attempt to show complete details of all piping, and no extra payment will be allowed for obstruction of work by other trades or local obstructions to the work under this item which require offsets. Verify all measurements and dimensions at the site. Adjust all equipment and leave in a condition satisfactory to the Engineer.

STEEL PIPE. Ream, clean, and remove burrs and mill scale from piping before making up. Make joints with compound approved for potable water. Provide unions to make possible removal of all equipment without cutting, and as directed by the Engineer.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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A15C. CAST IRON PIPE AND FITTINGS

A. SCOPE. This section covers the work necessary for furnishing and installing the cast iron pipe and fittings, complete.

Reference herein is made to the latest editions of standards, tests, methods, and specifications of research and technical organizations as follows:

Item	Standard Specification, Test, or Method Designation
Cast iron pipe and fittings	Federal Specification WW-P-421 ASA A21.4, A21.6, A21.10, A21.11
Flanged pipe and fittings	Federal Specification WW-P-421 ASA B16.1

References to ASTM, AWWA, ANSI, or Federal Specifications shall be understood to mean the latest standard or specification, unless otherwise stated.

B. MATERIALS.

FLANGED CAST IRON PIPE. Flanged cast iron pipe shall be cement-mortar lined and shall conform to ASA A21.6 as to metal thickness and quality, and the cement lining to ASA A21.4. Flanges shall be screw type, faced and drilled 125-pound ASA. Flanges and bolts shall conform to ASA B16.1.

GASKETS. Gasket material for flanged joints in cast iron pipe shall be cloth-inserted sheet rubber gaskets conforming to AWWA C207 and ASA B16.21, 1/8-inch thick. The gasket shall be full-cut, with holes to pass bolts. Gasket material shall be free from corrosive alkali or acid ingredients.

MECHANICAL COUPLING. Mechanical coupling, not a part of the pipe itself, shall be cast iron couplings with rubber rings and ductile iron bolts and nuts. Couplings shall be Smith-Blair No. 431 or as approved. Provide thrust lugs attached to the pipe sections at the factory.

FLANGED COUPLING ADAPTER. Smith-Blair Type 913, or as approved.

C. WORKMANSHIP.

CUTTING PIPE.

GENERAL. Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe.

CAST IRON PIPE. Cut pipe with milling-type cutter, rolling pipe cutter, or with sledge and cold cutter. Do not flame cut.

HYDROSTATIC TESTS. Hydrostatic test will be accomplished under Schedule B, as a part of the complete pipeline test. Leakage found during testing shall be corrected under this section. Any leakage detected during pump testing shall be corrected.

STERILIZATION. Sterilization will be accomplished under Schedule B.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

A16A. ELECTRICAL

A. SCOPE. This section covers the work necessary for the complete power, lighting, and control systems. The following electrical devices are to be furnished and installed under other sections:

Motor Heaters
Motor
Solenoid Valve

B. MATERIALS.

GENERAL. Unless otherwise instructed by the Engineer, provide all new materials, first quality, approved by UL wherever standards have been established by that agency. Materials shall comply with the NEC and applicable State and local electric codes. It is the intent of these Documents that all items of material required for a complete installation shall be furnished and installed. Where 2 or more units of the same class of equipment are required, they shall be products of a single manufacturer; however, the component parts of the equipment need not be the products of the same manufacturer.

STANDARD PRODUCTS. Unless otherwise indicated, the materials to be furnished shall be the standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design that conforms to the Specification requirements.

MATERIAL AND EQUIPMENT SCHEDULES. As soon as practicable and within 30 days after the date of notice to proceed and before commencement of installation or fabrication of any materials or equipment, submit to the Engineer for approval, in quadruplicate (minimum), complete descriptive information for all materials as follows in accordance with the provisions of the applicable Article of the General Conditions:

Motor starter outline and elementary drawings.
Lighting panel.
Separately mounted main circuit breaker.
Separately mounted feeder or branch circuit, circuit breakers.
Dry type transformes.
Lighting fixture.
Rigid conduit.
Flexible conduit.
Low voltage wire.
Control cable.
Receptacle.
Light switch.
Separately mounted timer.
Well probe equipment.
Separately mounted latching relay.

INSTRUCTION BOOKS. Compile 4 copies of a composite instruction book including operation, installation, maintenance, renewal parts information,

and complete as-built drawings for all electrical equipment. This information shall be placed in a hard-backed binder in a well organized manner. These books shall be delivered to the Owner at the completion of the project.

TYPE. The materials used shall be as follows:

CONDUIT.

CONDUIT, RIGID STEEL, ZINC-COATED. Rigid steel conduit, including couplings, elbows, and nipples shall be galvanized by hot-dipping electroplating, sherardizing, or metallizing process, and shall meet the requirements of ASA C80.1, UL, and the NEC.

CONDUIT, FLEXIBLE. All flexible conduit shall be moisture-proof flexible steel, polyvinyl chloride jacketed type, UL approved, with continuous copper ground path in the flexible steel tube, and shall be American Brass Sealtite Flexible Conduit, or as approved.

CONDUIT FITTINGS. Conduit fittings shall be of the type indicated or required for the anticipated purpose, and shall meet applicable requirements of ASA C80.4, UL, NEC, and NEMA FB 1.

CONDUCTORS.

CONDUCTORS, 600 VOLTS AND LESS. Conductors in raceways, ducts, and cables shall be copper with the type of insulation specified. Conductors, including insulation, cabling, jacket, filler, shielding, covering, and testing, shall meet all applicable requirements of IPCEA S-19-81 and S-61-402, the NEC, and UL. Conductor sizes shall be not less than those shown.

Conductors No. 8 AWG or larger shall be stranded. Conductors No. 6 AWG or larger shall have insulation of a heat- and moisture-resistant Grade THW. Conductors smaller than No. 6 AWG shall have thermoplastic insulation Type TW, and shall be factory color coded with separate color for each phase and neutral used consistently throughout the system.

CONTROL CABLE. Where specified and where control circuits require 4 or more conductors between units of equipment installed 6 feet or more apart, use multiconductor, color coded, industrial control cable, with the number of conductors indicated. Cable shall be in accordance with IPCEA S-61-402, and shall be color coded in accordance with Method No. 1 of that standard. At his option, the Contractor may supply cable with a greater number of conductors or larger sized conductors than those indicated, provided conduit sizes used are those required by the NEC. Multiconductor control cable shall be Alcoa CT-3, Anaconda AP06932, Okonite P-30, or as approved.

EQUIPMENT GROUNDING CONDUCTORS. Conductors for equipment grounding shall be stranded copper. Conductor sizes No. 12 AWG through No. 2 AWG shall have green Type TW insulation with a minimum thickness of 2/64 inch. Conductor sizes No. 1 AWG or larger shall be bare copper.

OUTLETS. Each outlet in the wiring or raceway system shall be provided with an outlet box to suit the conditions encountered. Outlet boxes shall be of the gasketed cast steel or alloy type having threaded hubs, similar and equal to Crouse-Hinds Type FS or FD. Boxes shall be not less than 1-1/2 inches deep, unless shallower boxes are required by structural conditions and are specifically approved by the Engineer. Ceiling and bracket outlet boxes shall not be less than 4-inch octagonal, except that smaller boxes may be used where required by the particular fixture to be installed. Switch and receptacle boxes shall be approximately 4" x 2", unless a larger box is required.

DEVICE PLATES. Provide one-piece device plates of satin-finish stainless steel, unless otherwise specified.

RECEPTACLES.

SINGLE AND DUPLEX CONVENIENCE RECEPTACLES. Each receptacle shall be specification grade and rated 10 amperes at 250 volts and 15 amperes at 125 volts. Each receptacle shall have a grounding pole. Contact arrangement shall be such that contact is made on two sides of an inserted blade. Bases shall be of brown phenolic composition with side-mounted terminals. Receptacles shall be capable of receiving 2-wire parallel-bladed caps or 3-pole caps. All receptacles shall be UL listed.

WALL SWITCHES. Wall switches shall be of the specification grades, totally enclosed, tumbler type. Enclosures shall be of phenolic composition with gray color to match the plates specified. Single-pole switches shall be rated 20 amperes at 120/277 volts. All switches shall be a-c type, suitable for the control of tungsten filament lamp loads, and approved by UL.

LAMPS AND LIGHTING FIXTURES. Lamps and lighting fixtures of the types and sizes as indicated shall be furnished and installed complete. Lamps manufactured by General Electric, Sylvania, or Westinghouse, of the proper type, wattage, and voltage rating shall be furnished and installed in each fixture. Illustrations and references on the Plans are indicative of the general type of fixture desired. Fixtures of similar designs and equivalent light distribution and brightness characteristics and having equal finish and quality will be acceptable if approved by the Engineer prior to bid opening.

LIGHTING PANELBOARD. Panelboard and enclosing cabinets, shall be circuit breaker type as indicated, and shall meet the standards established by UL, NEMA PB 1, and the NEC.

CIRCUIT BREAKERS, INDIVIDUAL. In the enclosures indicated, mount individual circuit breakers of the indicating type providing ON, TRIPPED, and OFF positions of the operating handle. Include provisions for padlocking circuit breakers in the ON or OFF position. Interlock enclosures to prevent opening the cover with the circuit breaker in the ON position. Circuit breakers shall be quick-make, quick-break, with thermal-magnetic action. An overload of one pole of all multiple-pole circuit breakers shall automatically cause all poles to open. Circuit breakers shall meet the requirements of UL and NEMA AB 1, and shall have a minimum interrupting

rating of 25,000 amperes, RMS asymmetrical at 480 volts. Where they are used as service entrance equipment, circuit breakers shall have UL approval for that use.

SERVICE ENTRANCE. Provide a meter base and other materials, as required by the electric utility which will provide service to the facility, for installation of metering equipment and attachment of service conductors.

MOTOR CONTROL, GENERAL. Provide each motor with a suitable controller and devices that will perform the functions as specified for the respective motors. Controllers shall meet NEMA IC 1, ASA C19.1, the NEC, and UL. Motor horsepower ratings and enclosures shown are what is expected. This information is for guidance only and does not limit the equipment size. When motors furnished differ from the expected ratings, make the necessary adjustments to wiring, conduit, disconnect devices, motor starters, branch circuit protection, and other affected material or equipment to accommodate the motors actually installed, at no additional cost to the Owner.

Provide each motor with thermal overload protection in all ungrounded phases. This protection shall consist of thermal overload relays sensitive to motor current and mounted within the motor controller as indicated. All overload protection devices shall be of the inverse-time-limit type.

Controller-mounted overload relays shall be manual-reset type with externally operated reset button. Select and install overload relay heaters after the actual nameplate full-load current rating of the motor has been determined.

Provide each motor with the disconnecting means indicated, and as required by the NEC. Disconnecting means, separately enclosed or included in combination starters, shall meet the requirements for individual circuit breakers specified herein.

Enclosures, modifications, and types of controllers shall be as indicated. Provide suitable laminated plastic nameplates for each starter.

CONTROL POWER TRANSFORMERS. Supply individual control power transformers where indicated. The transformers shall have sufficient capacity to serve the connected load and limit voltage regulation to 10 percent during contact or pickup. Fuse one side of the secondary winding and ground the other side.

PUSH BUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES. Push buttons, indicating lights, selector switches, and stations for nonhazardous indoor dry locations shall be of the heavy-duty, oiltight type, similar and equal to Westinghouse Type OT, General Electric Type CR 2940, or Square D Class 9001, and shall be mounted in starter covers or oiltight NEMA 1 general purpose enclosures, as indicated. For nonhazardous outdoor or normally wet locations, these devices shall be of the heavy-duty type mounted in NEMA 4 watertight enclosures, and shall be Westinghouse Type HDW, G.E. Type CR 2940, or Square D Class 9001. These devices shall meet the requirements of NEMA IC 1, and shall have individual, extra large nameplates indicating

their specific function. Push-button stations shall have laminated plastic nameplates indicating the drive they control.

All selector switches shall have gloved-hand operating levers.

All indicating lights for 110-volt control circuits shall be transformer type.

TRANSFORMERS, DRY TYPE. Provide self-cooled dry type transformers of the ratings indicated built in accordance with the latest Standards of IEEE, UL, ASA, and NEMA.

The terminal compartment shall be located in the bottom of the transformer. Transformers shall be manufactured by Westinghouse, General Electric, Tierney, or Sorgel.

PNEUMATIC TIME DELAY RELAYS. Pneumatic time delay relays shall be adjustable from 0.2 to 180 seconds with micrometer type dial. Contacts shall be rated 10 amps minimum continuous. Relays shall be invertible, allowing field conversion from time delay after energization to time delay after de-energization and vice versa. Relays shall be Square D Class 9050, Type B, or as approved.

MECHANICALLY HELD LATCHING RELAY. Latching relays shall be of size and number of contacts required with the enclosures indicated on the Plans. Relays shall be Square D, Class 8508, or as approved.

C. WORKMANSHIP.

GENERAL. The installations shall conform to the latest applicable rules of the NEC, and applicable State and local codes. Workmanship shall be of the highest grade. Install products in strict accordance with the manufacturer's recommendations, unless otherwise specified or directed by the Engineer. Replace or repair defective equipment or equipment damaged in the course of installation or test in a manner approved by the Engineer. If any departures from the Plans are deemed necessary, submit details of such departures and the reasons therefor as soon as practicable, and within 30 days after the award of the Contract, to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer.

Examine all Plans and coordinate work so as to avoid conflicts, errors, delays, and unnecessary interference with the continuous operation of the plant during construction. Wiring shown is diagrammatic only and is meant to show circuiting and switching details. Locations of lighting fixtures, equipment, and electrical outlets shown are approximately correct. In the event of any conflicts, consult the Engineer; his decision shall govern.

Obtain all permits and pay all fees required by any governmental agency having jurisdiction over his work.

Electrical loads shall be balanced at panelboards. After final service connections are made, check and correct, if necessary, the rotation of all motors.

WIRING METHODS.

GENERAL. Generally and unless otherwise specified or indicated, wiring shall consist of insulated conductors installed in rigid zinc-coated steel conduit.

CONDUIT SYSTEMS. Conduit system installations shall meet or exceed the requirements of the NEC. Minimum size of conduit shall be 1/2 inch, except conduit not smaller than 3/4 inch shall be used where run in or under concrete floor slabs. Raceways shall be concealed or exposed as indicated. Separate raceways shall be supported at intervals required by the NEC, and shall have exposed runs installed parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings. Avoid field-made bends and offsets where possible, but where necessary, make with an approved hickey or conduit bending machine. Heating of conduit to facilitate bending will not be acceptable. Changes in direction of runs shall be made with symmetrical bends or cast metal fittings. Do not install crushed or deformed raceways. Avoid trapped raceways where possible. Take care to prevent the lodgment of plaster, dirt, or trash in raceways, boxes, fittings, and equipment during the course of construction. Raceways shall be entirely free of obstructions or shall be replaced. All conduit shall be reamed, burrs removed, and cleaned for proper introduction of wires and cables. Immediately after installation, plug or cap all conduit ends with watertight and dust-tight conduit seals until the time for pulling wires.

Install insulating type bushings or manufacturer's standard insulated metallic bushings on the ends of all rigid conduits, except where conduits terminate in threaded hubs on cast boxes or cabinets, in which case insert manufacturer's standard insulating sleeves. Where insulating bushings are used, and where bushings cannot be brought into firm contact with the box, fasten rigid conduits to all sheet metal boxes and cabinets with 2 locknuts where required by NEC; otherwise, a single locknut and insulated, metallic bushings are acceptable. Wooden plugs inserted in concrete or masonry are not acceptable as a base for raceway fastenings, nor shall raceways or pipe straps be welded to steel structures. Support multiple raceways adjacent to each other by ceiling trapeze. Support individual raceways by wall brackets, strap hangers, or ceiling trapeze, fastened by wood screws on wood, expansion shields on concrete or brick, and machine screws or welded threaded studs on steelwork. Threaded studs driven in by a powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.

Conduits shall emerge from the concrete at right angles and shall have none of the curved portion of the bend exposed. The curved portion of the bends under floor slab where conduits emerge from the floor shall be concrete encased. Provide structural support for the conduit during pouring of concrete to insure that the conduit remains in position; also, seal the ends of all conduits by pipe caps or plugs in couplings. Conduit shall be of greatest practicable single length between joints, and all joints shall be made up with approved jointing compound. Do not use nails to fasten boxes or conduits; do not use wire in lieu of straps or hangers; and do not notch structural members for the passage of raceways.

Install and equip conduit boxes and fittings installed outdoors or in other wet locations so as to prevent water from entering the conduit.

Rigid steel conduit installed underground shall have a minimum cover of 3 feet and the excavation and backfill shall conform to the requirements of Section EARTHWORK. Coat conduit installed underground at couplings and joints with Kopper's Bitumastic No. 505, or wrap with Scotchrap No. 51 plastic tape with 1/2-inch overlap in strict accordance with the manufacturer's recommendations. Conduit may be wrapped or coated before final assembly, provided that all wrench marks, exposed threads, or other holidays are wrapped or coated to provide a continuous holiday-free uniform coating after final assembly. Do not use union type fittings underground, except with approval of the Engineer.

Do not backfill underground conduit until it has been inspected by the Engineer or his representative.

Final connection to motors and to other equipment where flexible connection is desired or required to minimize vibration, shall be made with 18-inch minimum lengths of liquid-tight, neoprene-jacketed, flexible steel conduit where the required conduit size is 3 inches or less. Where required conduit size is greater than 3 inches, rigid steel conduit shall be continued to the motor terminal box.

CONDUCTORS.

CONDUCTORS, 600 VOLTS AND BELOW. All wire shall be continuous from outlet to outlet. Splices, where required, may be made in outlet and pull boxes only. Use wire connectors of insulating material or solderless pressure connectors properly taped for all splices. Soldered mechanical joints insulated with tape will not be acceptable. Vinyl plastic tape of suitable quality is acceptable in lieu of rubber and friction tapes. Conductor sizes shall not be less than those shown. Conductors shall not be smaller than No. 12 AWG for lighting or power circuits, or No. 14 AWG for control circuits, unless otherwise indicated.

Arrange wiring in cabinets and panels neatly cut to proper length, and remove surplus wire. Apply Stak-on or similar terminals to control wiring for connection to terminals, and bridle and secure in an approved manner. List all circuits emanating from power, distribution, and lighting panelboards by function on the directory card. Identify all circuits entering control cabinets by directory card listing terminal block number and function or by means of tags securely fastened to the conductors.

CONTROL CABLE. Keep splices to an absolute minimum. Locate splices, when necessary, only in readily accessible cabinets or junction boxes using terminal strips. Splices of a control cable with a large number of conductors, into one or smaller control cables, will not be acceptable.

OUTLETS. Provide each outlet in the wiring or raceway systems with an outlet box to suit the conditions encountered. Each box shall have sufficient volume to accommodate the number of conductors entering the box

in accordance with the requirements of the NEC. Install boxes in a rigid and satisfactory manner and fasten directly with wood screws on wood and machine screws or welded threaded studs on steelwork. Where boxes are concealed in walls, if not embedded in concrete, the hole shall be no larger than required to receive the box. Locations of outlets indicated are approximate; study the building plans in relation to the spaces and equipment surrounding each outlet, so that the lighting fixtures are symmetrically located according to the room layout. When necessary, with the approval of the Engineer, relocate outlets to avoid interference with the mechanical equipment or structural features.

RECEPTACLES AND WALL SWITCHES. Equipment shall be located at the following height above the floor, unless otherwise indicated:

Convenience receptacles (indoor)	12" above floor
Wall switches	48" above floor

LIGHTING FIXTURES. Install lighting fixtures at the height and in the manner indicated. Provide accessories, such as straps, mounting plates, nipples, or brackets, for proper installation. Provide suspended incandescent fixtures with swivel hangers to insure a plumb installation.

Deliver lamps to the project in their original cartons and install in the fixtures just prior to the completion of the project. After construction of the total project is completed, wash fixtures and clean lamps.

GROUNDING. Except where specifically indicated otherwise, ground all exposed noncurrent-carrying metallic parts of electrical equipment, raceway systems, and the neutral of all wiring systems in strict accordance with the NEC and other applicable laws and regulations. Where ground rods are indicated or used, they shall be of galvanized steel, not less than 3/4-inch diameter, 8 feet long, and driven full length into the earth. Special requirements shall be as shown and as specified herein.

GROUNDING CIRCUITS ABOVE 150 VOLTS TO GROUND. Ground all enclosing cases and mounting frames of all switches, control panels, motors, junction boxes, and other electrical or electrically operated equipment with a separate grounding conductor from the source of supply. Run the grounding conductor inside the conduit enclosing the power conductors supplying the equipment.

Supply all metallic conduits with ground wedges and connect at each end to the grounding conductor.

Make the ground conductor connections to motors 10 hp and above or circuits 20 amperes and above by solderless terminal and a 5/16-inch minimum bolt tapped to the motor frame or equipment housing. Ground connections to smaller motors or equipment may be made by fastening the terminal to a connection box. Connect junction boxes to the equipment grounding system with grounding clips mounted directly on the box or with 3/8-inch machine screws.

GROUNDING CONNECTIONS. Make all buried grounding connections by brazing or Cadweld type joint. Make all other grounding connections by brazing, Cadweld, or with approved pressure terminals.

TESTS. After the electrical system installation is completed and at such time as the Engineer may direct, conduct an operating test for approval. Demonstrate the equipment operating in accordance with the requirements of these Special Specifications. Perform the test in the presence of the Engineer or his authorized representative. Furnish all instruments and personnel required for the tests; the Owner will furnish the necessary electric power.

GUARANTEE. All equipment to be furnished under this item shall be guaranteed for a period of one year from the date of acceptance thereof against defective materials, design, and workmanship in accordance with the provisions of the applicable Article of the General Conditions.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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SCHEDULE B

SUPPLY TRANSMISSION PIPELINE

B2A. TRENCH EXCAVATION AND BACKFILL

A. SCOPE. This section covers the work necessary for the trench excavation and backfill, complete.

TYPE OF BACKFILL. Trench excavation and backfill will be divided into the following classifications for the purpose of payment:

CLASS C BACKFILL. Class C backfill will, generally, be limited to locations where trenches are located in unsurfaced areas and where prevention of subsequent trench settlement is not considered critical.

CLASS D BACKFILL. Class D backfill will, generally, be limited to traveled roadways and crossings where surface replacement will be made shortly after backfilling and subsequent trench settlement must be held to a minimum.

CLASS E BACKFILL. Class E backfill will, generally, be limited to the shoulders of streets and roadways on which gravel surfacing is to be replaced.

GENERAL. For bidding purposes, the class of backfill to be used is indicated. The right is reserved to modify the use, location, and quantities of the various types of backfill during construction as the Engineer considers to be to the best interest of the Owner. No claims for extra payment will be allowed for any deviation from the original, unless specifically outlined in other portions of these Specifications. During construction, the Engineer will designate the type of backfill to be used in each location throughout the project.

EXCAVATION AND BACKFILL FOR VALVES AND SIMILAR APPURTENANCES. Will be included for payment under the applicable section.

B. MATERIALS.

TRENCH EXCAVATION. Trench excavation shall be classified as common. No rock excavation is anticipated.

COMMON EXCAVATION. Common excavation is defined as the removal of all material which is not classified as rock excavation.

ROCK EXCAVATION. Rock excavation is defined as the removal of all material which by actual demonstration cannot, in the Engineer's opinion, be reasonably excavated with a 3/4-yard, Bucyrus Erie 22-B backhoe equipped with a 19-foot boom, general duty dipper and rock points, or similar approved equipment.

If rock is encountered, the Contractor and the Owner will negotiate a price for rock excavation.

Individual masses of material having less than 1/2-cubic yard volume within the limits of the trench shall not be classed as rock excavation, regardless of the method of excavation and removal.

TRENCH BACKFILL.

FOUNDATION STABILIZATION. Three-inch minus crushed rock, with reasonably even gradation from coarse to fine and free from excessive dirt or other foreign material.

CLASS C BACKFILL. Class C backfill shall be the native material excavated from the trench.

CLASS D BACKFILL. Gravel for Class D backfill from the top of the pipe zone to a point 8 inches below the bottom of the existing asphalt surfacing shall be clean bank- or pit-run gravel or crushed rock, having reasonably even gradation from coarse to fine with a maximum size of 3 inches. The next 8 inches shall be 3/4-inch minus crushed rock or gravel.

CLASS E BACKFILL. Class E backfill shall be native material from the top of pipe zone to 8 inches below finished grade. The top 8 inches shall be 3/4-inch minus crushed rock or gravel.

MANUALLY GUIDED VIBRATORY COMPACTOR. Self-propelled machine that compacts granular material by a combination of weight, vibration, and impact, similar to the Jackson Manually Guided Vibratory Compactor, as manufactured by Jackson Vibrators, Inc., of Ludington, Michigan. Operate the compactor at a speed not exceeding 60 linear feet per minute or at the speed recommended by the manufacturer if slower. A pass of the machine shall consist of 1 trip over each lift of backfill material with a 2-inch overlap on previously compacted area.

C. WORKMANSHIP.

CLEARING THE RIGHT-OF-WAY. Where clearing of the right-of-way is necessary, complete prior to the start of trenching. Cut trees and brush as near to the surface of the ground as practicable and pile for disposal. Stumps within 4 feet of the trench center line shall be removed. All trees, brush, and other flammable debris from the clearing shall be burned or otherwise disposed of off the construction site in an approved location at the Contractor's expense. Burn unless otherwise directed by the Engineer. Observe all Federal and State laws relating to fire permits and local regulations relating to burning such materials. Do not permit excavated materials to cover brush or trees prior to clearing and burning.

Do not remove existing trees or tree limbs, whether on public or private property, without permission from the Engineer.

OBSTRUCTIONS. This item refers to obstructions which may be removed and do not require replacement. Obstructions to the construction of the trench such as tree roots, stumps, abandoned piling, buildings and concrete structures, logs, rubbish, and debris of all types shall be removed without additional compensation from the Owner. The Engineer will, if requested, make

changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the perpetual easement and right-of-way and without adversely affecting the intended function of the facility. The Contractor shall pay all additional costs or credit the Owner for any savings resulting from such alignment changes.

PAVEMENT REMOVAL. Cut bituminous pavement prior to excavation of the trenches with an approved pavement saw, hydrohammer, or other approved breaker. Width of the pavement cut shall be at least equal to the required width of the trench at ground surface.

Pavement and concrete materials removed shall be taken from the site and not used for trench backfill.

TRENCH WIDTH. Minimum width of unsheeted trenches in which pipe is to be laid shall be 18 inches greater than the inside diameter of the pipe, except by permission of the Engineer. Sheeting requirements shall be independent of trench widths.

The maximum clear width at the top of the pipe will not be limited, except in cases where excess width of excavation would cause damage to adjacent structures.

In all cases, confine trench widths to dedicated rights-of-way for public thoroughfares or within areas for which construction easements have been obtained, unless special arrangements have been made with the affected property owners.

GRADE. Carry the bottom of the trench to the lines and grades shown or as established by the Engineer with proper allowance for pipe thickness and for gravel base or special bedding when required. Correct any part of the trench excavated below the grade at no additional cost to the Owner, with gravel of the type specified for pipe base under pipe by placing the gravel over the full width of trench to the established grade.

SHORING, SHEETING, AND BRACING OF TRENCHES. Whenever necessary to prevent caving during excavation in sand, gravel, sandy soil, or other unstable material, or to protect adjacent structures or property, adequately sheet and brace the trench. Where sheeting and bracing are used, increase trench widths accordingly. Keep trench sheeting in place until the pipe has been placed, backfilled at the pipe zone, tested for defects, and repaired, if necessary. All sheeting, shoring, and bracing of trenches shall conform to the requirements of the public agency having jurisdiction.

LOCATION OF EXCAVATED MATERIALS. During trench excavation, locate the excavated material within the construction easement or right-of-way so that the excavated material will not obstruct any private- or public-traveled roadways. Pile and maintain material from trenches so that the toe of the slope of the material excavated is at least 18 inches from the edge of the trench. It shall be the Contractor's responsibility, however, to determine the safe loading of all trenches with excavated material.

REMOVAL OF WATER. Provide and maintain ample means and devices with which to promptly remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe, and until the backfill at the pipe zone has been completed.

Dispose of the water in an approved manner without damage to adjacent property. Drainage of trench water through the pipeline under construction is prohibited.

FOUNDATION STABILIZATION. When, in the opinion of the Engineer, the existing material in the bottom of the trench is unsuitable for supporting the pipe, excavate below the flow line of the pipe, as directed by the Engineer, and backfill the trench to subgrade of pipe base.

PIPE BASE AND BACKFILL IN PIPE ZONE. Base and pipe zone backfill are included in specification for pipe.

TRENCH BACKFILL ABOVE PIPE ZONE. Push all earth, gravel, or other material used in backfilling first onto the slope of the backfill previously placed and allow to roll down into the trench. Do not push the backfill material into the trench in such a way as to permit free fall of the material into the open trench until at least 2 feet of cover is provided over the pipe. Under no circumstances allow sharp, heavy pieces of material to drop directly onto the pipe or the tamped material around the pipe. Do not use backfill material of consolidated masses 1/4 cubic foot and larger in size or as otherwise specified.

TRENCH DEPTH. Trench shall be at a depth as shown and shall allow for a minimum of 3 feet of cover over the top of the pipe.

CLASS C BACKFILL. After the completion of the backfilling of the pipe zone, the excavated trench material may be pushed back into the trench by mechanical means. The requirements for topsoil shall apply in all trenches designated on the Plans and by the Engineer.

Where Class C backfill is used on private or public street or road rights-of-way, leave the trench with the backfill material neatly mounded not more than 6 inches above the existing ground for the full width of the trench. In all other locations where Class C backfill is used, the Contractor shall make his own estimate of the amount of backfill material required at the trench so that after normal settlement has occurred, the finished surface will meet the existing grade. Neatly windrow the material over the trench, and remove all excess. Any excess or deficiency of backfill material which becomes apparent after settlement and within the guarantee period shall be corrected by regrading, disposal of excess material, and adding additional material where required.

CLASS D BACKFILL. Backfill the entire trench above the pipe zone with Class D backfill material in layers not exceeding 6- to 10-inch loose lifts and compact each lift to 95 percent maximum density as determined by AASHO T 99, Method D, with approved pneumatic or gasoline powered compaction equipment.

Maintain the surface of the backfilled trench level with the existing grade with 3/4-inch minus gravel or crushed rock until pavement replacement is completed or the entire project is accepted by the Owner.

CLASS E BACKFILL. Backfill the trench above the pipe zone with excavated material to a depth of 8 inches below the ground surface. Place a minimum of 8 inches of 3/4-inch crushed gravel or rock as specified over the entire trench surface and compact by at least 5 passes with the wheels of a loaded 10-yard dump truck or other approved equipment. The final backfilled surface shall be at the same level as the original surface. Any subsequent settlement of the finished surfacing during the warranty period shall be promptly repaired by the Contractor at no cost to the Owner.

EXCESS EXCAVATED MATERIAL. Dispose of all excess excavated materials. Make arrangements for the disposal and bear all costs or retain any profit incidental to such disposal.

DRAINAGE CULVERTS. Replace in kind drainage culverts which are removed and are at or near the trench. If the pipe is damaged during removal, dispose of it and furnish and install new pipe. Dispose of culvert pipe that is in too poor condition to replace because of age, physical conditions, or other reasons beyond the Contractor's control, and install new pipe furnished by the Owner.

Replace all culvert pipe to the lines and grades established by the Engineer. Do not replace culverts until the proposed pipeline is installed and the proper backfilling of the trench has been completed to the subgrade of the culvert.

D. PAYMENT. Payment for the work specified in this section will be made at the unit prices stated in the Contractor's Proposal and shall be included under the following items. Computation of quantities will be as indicated for each item and will be based upon measurements made by the Engineer.

TRENCH EXCAVATION AND BACKFILL. Payment for trench excavation and backfill will be made at the respective unit prices per linear foot stated in the Contractor's Proposal for the trench excavation and the class of backfill used, and all incidental work.

The length of trench for which payment will be made is based on the measured horizontal distance along the center line of the pipe and fittings in place.

Payment for trench excavation and the respective backfill shall constitute full compensation for all work specified under this item.

Consider the price bid per linear foot to include any extra excavation required to provide space for gravel base where specified or ordered by the Engineer. The bid price shall also include any incidental excavation and backfill necessary to widen the trench for installation of branch-line fittings, electrical conduit, and control cable. Pipe base and pipe zone backfill is specified under the specifications for PIPE.

FOUNDATION STABILIZATION. Payment for this item will be based on the unit price per cubic yard as stated in the Contractor's Proposal. Measurement will be based upon individual trip tickets of actual truck measure furnished the Engineer for cubic yards used under this item. Trip tickets shall be presented to the Engineer for his signature on the day the material is delivered. No payment will be allowed on trip tickets not so validated by the Engineer. Payment for this item shall be considered full payment for all materials, labor, equipment, and incidentals necessary to furnish materials at trench side and for placing it in the trench and for the extra depth of trench excavation required below flow line grade to provide for a stable base for the pipe. This item is to provide for unstable base encountered in the progress of the work and shall be used only under the direction of the Engineer.

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B2B. SURFACE RESTORATION

A. SCOPE. This section covers the work necessary for all required replacement of pavement and rock surfacing, complete.

B. MATERIALS.

ROCK FOR SURFACE REPLACEMENT AND BASE. Rock shall be 3/4-inch minus crushed gravel or rock.

The aggregate shall consist of uniform quality, clean, tough, durable fragments of rock or gravel, free from flat, elongated, soft or disintegrated pieces, and other objectionable matter occurring either free or as a coating on the stone.

The sizes of the aggregates to be furnished shall be as indicated below and shall be furnished mixed to the proportions shown therein:

GRADATION

Sieve Size	Designated Size Leveling Course 3/4" Minus
1" to 3/4" size	0-10%
3/4" to 3/8" size	20-40%
Passing 1/4" sieve	40-60%
Passing 200 sieve	0-5%

Submit proof in the form of test results from an approved commercial testing laboratory or other evidence satisfactory to the Engineer to show that the materials meet the quality and gradation requirements, if requested.

ASPHALT CONCRETE. Hot plant-mix with maximum 3/4-inch aggregate, conforming to the Standard Specifications for Highway Construction of the Oregon State Highway Department.

Asphalt cement shall be 85-100 penetration paving asphalt conforming to AASHO M 20.

ASPHALT PRIME. Liquid asphalt for use as a prime coat under asphalt concrete shall be RC-70 or MC-70 liquid asphalt conforming to AASHO M 81 or M 82.

C. WORKMANSHIP.

CONSTRUCTION PROCEDURE. The Engineer reserves the right to vary the classes of backfill and the type of resurfacing as best serves the interest of the Owner. Trench backfill shall be as specified in Section TRENCH EXCAVATION AND BACKFILL.

In addition to the requirements set forth herein, the work shall conform to the applicable workmanship requirements of the Marion County Road

Department, namely, Oregon State Standard Specifications for Highway Construction.

All applicable requirements concerning construction responsibilities and procedures shall apply.

REMOVAL OF PAVEMENT. Removal of all pavement shall conform to Section TRENCH EXCAVATION AND BACKFILL, and payment for removal shall be included in that section.

TRENCH MAINTENANCE. Maintain all trenches as specified under Section TRENCH EXCAVATION AND BACKFILL.

ASPHALT CONCRETE PAVEMENT REPLACEMENT.

SUBGRADE. Bring the trench to a smooth, even grade at the correct distance below the top of the existing pavement surface so as to provide adequate space for the 2-inch leveling course. Trim existing pavement to a straight line to remove any pavement which has been damaged or which is broken and unsound to provide a smooth, sound edge for joining the new pavement.

Compact the subgrade to 100 percent of the maximum density obtained in the Standard Proctor Test, AASHO T 99, Method D. Accomplish supplementary compaction where required with approved mechanical vibrating or power tampers.

LEVELING COURSE. Place, without segregating, enough leveling course material to obtain a thickness of 2 inches after compaction. Compact to the required depth of finished pavement and for proper matching with the adjacent existing pavement. Place the leveling course for the full width of the trench where pavement was disturbed, including bituminous surfaced shoulders.

Compact the leveling course to 100 percent of maximum density, AASHO T 99, Method D.

PRIME COAT. After the leveling course has been compacted, apply an asphalt prime coat, specified above, at 0.25 to 0.40 gallons per square yard to the surface of the leveling course and to the edges of the existing pavement.

ASPHALT CONCRETE. After the prime coat has set, but before it loses its adhering properties, place the hot plant-mix asphalt concrete on the prepared subgrade over the trench to a depth of not less than 2 inches or the depth of the adjacent pavement. Spread and level the asphalt concrete with hand tools or by use of a mechanical spreader, depending upon the area to be paved. Bring the asphalt concrete to the proper grade and compact by rolling or the use of hand tampers where rolling is impossible.

Roll with power rollers capable of providing compression of 350 pounds per linear inch. Begin the rolling at the edges of the patch overlapping the existing surface at least 1/2 the width of the roller and progress toward the

center of the resurfaced area. Overlap each preceding track by at least 1/2 the width of the roller and make sufficient passes over the entire area to produce the desired result, as determined by the Engineer.

The finished surface of the new paving shall be flush with the existing surface and shall conform to the grade and crown of the adjacent pavement.

SURFACE SMOOTHNESS. The surface smoothness of the replaced pavement shall be such that when a straightedge is laid across the patched area between the edges of the old surfacing and the surface of the new pavement, the new pavement shall not deviate from the straightedge more than 1/4 inch.

WEATHER CONDITIONS. Resurfacing will be permitted only during dry weather and while the trench conditions are satisfactory for pavement replacement. Exceptions will be permitted only in special cases and only with prior written approval of the Engineer.

PROTECTION OF STRUCTURES. Provide whatever protective coverings may be necessary to protect the exposed portions of any structures from splashing oil and asphalt from the paving operations. Remove any oil, asphalt, dirt, or any other undesirable matter that may come upon these structures by reason of the paving operations.

Where water valve boxes or other underground utility appurtenances are within the area to be surfaced, the resurfacing shall be level with the top of the existing finished elevation of these facilities.

EXCESS MATERIALS AND CONTRACTOR'S RESPONSIBILITY. Dispose of excess materials. Repair all settlement of pavement over Class D backfilled trenches within the warranty period at no additional cost to the Owner.

ROCK SURFACING. Where so directed by the Engineer, place crushed rock surfacing material, as specified herein, for the full width or part width of road shoulders and other areas disturbed by the construction. The areas covered, size of rock, and depth of application shall be as directed by the Engineer. Spread the rock by "tailgating" and supplement by hand labor where necessary. Level and grade the rock to conform to existing grades and surfaces.

D. PAYMENT. Payment for the work under this section shall be based on the appropriate unit prices stated in the Contractor's Proposal. Payment shall constitute full compensation for furnishing all labor, materials, and equipment to complete the work as specified under this section.

ROCK SURFACING. Payment for replacement of rock surfacing shall be based on the unit price per cubic yard for 3/4-inch rock as stated in the Contractor's Proposal. The quantity of rock replaced shall be the actual number of cubic yards used as directed by the Engineer, and shall be based on truck measure and trip tickets signed by the Engineer on the date of use. No payment will be allowed on trip tickets not so validated by the Engineer. The unit price for the rock shall include payment for excavating to provide space for the rock if necessary and disposal of all excess excavated material.

ASPHALT CONCRETE PAVEMENT REPLACEMENT. Payment for asphalt concrete will be based on the unit price bid per linear foot for the full width of the disturbed or damaged surface as stated in the Contractor's Proposal for each.

The unit prices shall include payment for excavation required to provide space for the surfacing, preparation of the trench, disposal of all excess excavated materials, and all other work required to complete the resurfacing. The 2-inch crushed rock leveling course will also be considered as included in the bid price per linear foot for pavement replacement as stated in the Contractor's Proposal.

Should the Contractor elect to tunnel under certain sections of pavement, payment will be made as though removal and replacement had been accomplished.

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B15A. CAST IRON PIPE AND FITTINGS

A. SCOPE. This section covers the work necessary for furnishing and installing the cast iron pipe and fittings, complete.

Reference herein is made to the latest editions of standards, tests, methods, and specifications of research and technical organizations as follows:

Item	Standard Specification, Test, or Method Designation
Cast iron pipe and fittings	Federal Specification WW-P-421 ASA A21.4, A21.6, A21.10, A21.11
Flanged pipe and fittings	Federal Specification WW-P-421 ASA B16.1
Ductile iron pipe	ASA A21.51, 1965

References to ASTM, AWWA, ASA, ANSI, or Federal Specifications shall be understood to mean the latest standard or specification, unless otherwise stated.

B. MATERIALS.

JOINTS. Pipe joints shall be push-on joints. Fitting joints shall be mechanical joint ends, except where specifically shown or detailed otherwise.

PUSH-ON JOINT CAST IRON PIPE. Push-on joint cast iron pipe shall be cement-mortar lined and conform to ASA A21.6 and ASA A21.11, and shall be U. S. Tyton joint pipe, as manufactured by United States Pipe and Foundry Company and Pacific States Cast Iron Pipe Company, or as approved. The thickness class shall be 22. The rubber-ring gaskets shall conform to ASA A21.11, be suitable for the specified pipe sizes and pressures, and shall be furnished with the pipe. A nontoxic vegetable soap lubricant shall be supplied in sufficient quantities for installing the pipe furnished.

MECHANICAL JOINT FITTINGS. Mechanical joint cast iron fittings shall conform to AWWA C110 and shall be of a class at least equal to that of the adjacent pipe. No mortar lining is required on fittings.

FLANGED CAST IRON PIPE. Flanged cast iron pipe shall be cement-mortar lined and shall conform to ASA A21.6 as to metal thickness and quality, and the cement lining to ASA A21.4. The thickness class shall be 22. Flanges shall be screw type, faced and drilled 125-pound ASA. Flanges and bolts shall conform to ASA B16.1.

FLANGED CAST IRON FITTINGS. Flanged fittings shall conform to ASA B16.1 and shall be faced and drilled 125-pound ASA.

GASKETS. Gasket material for flanged joints in cast iron pipe or fittings shall be cloth-inserted sheet rubber gaskets conforming to AWWA C207 and ASA B16.21, 1/8-inch thick. The gasket shall be full-cut, with holes to pass bolts. Gasket material shall be free from corrosive alkali or acid ingredients.

HANDLING. Handle the pipe so as to prevent injury to the coating. Place no pipe or other material inside any other pipe at any time after it has been coated.

TRANSITION OR REDUCING COUPLINGS. The couplings shall be cast iron couplings with rubber rings and ductile iron bolts and nuts. Couplings shall be Smith-Blair No. 433 or No. 435.

IMPORTED GRANULAR MATERIAL FOR PIPE BASE. Use clean pea gravel or crushed rock with a maximum size of 3/4 inch, uniformly graded from coarse to fine. Clean pit-run, or reject crusher-run sand may be substituted for gravel in trenches with no groundwater in the pipe zone.

SELECTED TRENCH SIDE MATERIAL FOR PIPE ZONE. Selected trench side material used for backfill in the pipe zone shall contain no rock, frozen soil, or other piece of material larger than 1-1/2 inches for pipe 18 inches and smaller, and 2-1/2 inches for pipe over 18 inches in diameter.

C. WORKMANSHIP.

PREPARATION OF TRENCH.

GRADE. Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

PIPE BASE. If the trench is overexcavated, rebuild the overexcavated section of the trench with imported pipe base at no additional cost to the Owner.

BELL (JOINT) HOLES. At the location of each joint, dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit the joint to be made properly and to permit easy visual inspection of the entire joint.

REMOVAL OF WATER. Provide and maintain ample means and devices at all times to remove and dispose of all water entering the trench excavation during the process of pipe laying.

LAYING.

DISTRIBUTING PIPE. Distribute material on the job from the cars or storage yard no faster than can be used to good advantage.

HANDLING MATERIAL. Provide and use proper implements, tools, and facilities satisfactory to the Engineer for the safe and convenient prosecution of the work. Lower all pipe, fittings, and appurtenances into the trench, piece by piece, by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to the pipeline materials and protective coatings and linings. Do not drop or dump pipeline materials into the trench.

CLEANING PIPE AND FITTINGS. Remove all lumps, blisters, and excess coal-tar coating from the bell-and-spigot ends of each pipe. Wire brush the outside of the spigot and the inside of the bell and wipe clean, dry, and free from oil and grease before the pipe is laid.

Wipe the ends of mechanical joint pipe and fittings and of rubber gasket joint pipe and fittings clean of all dirt, grease, and foreign matter.

PLACING OF PIPE IN THE TRENCH. Do not allow foreign material to enter the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into the pipe, the Engineer may require that a heavy, tightly woven canvas bag of suitable size be placed over each end before lowering the pipe into the trench and left there until the connection is to be made to the adjacent pipe. During laying operations, prevent debris, tools, clothing, or other materials from entering the pipe.

PUSH-ON JOINT PIPE. After the first length of push-on joint pipe is installed in the trench, secure pipe in place with approved backfill material tamped under and along sides to prevent movement. Keep ends clear of backfill. After each section is joined, place backfill as specified to prevent movement.

MECHANICAL JOINT AND PUSH-ON JOINT PIPE. Connect mechanical joint pipe and push-on joint pipe as hereinafter specified as soon as they are placed in the trench.

PREVENTING TRENCH WATER FROM ENTERING PIPE. At times when pipe laying is not in progress, close the open ends of pipe by a watertight plug or other means approved by the Engineer, and allow no trench water to enter the pipe. Caulk joints of pipe in the trench which cannot be poured with packing to make them as watertight as possible. These provisions shall apply during the noon hour as well as overnight. If water is in the trench, keep the seal in place until the trench is pumped dry.

CUTTING PIPE.

GENERAL. Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe.

CAST IRON PIPE. Cut pipe with milling-type cutter, rolling pipe cutter, or with sledge and cold cutter. Do not flame cut.

DRESSING CUT ENDS. Dress cut end of mechanical joint pipe to remove sharp edges or projections which may damage the rubber gasket. Dress cut ends of push-on joint pipe by beveling, as recommended by the manufacturer.

BELL END TO FACE DIRECTION OF LAYING. Unless otherwise directed, lay pipe with bell end facing in the direction of the laying. For lines on an appreciable slope, face bells upgrade (at the discretion of the Engineer).

PERMISSIBLE DEFLECTION AT JOINTS. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or plumb stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that recommended by the manufacturer, approved by the Engineer, or indicated hereinafter.

Maximum Deflection Permitted

18' Length Pipe

D	Bell & Spigot *		Mechanical Joint**		Push-On Joint	
	Max. Defl. Angle	Defl. in Inches	Max. Defl. Angle	Defl. in Inches	Max. Defl. Angle	Defl. in Inches
4"	4°20'	16.7	8°18'	31	5°	18
6"	4°20'	16.7	7°07'	27	5°	18
8"	3°50'	14.6	5°21'	20	5°	18
10"	3°40'	14.0	5°21'	20	5°	18
12"	3°10'	11.9	5°21'	20	5°	18
14"	2°40'	10.1	3°35'	13-1/2	3°	11

The maximum deflection shall be whichever is less, the above or that recommended by the pipe manufacturer.

*--Limiting factors: (1) Joint opening not to exceed 0.75 inch.
(2) Caulking space at face of bell to be not less than 0.25 inch in width.

**--Safe deflection for 150 pounds pressure. For higher pressure, reduce tabulated deflection 10 percent for each 150 pounds added pressure.

ALIGNMENT. For pipelines intended to be straight, do not deviate from the straight line at any joint in excess of 1 inch.

UNSUITABLE CONDITIONS FOR LAYING PIPE. Do not lay pipe in water or when, in the opinion of the Engineer, trench conditions are unsuitable.

JOINTING MECHANICAL JOINT FITTINGS. Mechanical joint fittings vary slightly with different manufacturers. Install the particular fitting furnished in accordance with the manufacturer's recommendations as approved by the Engineer. In general, the procedure shall be as hereinafter specified. Clean the ends of the pipe of all dirt, mud, and foreign matter by washing with water and scrubbing with a wire brush, after which slip the gland and gasket on the plain end. If necessary, lubricate the pipe end with soapy water to facilitate sliding the gasket in place. Then guide the end of the pipe into the bell of the fitting. Locate the spigot centrally in the bell, place the gasket in position, and insert the bolts in the holes.

Torque ranges to be applied to bolts and wrench lengths which should produce the required torque when applied by the average man should be as follows:

Diameter of Bolt - In.	Torque Range Ft. - Lbs.	Wrench Length - In.
5/8	40 - 60	8
3/4	60 - 90	10
1	70 - 100	12
1-1/4	90 - 120	14

When tightening bolts, bring the gland up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tighten all nuts progressively a little at a time. Do not overstress bolts to compensate for poor alignment. If effective sealing is not attained at the maximum torque, disassemble the joint and reassemble after cleaning.

JOINTING PUSH-ON JOINT PIPE. Lay and joint pipe with push-on type joints in strict accordance with the manufacturer's recommendations as approved by the Engineer. Provide all special tools and devices, such as special jacks, chokers, and similar items required for the installation. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer, and no substitutes will be permitted under any circumstances.

ANCHORAGE.

LIMITING PIPE DIAMETER AND DEGREE OF BEND. On all pipelines 4 inches in diameter or larger, securely anchor by suitable thrust blocking all tees, plugs, caps, and bends exceeding 22-1/2 degrees, at all locations where unbalanced forces exist, as directed by the Engineer.

THRUST BLOCKING. Provide reaction or thrust blocking as shown on the standard details. The concrete mix shall not be leaner than 1 cement,

2-1/2 sand, 5 stone, and shall have a compressive strength of not less than 2,000 pounds per square inch. Place blocking between the undisturbed ground and the fitting to be anchored. The quantity of concrete and the area of bearing on the pipe shall be as shown or as directed by the Engineer. Place the blocking so that the pipe and fitting joints will be accessible to repairs.

DEFINITION OF PIPE ZONE. The pipe zone shall include the full width of the trench from the bottom of the pipe to a point 6 inches above the top of the pipe barrel.

SELECTED TRENCH SIDE MATERIAL AT PIPE ZONE. After the pipe is in place and ready for backfilling, place SELECTED TRENCH SIDE MATERIAL FOR PIPE ZONE at approximately the same rate on each side of the pipe such that the elevation of the backfill on each side of the pipe is approximately equal at all times. Compact the backfill by tamping by hand or pneumatic tampers in 6-inch lifts. Each layer shall be compacted to at least 90 percent of its maximum density as determined by AASHO T 99, Method C. Particular attention shall be given to the backfilling and tamping procedures to insure that no unfilled or uncompacted areas occur beneath the pipe.

HYDROSTATIC TESTS. Make pressure and leakage tests on all newly laid pipe. Test all sections of pipe separately that can be isolated by valves and dead ends. Furnish all necessary equipment and material, make all taps in the pipe as required for filling, expelling air, and mounting pressure gauges, and conduct the tests. The Engineer will monitor the tests.

Furnish the following equipment and materials for the tests:

2 Approved graduated containers.
2 Pressure gauges.
1 Hydraulic force pump as approved by the Engineer. Suitable hose and suction pipe as required.

Conduct the tests after the trench has been backfilled or partially backfilled with the joints left exposed for inspection, or when completely backfilled, as permitted by the Engineer. Where any section of pipe is provided with concrete reaction blocking, do not make the pressure test until at least 5 days have elapsed after the concrete thrust blocking is installed. If high-early cement is used for the concrete thrust blocking, the time may be cut to 2 days.

Conduct the pressure test in the following manner, unless otherwise approved by the Engineer: After the trench has been backfilled or partially backfilled as hereinbefore specified, fill the pipe with water. The test pressure shall be 70 pounds per square inch at the low points in the line.

DURATION. The duration of each pressure test shall be 30 minutes, unless otherwise directed by the Engineer.

EXPELLING AIR. Before applying the specified test pressure, expel all air from the pipe.

PROCEDURE. Fill the pipe with water and apply the specified test pressure by pumping, if necessary.

Then valve off the pump and hold the pressure in the line for the test period. At the end of the test period, operate the pump until the test pressure is again attained. The pump suction shall be in a barrel or similar device, or metered so that the amount of water required to restore the test pressure may be measured accurately.

LEAKAGE. Leakage shall be defined as the quantity of water necessary to restore the specified test pressure at the end of the test period. No pipe installation will be accepted if the leakage is greater than the number of gallons per hour as determined by the following formula:

$$L = \frac{NDP^{\frac{1}{2}}}{5,500}$$

in which

L = allowable leakage in gallons per hour
N = number of joints in the length of pipe tested
D = nominal diameter of pipe in inches
P = average test pressure during the leakage test in pounds per square inch.

CORRECTION OF LEAKAGE. Should any test of pipe laid disclose leakage greater than that allowed, in accordance with the above formula, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance and there is no visible leakage.

FLUSHING. Before sterilizing, flush all foreign matter from the pipeline. Provide hoses, temporary pipes, ditches, etc. as required to dispose of flushing water without damage to adjacent properties.

STERILIZATION. Pipeline shall be sterilized before placing in service. Sterilizing procedures shall conform to AWWA C601 as hereinafter modified or expanded.

STERILIZING MIXTURE. Shall be a chlorine-water solution having a free chlorine residual of 40 - 50 ppm. The sterilizing mixture shall be prepared by injecting: 1) a liquid chlorine gas-water mixture; 2) dry chlorine gas; or 3) a calcium or sodium hypochlorite and water mixture into the pipeline at a measured rate while fresh water is allowed to flow through the pipeline at a measured rate so that the combined mixture of fresh water and chlorine solution or gas is of the specified strength.

All materials used to make connections to existing pipelines shall be swabbed with a solution containing sufficient chlorine to provide a free chlorine residual of 200 ppm prior to installation.

The liquid chlorine gas-water mixture shall be applied by means of an approved solution feed chlorinating device. Dry chlorine gas shall be fed

through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine cylinder.

If the calcium hypochlorite procedure is used, first mix the dry powder with water to make a thick paste, then thin to approximately a 1 percent solution (10,000 ppm chlorine). If the sodium hypochlorite procedure is used, dilute the liquid with water to obtain a 1 percent solution. The following proportions of hypochlorite to water will be required:

Product	Quantity	Water
Calcium Hypochlorite (1) (65 - 70% Cl)	1 lb.	7.5 gal.
Sodium Hypochlorite (2) (5.25% Cl)	1 gal.	4.25 gal.

(1) Comparable to commercial products known as HTH, Perchloron, and Pittchlor.
(2) Known as liquid laundry bleach, Chlorox, Purex, etc.

POINT OF APPLICATION. Inject the chlorine mixture into the pipeline to be treated at the filling point of the line through a corporation stop or suitable tap in the top of the pipeline. Water from the existing system or well source shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the combined mixture shall contain 40 - 50 ppm of free available chlorine. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Use check valves if necessary.

RETENTION PERIOD. Treated water shall be retained in the pipeline long enough to destroy all nonspore-forming bacteria. With proper flushing and the specified solution strength, 24 hours is adequate. At the end of the 24-hour period, the sterilizing mixture shall have a strength of at least 10 ppm of chlorine.

Operate all valves and other appurtenances during sterilization to assure that the sterilizing mixture is dispersed into all parts of the line.

Do not place concentrated quantities of commercial sterilizers in the line before it is filled with water.

After chlorination, flush the water from the line until the water through the line is equal chemically and bacteriologically to the permanent source of supply.

DISPOSAL OF STERILIZING WATER. Dispose of sterilizing water in an approved manner. Do not allow sterilizing water to flow into a waterway

without adequate dilution or other satisfactory method of reducing chlorine concentrations to a safe level.

D. PAYMENT.

CAST IRON PIPE. Payment for furnishing and installing the cast iron pipe will be made at the unit price per linear foot stated in the Proposal. This payment shall constitute full compensation for all work specified under this section.

The measure for payment will be the field measured center line length of the pipe and fittings in place within the limits shown.

No payment for pipe in place will be made until the pipe has successfully passed the leakage test.

The Engineer will withhold full payment on any section of pipe deemed unsatisfactory due to excessive leakage or any other causes until such defects have been corrected in accordance with these Contract Documents and are acceptable to the Engineer.

CAST IRON FITTINGS. Payment for the cast iron fittings will be made at the unit price per pound stated in the Contractor's Proposal.

Measurement for payment of each type of fitting will be based upon the weight of each type of fitting furnished and installed. Whenever possible, the weight of cast iron fittings shall be the theoretical weight of the size and type of fitting, as listed in AWWA C110. The weight of all other cast iron fittings shall be as listed by the fabricator or supplier of the particular fitting. If the weight of a particular fitting is unavailable from the above sources, the Contractor shall have the fitting weighed. Weight tickets shall be presented to the Engineer for verification and his records. Retainer glands will be measured for payment only to the extent that their weight exceeds that of a standard mechanical-joint gland. Standard joint accessories and cut sections of pipe will not be measured for payment as fittings.

MECHANICAL COUPLINGS. Payment for steel and cast iron mechanical couplings will be made at the unit price per diameter-inch stated in the Contractor's Proposal for each coupling furnished and installed as a permanent part of the system. The term "Mechanical Couplings" shall include also transition and reducing couplings.

Measurement for payment of mechanical couplings will be based upon the nominal diameter, in inches. Measurement for payment of transition and reducing mechanical couplings will be based on the nominal diameter, in inches, of the larger of the two openings.

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B15B. VALVES AND VALVE BOXES

A. SCOPE. This section covers the work necessary for furnishing and installing the butterfly valves and valve boxes, complete.

B. MATERIALS.

BUTTERFLY VALVES. Butterfly valves shall be the rubber-seated type, suitable for direct-burial service and suitable for 150 psi working pressure and 150 psi pressure differential across the valve. Valve ends shall be as shown. Furnish all joint accessories with valve. Mechanical joint ends shall conform to AWWA C111. Valves shall be equipped with iron body and either 304 stainless steel circular shaft or high-tensile steel hexagon shaft with 304 stainless steel journals. Shaft and disc seals shall be designed for a bottle-tight seal. Valve disc shall be either cast iron alloy conforming to ASTM A 436, Type 1, or chrome-edged cast iron with Buna-N rubber seat bonded to the valve body; or shall be cast iron with rubber disc seat and 304 stainless steel body seat integrally cast into the valve body. Valve operator shall be as specified below. Except as herein noted, the butterfly valve shall conform to AWWA C504-66 for Class 150B. Valve shall be Dresser 450, or as approved.

BUTTERFLY VALVE OPERATORS. All butterfly valves shall be furnished with totally enclosed, integral valve operators designed to withstand a minimum of 300 foot-pound input torque without damage to the valve or operator. Operators shall be fully gasketed and grease-packed and designed to withstand submersion in water to a pressure of 10 psi. Valves shall open with a counterclockwise rotation of an AWWA nut. A minimum of 30 turns of the operating nut shall be required to move the disc from a fully-open position to a fully-closed position. Valve operators shall conform to AWWA C504-66.

JOINTING MATERIALS. Jointing materials for mechanical joint or push-on joint for cast iron pipe shall conform to AWWA C111. Jointing materials for flanged joints shall consist of 1/8-inch thick, full-face, rubber gaskets conforming to Section 7 of AWWA C207. Bolts and nuts shall conform to Section 8 of AWWA C207.

VALVE BOXES. Valve boxes shall be Buffalo 2-piece sliding type, cast iron with 5-1/4-inch shaft, and shall be Mueller H-10364 of appropriate length for the installation, or as approved. The word WATER shall be cast into the top of the lid. Extension pieces, if required, shall be the manufacturer's standard type for use with the valve box.

C. WORKMANSHIP.

VALVES. Before installation, the valves shall be thoroughly cleaned of all foreign material, and shall be inspected for proper operation, both opening and closing, and to verify that the valves seat properly. Valves shall be installed so that the stems are vertical, unless otherwise directed by the Engineer. Jointing shall conform to AWWA C600 or AWWA C603, whichever is applicable. Butterfly valves shall be installed in accordance with Standard Detail No. 113.

VALVE BOXES. Center the valve boxes and set plumb over the wrench nuts of the valves. Set valve boxes so that they do not transmit shock or stress to the valves. Set the valve box covers flush with the surface of the finished grade as shown, or such other level as may be ordered by the Engineer. Cut extensions to the proper length so that the valve box does not ride on the extension when set at grade. Valve boxes shall be installed in conformance with Standard Detail No. 113.

Place backfill around the valve boxes and thoroughly compact to a density equal to that of the undisturbed ground and in such a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be excavated, plumbed, and backfilled at the Contractor's expense.

D. PAYMENT. Payment will be made for each valve and valve box furnished and installed at the unit prices stated in the Contractor's Proposal. Payment for the valves and valve boxes shall constitute full compensation for all work specified under this section.

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SCHEDULE C

BRIDGE PIER REPAIR

SCHEDULE C
BRIDGE PIER REPAIR

C2A. MOVE IN AND SITE PREPARATION

A. SCOPE. This section covers the work necessary to move in the equipment, set up facilities, and prepare the site for construction, complete.

B. MATERIALS. Provide all materials, suitable and in adequate quantity, required to accomplish the work as specified herein.

C. WORKMANSHIP.

GENERAL. The Contractor shall mobilize men, equipment, and materials required to complete the work as shown.

PERMITS. The Contractor shall obtain all permits required for the work as shown and shall comply with all local, State, and Federal statutes pertaining to such work. The Owner will obtain a permit from the Corps of Engineers for construction in navigable waters.

DEBRIS REMOVED. An unknown quantity of snags, trees, limbs, roots, and other debris is lodged against the bridge pier. From a preliminary inspection, it was estimated that the top of the debris pile was approximately 12 feet below the water surface, and the pile of debris around the pier was approximately 14 feet thick. The Contractor shall make his own estimate of the work involved to remove this material. The Contractor shall remove all the debris from the area to receive riprap so the riprap is placed on undisturbed soil. The debris shall be placed in the disposal area near the boat ramp upstream from the bridge. The Engineer will designate the exact location. The trees and large limbs shall be limbed and bucked into 10-foot sections. Limbs and roots shall be neatly piled. Logs shall be stacked.

PROTECTION OF EXISTING STRUCTURES. The bridge and adjacent structures shall be protected from damage during construction. Any damage shall be repaired by the Contractor, at no expense to the Owner, to the approval of the Engineer.

D. PAYMENT. Payment for the work in this section will be included as part of the lump sum bid.

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C2B. RIPRAP

A. SCOPE. This section covers the work necessary for the riprap, complete.

B. MATERIALS.

RIPRAP. Riprap shall be clean, hard, quarry stone free from seams, cracks, and other defects tending to destroy resistance to weather or disintegration. Material shall be hard and durable and show a percentage of wear not greater than 35 percent when subjected to the Standard Los Angeles Abrasion Test, ASTM C 131. Riprap shall weigh not less than 160 pounds per dry, solid, cubic foot.

The least dimension of any one face shall not be less than 1/3 the greatest dimension. At least 75 percent of the volume shall be from 400 pounds to 1,600 pounds. Thirty percent of the volume shall be over 800 pounds. Not more than 10 percent shall be less than 50 pounds. Smaller pieces will be allowed only in the amount which will fill the voids in the larger stones.

Indicate the source from which the riprap will be obtained so the Engineer may inspect the quarry. Unless otherwise directed, submit samples to the Engineer and obtain his approval prior to the delivery of any riprap.

C. WORKMANSHIP.

SITE PREPARATION. After the limbs, trees, and other debris have been removed as specified in Section MOVE IN AND SITE PREPARATION, the Contractor shall inspect the site with a diver. The Contractor and the Engineer shall survey the site after the debris has been removed and compute the volume or riprap needed prior to ordering the riprap. Place no riprap until site has been approved by the Engineer.

PLACING RIPRAP. Machine place riprap with a clamshell shovel or other suitable equipment to the lines and grades shown. Riprap shall be placed from the toe of the slope up. Insofar as practicable, the riprap shall be deposited directly in its final resting place. Placing riprap by dumping into chutes or by other means that are likely to cause segregation of the various sizes will not be permitted. Riprap shall be reasonably well-graded with the larger pieces uniformly distributed and in close contact with smaller pieces and spalls filling the voids between the larger chunks. Finished riprap shall be free from objectionable concentrations of large or small pieces and shall provide a well-graded, compact mass. A tolerance of ±18 inches from slope lines and grades shown on the Plans will be allowed in the finished surface of the riprap, except that extreme plus or minus tolerances shall not be continuous over individual areas exceeding 100 square feet.

Maintain the riprap protection until it has been accepted. Materials displaced by any cause shall be replaced at the Contractor's expense to the lines and grades shown on the Plans.

D. PAYMENT.

RIPRAP. Payment for riprap will be based on the unit price per ton stated in the Contractor's Proposal. This payment shall constitute full compensation for the work as specified herein.

Quantities for payment will be based on the number of tons (2,000 pounds) as weighed on approved and tested scales. Present trip tickets to the Engineer for his signature as material is delivered. Each trip ticket shall show the date and time of delivery, truck number or driver's name, and net weight of the material, and shall be considered as valid delivery receipts only when signed by the Engineer.

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STANDARD SPECIFICATIONS

FOR

REINFORCED CONCRETE

(Index follows Page 24)

STANDARD SPECIFICATIONS
FOR
REINFORCED CONCRETE

Reference herein is made to Standards, Tests, Methods, and Specifications of research and technical organizations, as follows:

AWS	American Welding Society
ASTM	American Society for Testing and Materials
CRSI	Concrete Reinforcing Steel Institute
CRD	Corps of Engineers

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Item		Standard Specification, Test, or Method Designation	
		ASTM	OTHER
B-1	Cement	C 150	
B-3	Concrete Aggregates	C 33 C 87	
B-6	Steel Reinforcement	A 82 A 185 A 615	
B-8	Air-Entraining Admixture	C 260	CRD-C 13
B-10	Asphalt & Asphalt Primer and Asphalt Joint Sealer	D 449 D 41 D 1190	
B-11	Rubber-Asphalt Joint Seal	D 1190	
B-12	Premolded Joint Filler	D 994 D 1751 D 1752	
B-14	Copper Water Stop	B 152	
B-17	Plastic Water Stop		CRD-C 572
C-8	Tests of Concrete	C 31 C 39	

All references to the above Specifications, Standards, or Methods shall, in each instance, be understood to refer to the latest adopted revision, including all amendments.

B. MATERIALS

B-1. Cement. Cement used shall conform to ASTM C 150, except that the total alkali content, when determined as the mixed sulphates of sodium and potassium and calculated to sodium oxide, shall not be greater than 0.6 of 1 percent. Unless otherwise specified in the Special Specifications or authorized by the Engineer, Type I cement shall be furnished.

B-2. Water. Water for concrete shall be clean and free from oil, acid, alkali, organic matter, or other deleterious substances. Water furnished by the Owner will be considered as meeting the above requirements.

B-3. Concrete Aggregates. Concrete aggregates shall conform to ASTM C 33, or to the applicable specifications of the State Highway Department for Bridge Construction of the state in which the work is to be performed. Fine aggregate, when tested in accordance with ASTM C 87, shall develop a compressive strength at 7 and 28 days of not less than 85 percent of that developed by the standard mortar specified in ASTM C 87 as the basis of comparison. The size of coarse aggregate shall be that specified in the Special Specifications.

B-4. Admixture for Nonshrinking Grout. The nonshrinking admixture shall be a metallic material which will reduce and control shrinkage and shall be Embeco, as manufactured by Master Builders Company, Cleveland, Ohio, or an approved equal. Unpolished aluminum powder may be used as an admixture to control shrinkage subject to approval of the Engineer.

B-5. Dry-Pack Grout.

a. Nonshrinking Type. Dry-pack grout for water-holding basins and as otherwise specified to be nonshrinking shall consist of 1 part portland cement, 1 part of fine sand, and 1 part Embeco, or other approved admixture. Proportions shall be established by weight. Where a nonstaining, nonshrinking grout is required, unpolished aluminum powder shall be used and the proportions shall be in accordance with the manufacturer's recommendations as approved. Only sufficient water shall be added to the mixture to produce a dry, crumbling mass. When the mixture is pressed tightly together into a ball with the hands, there should not be sufficient water in the mixture to stain the hands, and when such a ball is broken, it should crumble.

b. Ordinary Type. Dry-pack grout for use in other than water-holding basins, unless otherwise specified, shall consist of 1 part portland cement to 2 parts of sand. Proportions shall be established by volumetric measurements. Only sufficient water shall be added to make a dry, crumbling mass. When the mixture is pressed tightly together into a ball with the hands, there should not be sufficient water in the mixture to stain the hands; and, when such ball is broken, it should crumble.

B-6. Steel Reinforcement. Reinforcement shall be plain or deformed steel bars or cold-drawn steel wire, or fabricated forms of these materials as required by the Plans or the Specifications, or both. Bar reinforcing

shall conform to ASTM A 615, Grade 40, unless otherwise specified. Cold-drawn steel wire and welded wire fabric shall conform to ASTM A 82 and A 185, respectively.

B-7. Forms. Plywood or steel forms shall be used on all exposed wall surfaces and shall extend to a minimum of 6 inches below finished grade on exterior surfaces or the normal waterline on the inside of uncovered basins, unless otherwise specified. Lumber used in forms for surfaces where plywood is not required shall be dressed to a uniform thickness and shall be free from loose knots or other defects. Upon approval by the Engineer, steel or plywood panel forms may be used to form walls of curved shape.

B-8. Concrete Admixtures. The air-entraining admixture furnished shall be approved by the Engineer and shall conform to ASTM C 260, or U.S. Army Corps of Engineers Specification CRD-C 13.

Admixture furnished for use as a water-reducing and cement-dispersing or plasticizing agent shall be Pozzolith (Normal), as manufactured by the Master Builders Company, Cleveland, Ohio, or approved equal. Pozzolith Retarder and high-early admixtures may be used in lieu of Pozzolith (Normal) to suit job conditions subject to approval of the Engineer. Water-reducing admixture shall be provided for concrete mixes when specified in the Special Specifications. Use of substitute admixtures will not be approved without verification, satisfactory to the Engineer, of the chemical properties of the admixture and its effects on the concrete mix as substantiated by laboratory reports and certified experience records.

B-9. Bonding Agent. Bonding agent for bonding new concrete to existing concrete shall be Sta-Crete, as manufactured by Sta-Crete, Inc., San Francisco, California; or Epoxy Bond MPC, Code 2090-Special, as manufactured by Edoco Technical Producers, Inc., Long Beach, California; or an approved equal.

B-10. Asphalt. Where indicated on the Plans, surfaces of concrete at joints shall be painted with asphalt meeting ASTM D 449 requirements. Asphalt primer for use with sealing asphalt shall meet the requirements of ASTM D 41. Hot-poured asphalt filler shall conform to ASTM D 1190, with the added requirement that the specific gravity shall be more than 1.

B-11. Poured Rubber-Asphalt Joint Sealing Material. Poured rubber-asphalt joint sealing material shall conform to ASTM D 1190.

B-12. Premolded Joint Filler. Premolded joint filler shall be a bituminous type conforming to ASTM D 994 or D 1751. Bituminous cellular types conforming to ASTM D 1751 or D 1752, Type III, may be used in dry interior locations. Where sponge rubber type is shown on the Plans, it shall be cement color conforming to ASTM D 1752, Type I.

B-13. Steel Water Stop for Construction Joints. Steel water stop in construction joints shall be 16-gauge, hot-dip galvanized sheet metal. Width shall be 6 inches, unless otherwise noted on the Plans.

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B-14. Copper Water Stop. Copper water stops shall be formed of 18-ounce, cold-rolled sheet copper of suitable temper, meeting the requirements of ASTM B 152. Water stops shall be formed as shown on the Plans.

B-15. Rubber Water Stop. Rubber water stop shall be molded or extruded and shall be fabricated from a high-grade, tread type compound. Water stop shall be Gates Type B or Type C, or an approved equal as shown on the Plans. Intersection pieces shall be furnished to provide a continuous seal.

B-16. Labyrinth Water Stop. Labyrinth type water stop shall be of size shown on the Plans and shall be Harza Labyrinth type water stop as supplied by Water Seals, Inc., Chicago, Illinois, or approved equal.

B-17. Plastic Water Stop. Plastic water stop shall be extruded from an elastomeric plastic compound, the basic resin of which shall be polyvinyl chloride (PVC). The compound shall contain any additional resins, plasticizers, stabilizers, or other materials needed to insure that, when the material is compounded, it will meet performance requirements herein. The material shall not, however, contain an excessive amount of inert filler added for the purpose of increasing the unit weight of the compound. Specific gravity shall be approximately 1.37 and the Shore Durometer Type A hardness, approximately 80. No reclaimed PVC shall be used in the compound.

Plastic water stop shall be resistant to alkalies, acids, salt water, fungi, petroleum products, sewage, and organic compounds. Water stop shall be produced by an extrusion process such that, as supplied for use, it will be dense, homogeneous, and free from holes and other imperfections.

The water stop, or the material from which the water stop is fabricated, shall meet the following performance requirements when tested by the methods outlined in the Corps of Engineers Specification CRD-C 572.

a. Samples taken from the finished water stop shall meet the following requirements:

Number of Specimens Tested	Requirements	
At least 5	Tensile strength not less than.....	1400 psi
	Ultimate elongation, not less than.....	280%

b. Samples taken from the sheet material from which the water stop is made shall meet the following requirements:

Number of Specimens Tested	Requirements	
At least 5	Tensile strength, not less than.....	1750 psi
	Ultimate elongation, not less than.....	350%
At least 3	Low temperature brittleness, no sign of failure, such as cracking or chipping at.....	-35°F.

Number of Specimens Tested	Requirements	
At least 3	Stiffness in flexure, 1/4-inch span, not less than	400 psi
	Effect of Alkalies	
	Change in weight after 7 days, between	-0.10 and +0.25%
	Change in Shore Durometer reading after 7 days, not more than	±5
	Change in weight after 28 days, between	-0.30 and +0.40%
	Change in thickness after 28 days, not more than	±1.0%

c. Samples taken across job-made splices should meet the following requirements:

Number of Specimens Tested	Requirements	
As directed	Tensile strength, not less than	1120 psi

Water stop shall be of the shape and dimensions shown on the Plans or specified in the Special Specifications. The cross section of the water stop shall be uniform along its length and shall be symmetrical transversely so that the thickness at any given distance from either edge of the water stop will be uniform. Water stop shall have a constant thickness from the edge of the bulb to the outside edge. All water stops shall have a number of parallel ribs or protrusions on each side of the center of the strip. Corrugated type or tapered water stops are not acceptable.

Dimensional Requirements

Ordinary Conditions:

Thickness, minimum	3/16 inch
Width, minimum	6 inches
Weight, minimum, pounds per 100 linear feet	75 pounds

6-inch water stop for expansion joints:

Type	Center bulb
Weight, minimum, pounds per 100 linear feet	135 pounds
Thickness, minimum	3/8 inch

9-inch water stop for expansion joints:

Type	Center bulb
Weight, minimum, pounds per 100 linear feet	205 pounds
Thickness, minimum	3/8 inch

B-18. Floor Hardener (Surface-Applied). Floor hardener shall be a colorless, aqueous solution of zinc and/or magnesium fluosilicate, or of sodium silicate. Each gallon of the fluosilicate solution shall contain not less than 2 pounds of crystals. The sodium silicate solution shall be 32 percent by volume of 42-degree Baume sodium silicate. An approved proprietary hardener such as Saniseal, as manufactured by the Master Builders Company, may be used provided the solution is delivered ready for use in the manufacturer's original containers.

C. WORKMANSHIP

C-1. Proportioning.

a. Submission of Samples of Materials. Immediately upon receipt of notification to begin work and upon request of the Engineer, the Contractor shall submit to the Engineer samples of the aggregate which he proposes to use in the construction, together with samples of the cement and air-entraining or cement-dispersion admixtures which he plans to use.

b. Proportions. Proportions indicated in Table I of the Special Specifications will provide the basis for estimating the type of mixture and the materials and methods necessary for placing the concrete, and are based on the use of aggregates available locally in the vicinity of the work. The actual proportions to be used will be based on tests made on samples of the aggregate, cement, and admixture submitted by the Contractor. The Engineer will make the necessary test and design the mixture. The Owner will bear the expense of the tests necessary to design the concrete mixture for 1 set of aggregate samples. Should the Contractor desire tests run or mixtures designed for additional samples of aggregate, such tests shall be made by the Engineer but shall be at the expense of the Contractor. Acceptance by the Engineer of a given aggregate on the basis of preliminary tests shall not prevent the Engineer from later rejecting aggregate from the same source if subsequent tests indicate that the aggregate no longer meets the requirements for grading and quality given herein.

The cement factor specified is that required for concrete of the desired strength using local aggregates. The Contract is to be based on this cement factor and the other proportions specified. If the subsequent mix design indicates a change from the specified cement content is necessary, the Engineer may order such change, and the Contract price shall be increased or diminished accordingly, in proportion to the increase or reduction of cement and the current market price of cement in the locality, unless otherwise provided for in the Proposal. This price adjustment shall be made on the basis of cost to the Contractor of cement only, without allowance for

overhead, profit, anticipated profits, or other indirect costs. If the Contractor chooses to use other than local aggregate, and greater or less cement than that specified for local aggregate is required to obtain the desired strength, or if he elects to increase the cement factor to correct for shortages of fines in the aggregate, or for any other reason, no adjustment of the Contract price will be made. Strength determinations will be made as specified under C-8.

c. Cement Factor. The cement factor given in the Special Specifications indicates the number of 94-pound sacks of cement per cubic yard of concrete when the concrete is in a freshly mixed condition. The volume of the freshly mixed concrete shall be assumed to be the absolute volume of the cement, plus the volume of the mixing water, plus the displaced volumes of the saturated, surface-dry aggregates. The quantity of mixing water to be used in this calculation shall not include water absorbed by the aggregates.

d. Variations in Proportions. In order to obtain proper workability and a smooth, dense, homogeneous, plastic mixture, free from segregation, the percentage of fine aggregate may be varied during the progress of the work with the approval of the Engineer.

e. Water Content and Slump Range. The maximum quantity of water per 94 pounds of cement specified in the Special Specifications shall be based on saturated, surface-dry aggregates. The slump range indicated in the Special Specifications is intended as a guide to the Contractor for the determination of placing and compacting procedures and equipment. Within the range specified, the slump shall be as directed by the Engineer. If the concrete has a greater slump than the maximum indicated, the proportion of water shall be reduced to meet the slump requirements. If the concrete has a smaller slump than the minimum indicated, changes in the mixture shall be made as specified hereinbefore in C-1.d. or water may be added with the approval of the Engineer.

C-2. Measurement of Materials.

a. Weight Measurement. Materials shall be measured by weighing. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. The equipment for weighing materials shall provide convenient and positive means for determining the quantities in the batch of concrete. Bins with adequate separate compartments for fine aggregates and for each required size of coarse aggregate shall be provided in the batching plant. Each compartment shall be designed to discharge efficiently and freely into the weighing hopper. Means of control shall be provided so that as the quantity desired in the weighing hopper is approached, the material may be added slowly and shut off with precision. A port or other opening for removing an overload and sampling materials from the weighing hopper shall be provided. Weighing hoppers shall be constructed so as to eliminate accumulations of tare material and discharge fully. Fine aggregate, coarse aggregate, and cement shall be weighed separately. Cement in standard packages (sack) need not be weighed.

Mixing water shall be measured by volume or by weight. Weighing of materials for a batch shall be within the following limits of accuracy: Water, 1 percent; cement, 1 percent; and aggregate, 2 percent. All measuring devices shall be subject to approval of the Engineer. The batching plant shall be of adequate capacity and acceptable to the Engineer. The Engineer reserves the right to disapprove of facilities which in his opinion are inadequate and/or do not conform to the Specification requirements.

b. Volumetric Measurement. Where volumetric measurements are authorized by the Engineer, the weight proportions shall be converted to equivalent volumetric proportions. In such case, suitable allowance shall be made for variations in the moisture condition of the aggregates, including the bulking effect in the fine aggregate.

c. Measurement of Air-Entraining Admixture. The air-entraining admixture shall be introduced with the water. Accurate means of measuring the amount of air-entraining admixture shall be provided, and the mix shall be controlled to maintain an entrained air content of not less than 3 percent nor more than 6 percent, unless otherwise specified in the Special Specifications.

d. Measurement of Water-Reducing Admixture. Accurate means of measuring the amount of Pozzolith admixture shall be provided. The quantity used per batch and the method of introducing and mixing shall be in accordance with the manufacturer's recommendations.

C-3. Mixing.

a. Equipment. The mixing equipment shall be capable of combining the aggregates, cement, and water within the specified time into a thoroughly mixed and uniform mass and of discharging the mixture without segregation.

b. Machine Mixing (at Site or at Central Mixing Plant). Unless otherwise authorized by the Engineer, the mixing of concrete shall be done in a batch mixer of approved type. The equipment at the mixing plant shall be so constructed that all materials entering the drum can be accurately proportioned and be under control. The entire batch shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer. Except as qualified in C-3.c. to C-3.e., mixing of each batch shall continue for the periods indicated below during which time the drum shall rotate at a peripheral speed of about 200 feet per minute. The mixing periods shall be measured from the time when all of the solid materials are in the mixer drum, provided that all of the mixing water shall be introduced before 1/4 of the mixing time has elapsed.

Mixing time shall be as follows:

(1) For mixers of a capacity of 1 cubic yard or less, 1-1/2 minutes; and,

(2) For mixers of capacities larger than 1 cubic yard, the time of mixing shall be increased 15 seconds for each additional 1/2 cubic yard capacity or fraction thereof.

c. Truck Mixing. Truck mixers shall be watertight and, unless otherwise authorized by the Engineer, shall be of the revolving-drum type. All solid materials for the concrete shall be accurately measured as specified in C-2 and charged into the drum at the proportioning plant. The mixing water may be added directly to the batch, but all truck mixers shall be equipped with a tank for carrying mixing water. When water is to be added subsequent to dry charging at the plant, only the prescribed amount of water shall be placed in the tank unless the tank is equipped with a device by which the quantity of water added can be readily verified. The maximum size of batch in truck mixers shall be in accordance with the specified rating. Truck mixing shall be continued for not less than 50 revolutions after all ingredients, including the water, are in the drum. The speed shall not be less than 4 rpm nor more than a speed resulting in a peripheral velocity of the drum of 225 feet per minute. Not more than 150 revolutions of mixing shall be at a speed in excess of 6 rpm. Mixing shall begin within 30 minutes after the cement has been added either to the water or aggregate.

d. Partial Mixing at Central Plant. When a truck mixer or an agitator provided with adequate mixing blades is used for transportation, the mixing time at the stationary machine mixer may be reduced to 30 seconds and the mixing completed in a truck mixer or agitator. The mixing time in the truck mixer or agitator, equipped with mixing blades, shall be as specified for truck mixing in C-3.c.

e. Time of Hauling Ready-Mixed Concrete. Concrete transported in a truck mixer, agitator, or other transportation device shall be discharged at the job within 1-1/2 hours after the cement has been added to the water or the aggregates, except for high-early-strength concrete mixes which shall be 45 minutes.

f. Retempering. The retempering of concrete or mortar in which the cement has partially hydrated will not be permitted.

g. Air-Entraining Admixture. The air-entraining admixture shall be added to the mixer at the time of mixing in such a manner as to insure uniform distribution of the admixture throughout the batch. An air meter shall be provided for measuring the air content of concrete at the jobsite, unless otherwise approved. Air-entraining admixture shall not be used unless suitable means for determining air content in the freshly mixed concrete are available. At the option of the Engineer, entrained air may be eliminated in interior slabs on ground and at other locations where appearance may be of greater importance than additional durability or impermeability.

C-4. Forms.

a. General. Forms shall conform to the shape, lines, grades, and dimensions of the concrete as called for on the Plans, unless otherwise approved by the Engineer. Lumber once used in forms shall have nails withdrawn and surfaces to be in contact with concrete cleaned before being used again. Reuse of forms and form lumber will be permitted only when the condition of forms or form lumber is approved by the Engineer. It is the intent of this Specification to maintain "new form" appearance for all work.

Suitable moldings or fillets shall be placed in the tops of the forms and in the crotch of the forms to bevel all concrete edges. Moldings shall also be placed on all discontinuous edges. Bevels shall be approximately 3/4 inch in depth. All bevels and fillets, except as otherwise shown on the Plans, shall be the same size. Where the tops of walls are given a trowel finish, an edging tool may be used instead of fillets.

b. Design. Forms shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain the desired position and shape until removed. Bolts and rods shall preferably be used for internal ties. Ties for water-holding structures and on walls exposed to weather or earth shall have conical or spherical type inserts and shall be so constructed that when the forms are removed no metal shall be within 5/8 inch of any surface. Plastic or rubber inserts shall be used with flat bar ties for panel forms and shall be a minimum of 1 inch in depth and of sufficient dimensions to permit proper grouting of the tie hole. Snap ties for water-holding basins shall be constructed with a water stop. The Engineer may direct the use of one type of insert or head where appearance is important. Flat washer type heads may be used on concealed walls which are to receive a finish coat of stucco, plaster, or wallboard. Openings shall be provided such that concrete is dropped no farther than 6 feet in walls 8 inches or less in width, and not more than 12 feet in walls wider than 8 inches. Temporary openings shall be provided at the base of wall forms and at other points where necessary to facilitate cleaning and inspection immediately before depositing concrete.

Forms shall be constructed and maintained to insure satisfactory fit of all components of the structures but in no case shall the following tolerance limits of the finished work be exceeded:

Tolerances for Reinforced Concrete Structures

Variation from the plumb:

In the lines and surfaces of columns, piers, walls, and in arrises;
- In 10 feet..... 1/4 inch
- In any story or 20 feet maximum..... 3/8 inch

For exposed corner columns control-joint grooves, and other conspicuous lines;
- In any bay or 20 feet maximum..... 1/4 inch

Variation from the level or from the grades indicated on the Plans:

In floors, *ceilings, beam soffits, and in arrises;
- In 10 feet..... 1/4 inch
- In any bay or 20 feet maximum..... 3/8 inch

For exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines;
- In any bay or 20 feet maximum..... 1/4 inch
- In 40 feet or more..... 1/2 inch

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*Applies to concrete only, not to reinforcing bars or dowels.

Variation of the linear building lines from established position in Plan and related position of columns, walls, and partitions:

In any bay or 20 feet maximum	1/2 inch
In 40 feet or more	1 inch

Variation in the sizes and locations of sleeves, floor openings, and wall openings ..... 1/4 inch

Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:

Minus	1/4 inch
Plus	1/2 inch

Footings:

Variation in dimensions in Plan;

Minus	1/2 inch
Plus	2 inches

Misplacement or eccentricity;
2 percent of the footing width in the direction of misplacement but not more than ..... 2 inches

Reduction in thickness;
Minus .....5% of specified thickness

Variation in steps:

In a flight of stairs;

Rise	1/8 inch
Tread	1/4 inch

In consecutive steps;

Rise	1/16 inch
Tread	1/8 inch

Tolerances for Pavements

Pavements and roadways:

Departure from established alignment	±1/2 inch
Departure from established longitudinal grade on any line	±1/4 inch

c. Oiling. The inside of forms shall be coated with nonstaining mineral oil or other approved material. Where oil is used, it shall be applied before the reinforcement is placed.

d. Removal of Forms. The removal of forms shall not be started until the concrete has attained the necessary strength to support its own weight and any construction live loads as well as strength to prevent cracking

or chipping when the forms are removed. The Contractor shall be responsible for all damage resulting from premature removal of forms. Forms and shoring for aboveground slabs or beams shall remain in place a minimum of 14 days or until the concrete has reached a compressive strength equal to 2/3 the specified 28-day compressive strength as determined by test cylinders as specified in C-8. Earth backfill shall not be placed against walls below grade until the concrete has obtained a compressive strength equal to 2/3 the specified 28-day compressive strength, except as otherwise directed by the Engineer.

C-5. Construction and Expansion Joints. (See also page 18)

a. Premolded Joints. Premolded joint filler shall be placed in the forms in the proper position before concrete is poured, and nails at about 1 foot on centers shall be driven through the filler so as to extend into the concrete when it is poured and hold the filler in position. Premolded joint filler shall be installed in all walks to provide expansion and contraction joints at not more than 40-foot intervals and at all changes in direction or intersections.

b. Water Stops. The water stop shall be correctly positioned in the forms so that the center of the water stop is centered on the joint. In cases where preformed expansion joint material is used in conjunction with the water stop, allowance shall be made for equal water stop embedment on each side in the concrete. Water stop shall be held in place in the forms by use of a split form or other approved method that will positively hold the water stop in correct position. The water stop may be held in place in the forms by driving nails at about 12-inch intervals adjacent to, but not through the water stop. Nails may be driven into the form and then bent over the water stop strip to hold it in position. During any concrete pour around the water stop, the half which is being embedded in the concrete shall be rigidly supported in an approved manner so that the final position of the water stop will be in a straight line. Concrete being placed around the water stops shall be well vibrated in order to obtain impervious concrete in the vicinity of all joints. In horizontal joints extreme care shall be taken during the placing of concrete to insure that the area below the water stop is completely filled with concrete. The method of installation of the water stop and the method to hold the water stop in proper position during and after the pouring of concrete shall be approved of by the Engineer before the concrete pour is begun.

(1) Water Stops in Construction Joints. All construction joints in concrete, liquid, or gas-holding basins shall be provided with steel water stops, unless otherwise noted (See B-13). Vertical water stops shall be rigidly held in place in the forms, and concrete shall be thoroughly worked around the metal. Horizontal water stops shall be placed immediately after the pour is completed and before concrete has begun to set. Each side shall be puddled to level the concrete and then the water stop properly embedded. After the concrete has set to the point where the surface can be cut with a broom or a stream of water, the surface shall be cut off to a rough finish with all laitance removed and the concrete left clean. Metal strips for water stops shall be provided in the maximum length practicable; and, where strips are spliced, they shall be lapped at least 12 inches.

(2) Labyrinth Water Stops. Labyrinth type water stops shall be installed in accordance with the manufacturer's directions. Splices and intersections shall be joined by heat to make a continuous, strong, watertight seal.

(3) Expansion Joints with Copper Water Stop. Copper expansion joints shall be accurately bent to shape and placed in position as shown on the Plans. Adjacent strips shall be lapped and soldered to make watertight joints. All joints shall be protected from damage at all times. Special joint pieces as shown on the Plans shall be used at intersections. The first piece fabricated of each type shall be carefully checked in its relation to adjoining pieces to insure that there is no error in either the Plans or the builder's pattern. Any errors found shall be corrected before additional pieces are fabricated. All joints, both shop and field, shall be lapped not less than 1/2 inch and continuously soldered or brazed on each edge of the lap.

(4) Expansion Joints with Rubber Water Stop. The rubber water stop shall be installed in accordance with the details shown on the Plans and the instructions of the manufacturer. Corner and intersection pieces shall be provided as required and shall be field spliced to insure a continuous, watertight seal at the joints. Field splices shall be made with cement gum and a field vulcanizer capable of supplying sufficient heat to vulcanize the joint, or may be made by means of a chemical bond. The method of splicing used shall be similar to that specified by the Bureau of Reclamation and shall be in strict accordance with the manufacturer's recommendations as approved. The completed splice shall develop a strength of at least 50 percent of the strength of the continuous factory-molded or extruded shape.

(5) Expansion Joints with Plastic Water Stop. The plastic water stop shall be installed in accordance with the details shown on the Plans and the instructions of the manufacturer. Corner and intersection pieces shall be made up by field splicing. Ends to be spliced shall be carefully cut with a sharp knife so that the 2 pieces will match as exactly as possible. Splices shall be made with a thermostatically controlled heating plate or iron. The maximum temperature shall not cause burning or charring of the plastic and in no case shall it exceed 460 degrees F. When using a plate, both ends shall be pressed together vertically on the heated metal plate until the plastic melts around the edges. When the ends are melted, the water stop shall be pulled up straight and 2 heated ends placed on a flat surface so that they meet in a straight line. The plate or iron shall be kept clean and the finished joint free from impurities. The ends shall be pressed together and held firmly for about 1 minute to allow the plastic to fuse while it cools. At least 10 minutes shall be allowed before the new splice shall be pulled or strained in any way. The finished splices shall provide a cross section that is dense and free of porosity with tensile strength of not less than 80 percent of the unspliced materials.

c. Poured Asphalt Filler. Poured asphalt filler shall not be placed until all other concrete has been poured. Before placing filler, all joints in copper water stops shall be checked and resoldered where necessary. Joints shall be thoroughly cleaned, dry, and primed before pouring asphalt filler. The primer shall be compatible with the filler. The filler material

shall be heated in a double-walled boiler and placed in the joint by means of a nozzle. Placement shall begin at the bottom of the joint and proceed upward in a manner that will preclude the possibility of trapping air in the joint.

d. Poured Rubber-Asphalt Filler. Poured rubber-asphalt filler shall be placed in accordance with the manufacturer's instructions. Joints shall be thoroughly cleaned of all dust, powder, and foreign materials and shall be primed before pouring the rubber-asphalt filler. The primer used shall be compatible with the filler material. The filler material shall be heated in a double-walled boiler and placed in the joint by means of a nozzle. Placement shall begin at the bottom of the joint and proceed upwards in a manner that will preclude the possibility of trapping air in the joint.

C-6. Steel Reinforcement.

a. Storage. Steel reinforcement not placed in the work shall be stored under cover to prevent rusting and shall be placed on blocking such that no steel touches any ground surface.

b. Fabrication. The Contractor shall submit detailed placing drawings and complete, legible bending lists in triplicate showing location, shape, dimensions, and number of bars required for the Engineer's approval before the reinforcement is fabricated. The details shall follow the Manual of Standard Practice for Detailing Reinforced Concrete Structures of the American Concrete Institute, except as otherwise specified. The Contractor is not required to use the exact arrangement of reinforcement shown, provided the same area and perimeter of reinforcement are provided at all sections and any changes in the Plans are approved by the Engineer. Reinforcement shall be formed to the dimensions shown on the Plans and the approved bending detail sheets. Bends for bars other than hooks, stirrups, and ties shall be made around a pin having a diameter not less than 6 times the minimum thickness of the bar. All bars shall be bent cold. Forming and cutting tolerances shall be in accordance with CRSI Recommended Practice for Placing Reinforcing Bars.

c. Cleaning. Metal reinforcement, before being positioned, shall be cleaned of loose mill scale, rust, oil, earth, and from any coatings. After positioning, the reinforcement shall be free of any coatings which will destroy or reduce the bond, including oil, dirt, ice, or old concrete. Where there is a delay in depositing concrete, reinforcement shall be re-inspected and cleaned when necessary.

d. Straightening and Rebending. Metal reinforcement shall not be straightened or rebent in a manner that will injure the material. Bars with kinks or bends not shown on the Plans shall not be used. Heating of the reinforcement will be permitted only when the entire operation is approved by the Engineer.

e. Placing Reinforcement.

(1) Positioning. Metal reinforcements shall be positioned and secured against displacement by using annealed iron wire ties or clips

at intersections, or by welding, and shall be supported by concrete or metal supports, spacers, or metal hangers. Reinforcement shall be placed as shown on the Plans and in accordance with CRSI Recommended Practice for Placing Reinforcing Bars. Where welding is required, the method shall be subject to the approval of the Engineer. Where concrete block supports are used, such blocks shall be of concrete of the same strength and density as required for the structural concrete. Galvanized metal chairs shall be used to support reinforcement in exposed concrete slab ceilings.

(2) Reinforcing Steel Tolerances. Placement of reinforcing steel shall conform to the following tolerances:

Location	Tolerances
Height of top and bottom bars above forms	±1/4 inch
Lengthwise location and spacing in slabs and walls	±2 inches
Number of bars	0
Lateral spacing of bars in joists or beams	-0 + 1/4 inch
Stirrup spacing	±1 inch in any one stirrup and ±1 inch in end stirrups.

(3) Spacing. The minimum clear distance between parallel bars, except in columns, shall be equal to the nominal diameter of the bars, but in no case shall the clear spacing between the bars be less than 1 inch nor less than 1-1/3 times the maximum size of the coarse aggregate. Where reinforcement in beams or girders is placed in 2 or more layers, the clear distance between layers shall be not less than 1 inch, and the bars in the upper layers shall be placed directly above those in the bottom layer.

(4) Protection. At surfaces of footings, walls, and other principal structural members where the concrete is deposited directly against the ground or gravel backfill, the metal reinforcement shall have a minimum covering of 3 inches of concrete. At other surfaces of concrete exposed to the ground or to the weather, metal reinforcement shall be protected by not less than 2 inches of concrete for bars 5/8 inch or more in diameter and 1-1/2 inches of concrete otherwise. In other cases, protection shall be not less than 3/4 inch for slabs and walls and not less than 1-1/2 inches for beams, girders, and columns, but in no case less than the diameter of the bar, except as otherwise shown on the Plans or approved by the Engineer.

(5) Splicing. When it is necessary to splice reinforcement at points other than shown on the Plans, the character of the splice shall be determined by the Engineer. In all splices, the bars shall be placed in contact and wired, and the lap shall be at least 24 times the diameter of the bar and a minimum of 12 inches, unless otherwise shown on the Plans. Splices in adjacent bars shall be staggered.

(6) Tying Reinforcing Bars. Tying of reinforcing bars shall be in conformance with CRSI Recommended Practice for Placing Reinforcing Bars (current edition). Additional tie wires shall be provided where necessary for a satisfactory installation.

(7) Reinforcement Around Openings. Where necessary to cut bars for pipe or openings and where not shown otherwise, an equivalent area of steel shall be placed around the pipe or opening and extended on each side sufficiently to develop bond in each bar as approved by the Engineer.

(8) Placing Wire Mesh. Wire mesh reinforcement used in slabs shall be placed at the depth shown on the Plans. The fabric shall extend to within 2 inches of the edges of the slab, and splices shall be lapped at least 1-1/2 courses of the fabric and a minimum of 6 inches. The fabric shall be pulled into position as the concrete is placed by means of hooks, and concrete worked under the steel to insure that it is placed at the proper distance above the bottom of the slab. Laps and splices of the fabric shall be tied together with annealed wire at least every 24 inches.

C-7. Placing Concrete.

a. General. Before beginning placement of concrete, hardened concrete and foreign materials shall be removed from the inner surface of the mixing and conveying equipment. Before depositing concrete, debris shall be removed from the space to be occupied by the concrete. Forms, if constructed of lumber, shall be thoroughly wetted. Reinforcement shall be secured in position and approved by the Engineer before concrete is placed.

b. Removal of Water. Except when the tremie method is specified, water shall be removed from the space to be occupied by the concrete before it is deposited, unless otherwise approved by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains to a sump or be removed by other approved methods.

c. Handling. Concrete shall be handled from the mixer, or in the case of ready-mixed concrete, from the transporting vehicle to the place of final deposit as rapidly as practicable by methods which prevent the separation or loss of the ingredients. Under no circumstances shall concrete that has partially hardened be deposited in the work. When placing concrete by pumping, the discharge line shall be steel pipe. The use of aluminum pipe or aluminum chutes will not be permitted. Concrete 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. Vertical lifts or layers greater than 1-1/2 feet in depth shall not be allowed in pouring wall sections. Total vertical lifts made in a single pour shall not exceed 10 feet in height, unless otherwise shown on the Plans or approved by the Engineer. Forms for walls or thin sections of considerable height shall be provided with openings or other devices that will permit the concrete to be placed in a manner preventing segregation and accumulations of hardened concrete on the forms or metal reinforcement above the level of the concrete. Concrete shall be dropped no farther than a distance which will prevent segregation of ingredients, but in no case more than 6 feet in walls 8 inches or less in width, or more than 12 feet in wider walls unless chutes or trunks are used. The buggy, the bucket, or the lower end of the chute from which the concrete is discharged shall be so positioned that the concrete is released within 2 feet horizontally of its final position. When deposited in the forms, concrete shall have the required quality, regardless of the type of transporting vehicle.

d. Chuting. When concrete is conveyed by chutes, the equipment shall be of such size and design as to insure a continuous flow in the chute. The slope shall not be less than 1 vertical to 2 horizontal and shall be such as to prevent the segregation of the ingredients. The discharge end of the chutes shall be provided with a baffle plate to prevent segregation. When the operation is intermittent, the chute shall discharge into a hopper. The chute shall be cleaned before and after each run, and the debris and any water used shall be discharged outside the forms.

e. Compacting. Concrete, during and immediately after depositing, shall be worked into place and compacted by mechanical vibration. The concrete shall be worked around the reinforcement and into the corners of the forms. Accumulations of water on the surface of the concrete due to water gain, segregation, or other causes during placement and compacting shall be prevented as far as possible by adjustments in the mixture. Provision shall be made for the removal of such water as may accumulate so that under no circumstances will concrete be placed in such accumulations. The number and type of vibrators shall be subject to the approval of the Engineer. Internal vibrators shall be used and they shall have a minimum frequency of 7000 vpm when the vibrator is immersed in the concrete. Vibration shall not be applied through the reinforcement, either directly or indirectly. Vibration shall not be applied to layers of concrete which have hardened to the extent the concrete is no longer plastic. Vibration shall be continued at each point of application until a decrease in volume is no longer apparent and all trapped air has been removed, but shall not be continued to the extent that localized areas of grout are formed. Vibration shall be applied at evenly spaced points not farther apart than the radius over which vibration is visibly effective such that the entire volume of concrete receives vibration. Vibration shall not be used to make concrete flow in the forms over distances so great as to cause segregation and in no case more than 2 feet.

f. Depositing Continuously. Concrete shall be deposited continuously or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the Plans or approved by the Engineer.

g. Bonding.

(1) To New Concrete. Before depositing new concrete on or against concrete which has hardened, the forms shall be retightened. The surface of the hardened concrete shall be roughened by green cutting, chipping, or sandblasting, as required by the Engineer so that sound concrete is exposed. It shall be thoroughly cleaned of foreign matter and laitance and saturated with water. In case oil has been spilled on the surface to be bonded, this oil must be removed by chipping out the oil-saturated concrete. To insure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including inclined surfaces, shall first be covered with a coating of mortar against which the new concrete shall be placed before the grout has attained its initial set. On horizontal construction joints, at least 2 inches of grout shall be provided. The proportions of sand and cement in the grout shall be the same as those for the

sand and cement in the concrete mixture, and only sufficient water to provide a consistency similar to that of thick cream shall be used.

(2) To Old Concrete. Where new concrete is to be placed against old concrete, a bonding agent shall be used to coat the surfaces of the old concrete, unless otherwise specified in the Special Specifications. The bonding agent shall be one of those specified in B-9 and the method of preparation and application shall conform to the manufacturer's printed instructions and recommendations. Mortar grout shall then be provided as hereinbefore specified in C-7-g.(1).

h. Depositing in Cold Weather. Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near-freezing weather. No frozen materials or materials containing ice shall be used. The temperature of concrete materials and all reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be above 32 degrees F.

Whenever the temperature of the surrounding air is below 40 degrees F., all concrete, when placed in the forms, shall have a temperature of between 50 degrees and 70 degrees F. and shall be maintained at a temperature of not less than 50 degrees F. for at least 6 days for normal concrete or 4 days for high-early-strength concrete, or for as much more time as is necessary to insure proper rate of curing of the concrete. After artificial heating is discontinued, the housing, covering, or other protection used in connection with curing shall be dismantled in such a way that the fall in temperature in all parts of the concrete will be gradual throughout the first 24 hours and shall not exceed 40 degrees F. in 24 hours.

Heaters for the protection of concrete in cold weather shall be vented so that carbon dioxide does not combine with concrete slab surface to make a dust-producing condition.

No dependence shall be placed on salt or other chemicals for the prevention of freezing. Calcium chloride in amounts not exceeding 2 percent by weight of cement may be used, with approval of the Engineer, except as hereinafter specified, to accelerate setting and reduce the period of protection required to a minimum of 3 days, but under no circumstances is the calcium chloride to be considered an "antifreeze."

The use of calcium chloride, Pozzolith high-early, or other additives which may be corrosive will not be permitted in any concrete that is to be prestressed or which will be placed in contact with prestressed wire or strand. Likewise, no such additives are permitted in concrete which embeds or is in contact with aluminum.

i. Construction Joints. (See also page 12)

(1) Location. Joints not indicated on the Plans shall be so made and located as to least impair the strength of the structure and shall be approved by the Engineer prior to construction.

(2) Time Between Pours. At least 2 hours must elapse after depositing concrete in the columns or walls before depositing in beams,

girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith.

(3) In Floors. Construction joints in floors shall be located near the middle of the spans 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. In this last case, provision shall be made for shear by use of inclined reinforcement.

C-8. Tests of Concrete. During the progress of construction, the Engineer will make or have tests made to determine whether the concrete as being produced complies with the standard specified. The Contractor shall cooperate in the making of such tests to the extent of allowing free access to the work for the selection of samples and storage of specimens, assistance in casting cylinders, and in affording protection to the specimens against injury or loss through his operations. Specimens shall be made and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

When a ratio between 7-day and 28-day strengths has been established by these tests or by preliminary tests, the 7-day strength may be taken as a satisfactory indication of the 28-day strength. Field strength shall be assumed as equal to 85 percent of the strength of laboratory-cured cylinders. The required compressive strength of concrete proportioned in accordance with Table I of the Special Specifications is the field strength.

C-9. Finish.

a. General. Concrete which requires finishing shall not be poured until the materials, tools, and labor necessary for finishing the wet concrete are on the job and approved by the Engineer. All horizontal surfaces shall be steel troweled, unless otherwise specified.

b. Patching. Defects in all concrete surfaces shall be cut out and patched as specified herein. After removal of the forms, all imperfections, rock pockets, holes from form ties, and other defects shall be chipped out to solid concrete. The surface of the cavity to be patched shall be thoroughly wet before the patching mixture is applied. This mixture shall be proportioned as set forth in B-5, herein, or it shall be of the proportions of the original pour where uniform color is desired. The mixture shall be tamped solidly into the cavity to be patched and shall then be cured. (See C-10)

Where the pull-out type ties are used, the holes shall be filled as recommended by the manufacturer of the ties.

c. Unexposed Wall Finish. Immediately after removal of the forms, all rock pockets, form tie holes, and other irregularities shall be patched as specified in C-9.b. and cured as specified in C-10. No further finishing will be required.

d. Ordinary Wall Finish. Ordinary wall finish requires the use of new plywood forms or linings which will produce a uniform surface. The number of joints should be kept to a minimum. Immediately after removal

of the forms, all defects shall be patched and patches cured as specified in C-10. After pointings have set sufficiently, all form marks and pointing shall be ground or filled to give a smooth surface even with the flat wall surface.

e. Rubbed Wall Finish.

(1) Class I. The rubbing shall be done immediately after the patching of rock pockets and form tie holes have set sufficiently. In all cases, except where it is structurally impossible to remove the forms within 5 days, the rubbing shall be done preferably the day following the pour, and in no case more than 5 days after the pour has been completed. Forms shall be removed at such a rate that all finishing can be completed on the same day that the forms are removed. After the pointings have set sufficiently to permit working on the surface, the entire surface shall be thoroughly saturated with water for a period of 3 hours and rubbed until a uniform surface is obtained, either by hand with a carborundum stone of medium-coarse grade, or an abrasive of equal quality, or a mechanically-operated carborundum stone. If a mechanically-operated carborundum stone is to be used, its type shall be approved by the Engineer before the concrete has been poured. A small amount of mortar shall be used on the face of the stone. The mortar shall be a mixture of cement and fine sand in proportions used in the concrete being finished. The paste formed by rubbing, as described above, may be finished by carefully striking with a clean brush, or it may be spread uniformly over the surface and allowed to take a reset, after which it may be finished by floating with a canvas, carpet face, or cork float, or rubbed down with dry burlap. Brushing shall be done in the long direction of the surface being finished.

(2) Class II. Rubbed wall finish, Class II, shall conform to the requirements for Class I, above, except that the paste obtained from the described rubbing shall be allowed to set at least 24 hours. After thoroughly saturating with water, the surface shall then be painted with a mixture of 85 percent cement and 15 percent lime with sufficient water to give a creamy consistency. This mixture shall be rubbed into the surface with a coarse carborundum stone and brushed with a damp brush. Brushing shall be done in the long direction of the surface being finished.

f. Concrete Floor and Roof Slab Finishes. Concrete slabs shall be finished with the type of finish specified in the Special Specifications. Each type shall be as specified hereinafter. The use of "jitterbugs" or other special tools designed for the purpose of forcing the coarse aggregate away from the surface will not be permitted on any slab finish. The dusting of surfaces with dry materials will not be permitted. Slabs and floors shall be thoroughly compacted by vibration or tamping. In preparation for finishing, floor slabs shall be struck off true to the required grade of the finished floors as shown on the Plans. Floors shall be level with a tolerance of 1/8 inch in 10 feet, except where drains occur, in which case the floors shall be pitched to the drains at 1/4 inch per foot or as indicated on the Plans or directed. All discontinuous edges shall be rounded off with a steel edging tool. Steel edging tool radius shall be 1/8 inch for all slabs subject to wheeled traffic.

(1) Monolithic Finish. Except where otherwise specified, floors and slabs shall be finished by screeding and floating with straightedges to bring the surfaces to the required finish elevation shown on the Plans. While the concrete is still green but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood floated to a true, even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood floats to bring moisture to the surface. After surface moisture has disappeared, the concrete shall be hand troweled to produce a smooth, impervious surface, free from trowel marks. An additional troweling shall be given the surface for the purpose of burnishing. The final troweling shall produce a ringing sound from the trowel. Dry cement or additional water shall not be used in troweling, nor will excessive troweling be permitted.

(2) Rough Slab Finish. Slabs to receive fill and mortar-setting beds shall be finished by screeding with straightedges to bring the surface to the required finish plane. All laitance shall be removed and the surface left clean.

(3) Wood-Float Finish. Exterior slabs and ramps and roof slabs, unless otherwise specified in the Special Specifications, shall be finished by screeding with straightedges to bring the surface to the required line as shown on the Plans. While the concrete is still green but hardened sufficiently to bear the cement finisher's weight, the surface shall be wood floated to a true and uniform plane with no coarse aggregate visible.

(4) Broomed Finish. Where broomed finish is specified, the concrete shall be finished as specified for monolithic floor finish above, except the final troweling shall be omitted and the surface shall be finished by drawing a fine-hair broom lightly across the surface. All brooming shall be in the same direction and parallel to expansion joints, or, in the case of inclined slabs, perpendicular to the slope.

(5) Power Machine Finish. In lieu of hand finishing, the Contractor may use an approved power machine for finishing concrete floors in slabs in accordance with the directions of the machine manufacturer as approved by the Engineer.

g. Sidewalk Finish. After the concrete has been deposited in place, it shall be compacted and the surface shall be struck off by means of a strike board and floated with a wooden or cork float. Joints shall be provided as specified in C-5.a. An edging tool shall be used on all edges and at all expansion joints. The surface shall not vary more than 1/8 inch under a 10-foot straightedge. The surface shall have a granular or matted texture which will not be slick when wet, or it shall be broomed at right angles to the direction of traffic. Walks shall slope 1/4 inch per foot away from structures, unless otherwise shown on the Plans.

Sidewalk surfaces shall be laid out in blocks with an approved grooving tool as shown on the Plans or as directed by the Engineer.

h. Screeded Finish on Clarifier Slabs. The concrete topping for the floor of clarifier tanks shall not be placed until the equipment for the tanks has been completely installed and in working order. All laitance

shall be removed from the surface of the concrete with a wire brush and the surface shall then be thoroughly cleaned and washed. The concrete base shall be kept constantly wet for a period of 24 hours and then hand-swept with grout as specified under C-7.g.(1) before placing the concrete topping. After placing the concrete topping, it shall be swept by the collector mechanism until the surface conforms accurately to the profiles of the blades on the raking arm and, if necessary, shall be troweled with a steel trowel to a smooth, even surface. The topping shall be kept wet using a hose with fine spray, and as soon as the concrete topping is sufficiently hard, the tank shall be filled with water to a sufficient height to cover the entire floor for a period of 7 days. This topping coat shall consist of 1 part standard portland cement, and 2 parts of sand as specified in B-3.

C-10. Curing of Concrete.

a. Curing. Curing of concrete shall be accomplished by keeping the surface continuously wet for 7 days where normal portland cement is used, or 3 days when high-early-strength cement is used. Subject to approval by the Engineer, one of the following methods shall be followed:

WALLS

(1) Concrete forms shall be left in place and kept sufficiently damp at all times to prevent opening of the joints and drying of the concrete; or

(2) An approved curing compound shall be applied immediately after removal of forms, except where finishing is required. In this case, forms will be kept damp as required above until removed. Where rubbed finish is required, curing compound shall be applied immediately upon completion of finishing, and the unfinished, exposed surfaces shall be kept wet by sprinkling until finishing begins. When ordinary wall finish is required, curing compound shall be applied immediately after removal of the forms and the compound chipped off or otherwise removed where patching or pointing is required. Compound shall not be applied to surfaces which are to later be bonded to new concrete; or

(3) Exposed surfaces shall be continuously sprinkled.

SLABS

(1) Protect surface by ponding; or

(2) Cover with burlap or cotton mats kept continuously wet; or

(3) Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet; or

(4) Continuously sprinkle the exposed surface.

b. Protection in Cold Weather. Concrete shall be protected in cold weather as specified in C-7.h.

C-11. Hardener Application. Floors to receive hardener shall be cured, cleaned, and perfectly dry with all work above them completed. Zinc and/or magnesium fluosilicate shall be applied evenly, using 3 coats, allowing 24 hours between coats; the first coat shall be 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength; each coat shall be applied so as to remain wet on the concrete surface for 15 minutes. Sodium silicate shall be applied evenly, using 3 coats, allowing 24 hours between coats; the material shall be applied full strength at the rate of 1/3 gallon per 100 square feet. Approved proprietary hardeners shall be applied in conformance with the manufacturer's instructions. After the final coat is completed and dry, surplus hardener shall be removed from the surface by scrubbing and mopping with water.

C-12. Blockouts for Pipe and Conduit. Where pipe or conduit passes into or through concrete walls, floors, or roof slabs, the Contractor may, to facilitate proper alignment, leave holes through the concrete and pour the concrete opening after the pipe or conduit is in place. The size of such openings shall be 2 inches larger than the outside diameter of the bell, flange, or coupling, and shall conform to the special details for pipe openings shown on the Plans. When the piping or conduit is entirely placed and securely anchored, the concrete openings through the walls will be poured in accordance with the requirements for bonding new concrete to old as set forth in C-7.g. Concrete used to pour these openings shall consist of 1 part cement, 1 part fine aggregate, 1 part nonshrinking aggregate, and 1-1/2 parts coarse aggregate of maximum size of 1/2 inch when the concrete is part of a liquid-holding basin. Otherwise, the nonshrinking aggregate shall be replaced by fine aggregate. Concrete poured in these openings shall be thoroughly vibrated or rodded to insure a watertight joint between the new and old concrete, and the new concrete and the pipe or conduit. The form for the closure shall be constructed with a pouring funnel. A plug of concrete shall be left in the pouring funnel. After the concrete has taken its initial set, the plug shall be removed and the exposed, broken face ground smooth. Pouring of blockout holes shall be done from the pressure side wherever possible. Such joints shall be cured by keeping them constantly wet for not less than 7 days.

Where approved by the Engineer, blockout holes may be dry packed using a grout proportioned and mixed as specified in B-5.a. This mixture shall be tamped or rodded solidly into the space from the pressure side. A backing board or stop shall be provided at the back side of this space against which the dry mixture can be tamped.

C-13. Grouting Machinery Foundations. Where machinery is to be secured by anchor bolts set in concrete and supported on foundations which are to be grouted in place, the original concrete pour shall be blocked out or finished off a sufficient distance below the bottom of the machinery foundation to provide for the thickness of grout shown on the Plans. After the machinery has been set in position and wedged to the proper elevation by steel wedges, the space between the bottom of the machinery foundation and the original pour of concrete shall be caulked with a dry-pack grout proportioned and mixed as specified in B-5.a. This dry mixture shall be tamped or rodded solidly into the space between the machinery foundation and the original concrete. A backing board or stop shall be provided at the back side of this space against which the dry mixture can be tamped.

C-14. Leakage Tests. After the final pour of concrete on basins which are to be subjected to leakage tests has been cured for 14 days, and before backfill or brick facing or other work which will cover the exposed faces of the walls of the basins has been completed, the basins specified in the Special Specifications to be subjected to leakage tests shall be filled with water to the normal liquid level line. Unless otherwise specified in the Special Specifications, water for this test shall be provided by the Contractor. After the basin has been kept full for 48 hours, it will be assumed for the purposes of the test that the absorption of moisture by the concrete in the basin is complete. All valves and gates to the structure shall then be closed and the change in water surface measured for a 24-hour period. During the test period, all exposed portions of the structure shall be examined and any leaks or damp spots shall be marked and such leaks or damp spots shall be later patched or corrected in any case. If the drop in water surface in the 24-hour period exceeds 1/10 of 1 percent of the normal volume of liquid contained in the basin, the leakage shall be considered excessive. If the leakage is excessive, the water surface shall be dropped by stages and the leakage measured at each stage until the area in which the leakage occurs has been isolated. The basin shall then be drained, all leaks previously marked shall be patched, and the necessary repairs made in the area where leakage is indicated. The basin shall then be refilled and again tested for leakage. This process shall be continued until the drop in water surface in a 24-hour period with the basin full is less than 1/10 of 1 percent of the volume of liquid held in the basin. If the cause of excessive leakage is found to be faulty workmanship or materials, the cost of repairs and subsequent tests shall be borne by the Contractor. If the leakage is found to be due to causes not under the Contractor's control, the cost of repairs and subsequent tests after the first shall be paid for by the Owner as extra work.

(For Index, see next page)

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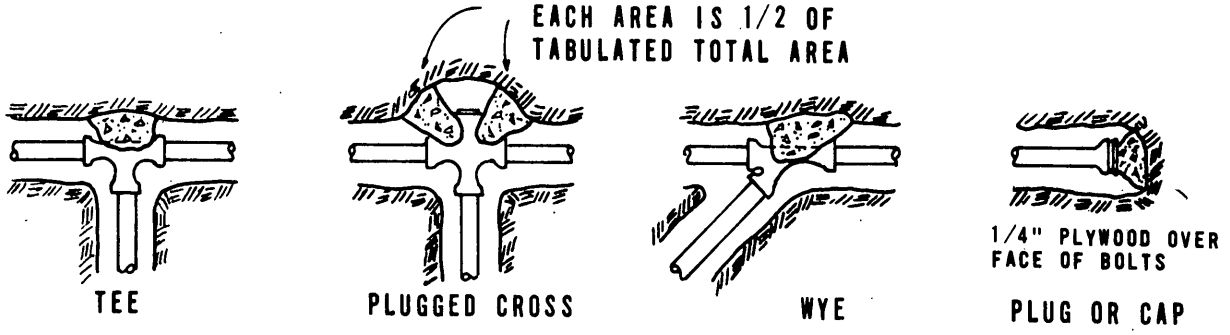

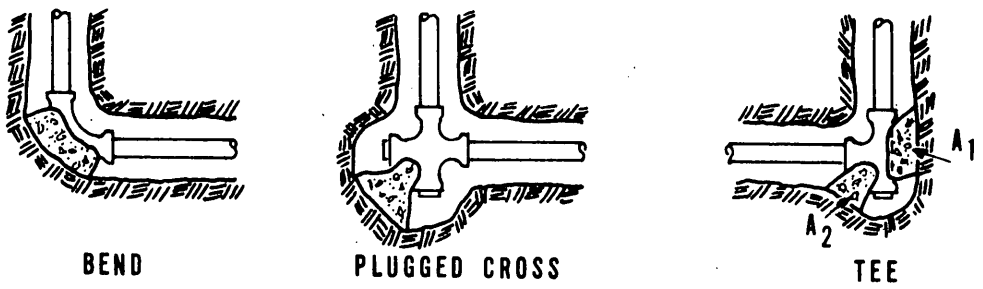

NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. KEEP CONCRETE CLEAR OF JOINT AND ACCESSORIES.
3. THE REQUIRED THRUST BEARING AREAS FOR SPECIAL CONNECTIONS ARE SHOWN ENCIRCLED ON THE PLANS; e.g. (15) INDICATES 15 SQUARE FEET BEARING AREA REQUIRED.
4. IF NOT SHOWN ON PLANS REQUIRED BEARING AREAS AT FITTING SHALL BE AS INDICATED BELOW, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS(ES) STATED IN THE SPECIAL SPECIFICATIONS.
5. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN ON THIS STANDARD DETAIL.

BEARING AREA OF THRUST BLOCKS IN SQ. FT.

FITTING SIZE	TEE, WYE, PLUG OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED ON RUN A_1	TEE PLUGGED ON RUN A_2	45° BEND	22½° BEND	11¼° BEND
4	1.0	1.4	1.9	1.4	1.0	—	—
6	2.1	3.0	4.3	3.0	1.6	1.0	—
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.4	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

NOTE: ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 150 p.s.i. AND AN ALLOWABLE SOIL BEARING STRESS OF 2,000 POUNDS PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION: BEARING AREA = (TEST PRESSURE/150)X(2000/SOIL BEARING STRESS)X(TABLE VALUE).

STANDARD DETAIL NO. 100

THRUST BLOCKING DETAILS

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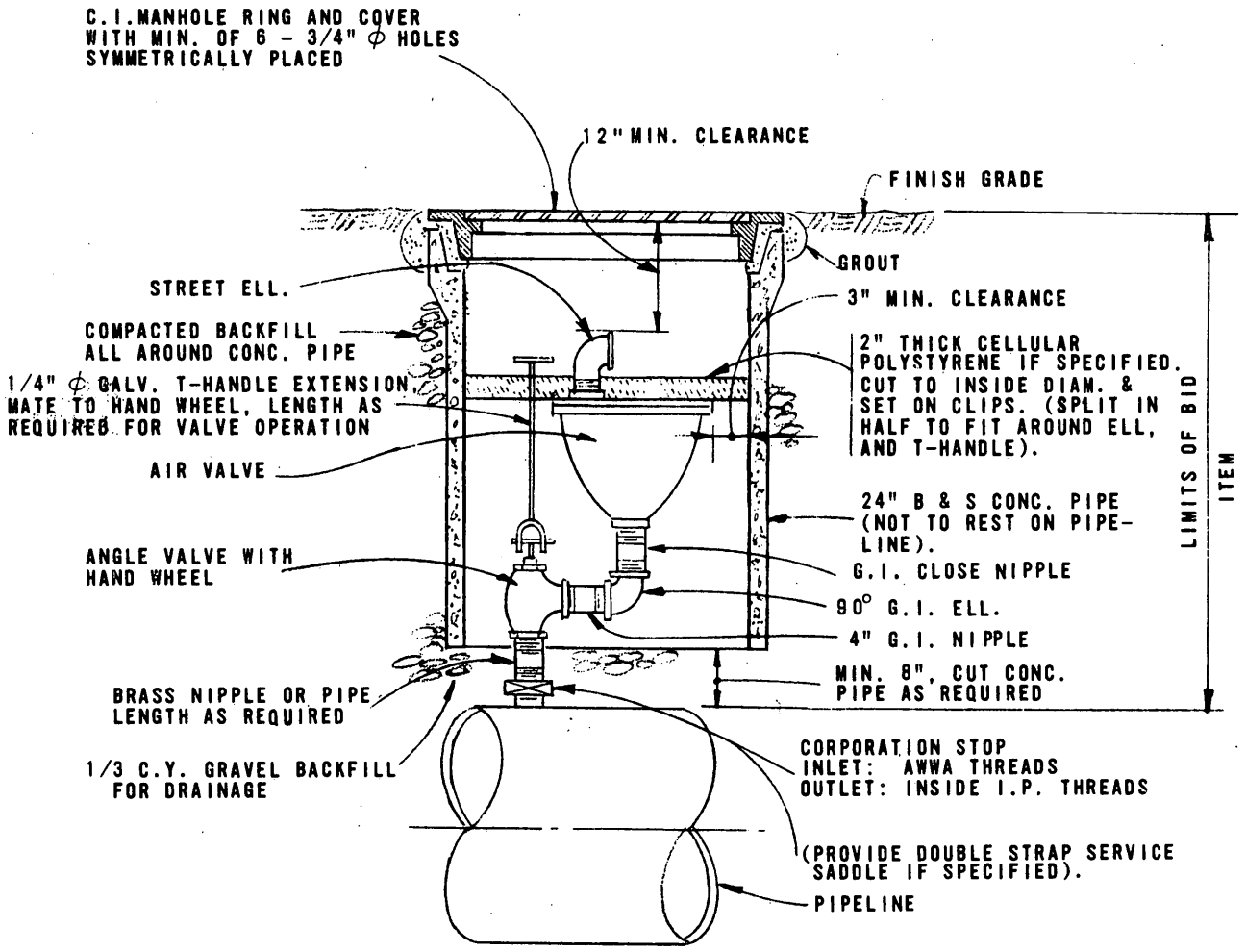
Engineers and Planners
SEATTLE CORVALLIS BOISE PORTLAND
CH2M

A-0-289 REV. SEPT. 1968



NOTES:

1. CORPORATION STOP, ANGLE VALVE AND CONNECTING PIPING SHALL BE THE SAME DIAMETER AS THE AIR VALVE INLET.
2. USE APPROVED JOINTING COMPOUND ON ALL THREADED CONNECTIONS.
3. ROTATE AIR VALVE TO PROVIDE MAXIMUM CLEARANCE FOR ACCESS TO ANGLE VALVE.
4. AIR VALVE DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER THIS STANDARD DETAIL.

STANDARD DETAIL NO. 101
AIR VALVE ASSEMBLY
DETAIL -- TYPE A
(FOR AIR VALVES UP TO AND INCLUDING 2")

REVISED OCTOBER 1968

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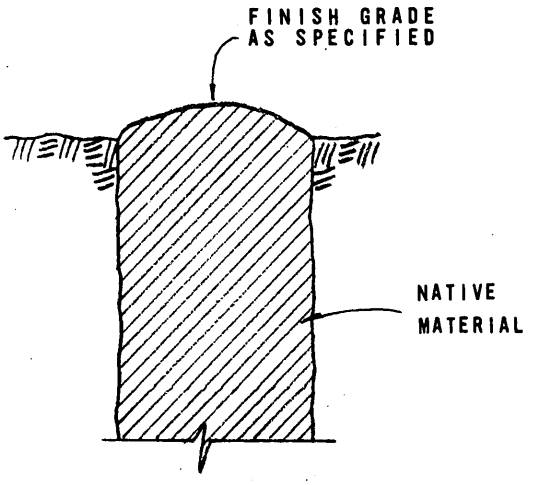
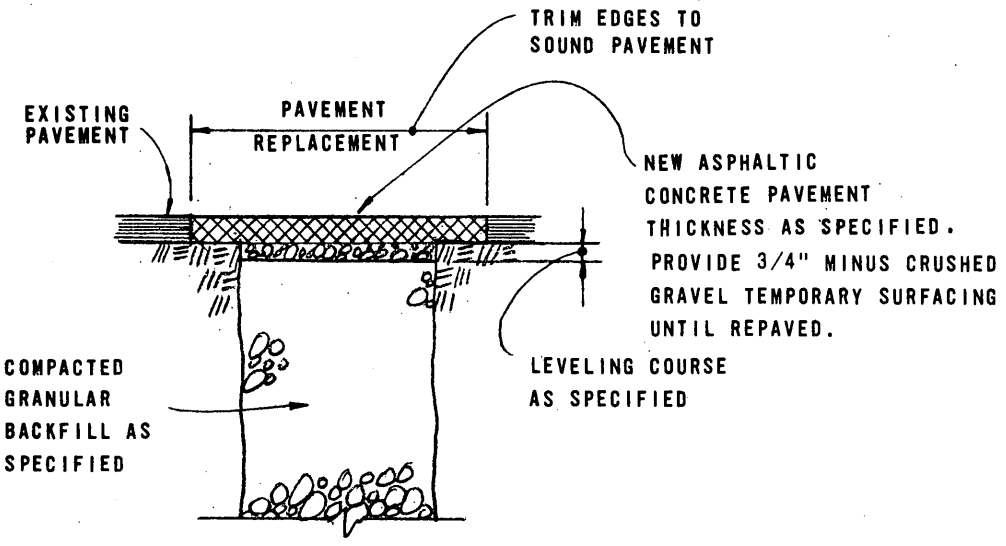


CLASS "C"



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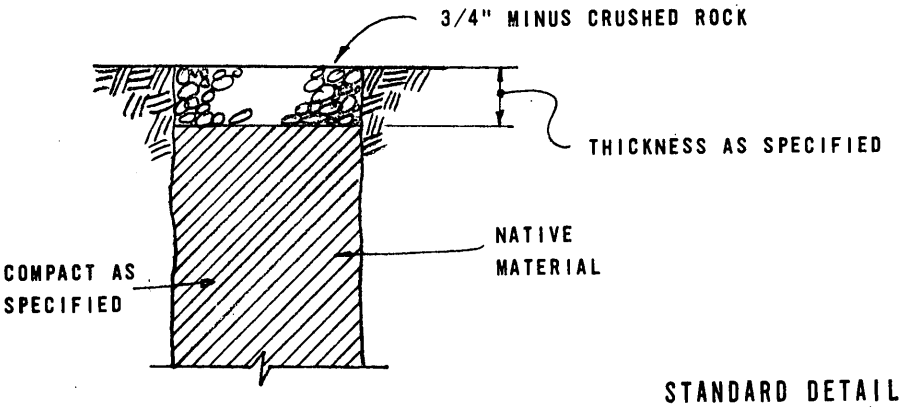

CLASS "E"

STANDARD DETAIL NO. 104

TRENCH BACKFILL ABOVE THE PIPE ZONE

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SEATTLE CORVALLIS BOISE PORTLAND
CH2M

LINE SYMBOLS FOR UTILITY LINE CONSTRUCTION (NOTE: All of the symbols shown below are not necessarily used on the accompanying plans)

GENERAL SYMBOLS

- Proposed Utility (this project)
- 5 — Stationing Along Proposed Utility
- Existing Improvements or Utilities
- —P/L— P/L: Property Lines; R/W: Rights-of-way Lines; E/L: Easement Line
- -x—x—x- Existing Fence
- —O—W 6"— Existing Water Line and Valve
- —O—S 12"— Existing Sanitary Sewer and Manhole
- —□—SS 18"— Existing Storm Sewer and Catch Basin
- —G—4"— Existing Gas Line
- —T— 26 PR Existing Underground Telephone
- -E- 220V Existing Underground Electric
- —IR— Existing Irrigation Pipeline
- Ditch
- 12" Existing Culvert Showing Showing Flow Direction
- Centerline (also noted ℄)
- Boundary Lines (city limits, parks, cemeteries, etc.)
- Section Lines, DLC Lines, etc.
- MH Proposed Manhole in new line
- Proposed Valve in new line
- Proposed Fire Hydrant on new line
- Existing Fire Hydrant
- 1" ARV / 2" CARV Air Release Valve, Size / Combination Air Release Valve, Size
- 6"BO Blowoff, size
- Power or Telephone Pole, Guy Anchor (line indicates the location of the face of the pole nearest the proposed utility line location)
- 32+10 Survey Hub and Stationing
- Land Monument (iron rod, iron pipe, brass cap set in concrete, etc.)
- Pavement Replacement
- T Topsoil Replacement
- D Backfill Classification
- 48"@0.0012 Size and Slope of Pipe 48" pipe = 0.0012 FT/FT
- PT Angle Point
- TH #3 Test Hole Location on Plan
- BM #3 Bench Mark Location on Plan
- 6 — Test Hole Number; Bottom of Test Hole — Test Hole Location On Profile

LETTER SYMBOLS

PIPING

A.C.	Asbestos Cement
ALT.V.	Altitude Valve
ARV.	Air Release Valve
BI.	Black Iron or Steel
BO.	Blowoff
BS.	Bell and Spigot
BV.	Butterfly Valve
CARV.	Combination Air Release Valve
CC	Concrete Cylinder
CI	Cast Iron
CISP	Cast Iron Soil Pipe
CMP	Corrugated Metal Pipe
CO	Clean Out
CONC.	Concrete
CORP.	Corporation Stop
CU.	Copper
CULV.	Culvert
DI	Ductile Iron
F	Flange
FCA	Flange Coupling Adapter
FH	Fire Hydrant
GI	Galv. Steel or Galv. Iron
GV	Gate Valve
H	Hub Joint
IPT	Iron Pipe Threads
MC	Mechanical Coupling
MH	Manhole
MJ	Mechanical Joint
P	Plastic (of type designated)
PE	Plain End
PO	Push-On Joint
PRV	Pressure Reducing Valve
P.RF.V.	Pressure Relief Valve
RED	Reducer
RG	Retainer Gland
SCR	Screwed Joint
SOL	Solvent Weld Joint

LETTER SYMBOLS (cont.)

PIPING (cont.)

TC	Transition Coupling
TT	Thrust Tie
VC	Vitrified Clay
WI	Wrought Iron
WOOD	Wood Stave
WS	Welded Steel

SURFACING

A.C.	Asphaltic Concrete
CONC.	Portland Cement Concrete
O.M.	Oil Mat
GR	Gravel
PVMT.	Pavement
SWDK.	Sidewalk

MISCELLANEOUS

A.B.	Anchor Bolt
AH	Ahead
BK	Back
BM	Bench Mark
EL	Elevation
EP	Edge of Pavement
EQ	Equation
EX	Existing
FL	Flow Line
Gd.	Ground
HOR.	Horizontal
INV.	Invert
LT.	Left
NA	Not applicable
NTS	Not to Scale
OC	On Centers
P.I.	Point of Intersection
P.O.T.	Point of Tangent
RT.	Right
TB	Thrust Block
TBM	Temporary Bench Mark
VERT.	Vertical
W/	With
W/O	Without
X-ING	Crossing: Railroad, Highway, etc.

GENERAL SYMBOLS (cont.)

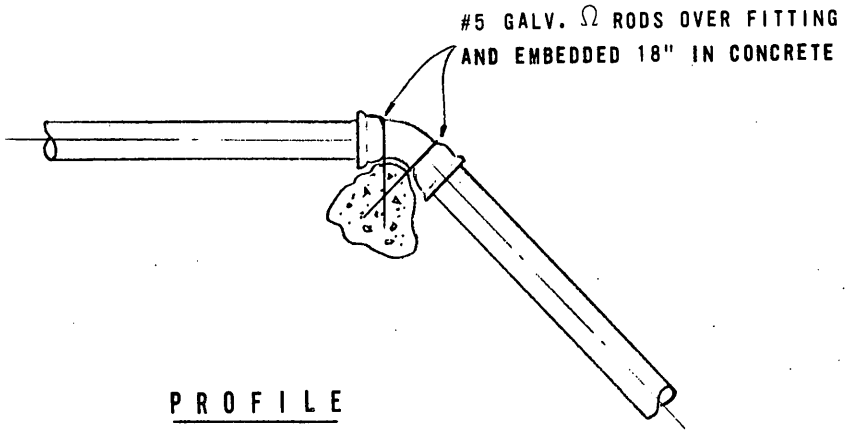
CLASS OF SEWER PIPE

- No Symbol ASTM C-14 Standard Strength
- X — ASTM C-14 Extra Strength
- IV — ASTM C-76 Class II, III, IV, or V, as indicated
- 10" AC 150 (Size, Type, Class) — Pressure Pipe Description

STANDARD DETAIL NO. 109

LINE SYMBOLS FOR UTILITY LINE CONSTRUCTION

CORNELL, HOWLAND, HAYES & MERRYFIELD
Engineers and Planners
SEATTLE CORVALLIS BOISE PORTLAND
CH2M



PROFILE

N.T.S.

1. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
2. THE REQUIRED THRUST BLOCK VOLUMES FOR SPECIAL CONNECTIONS ARE SHOWN ENCIRCLED ON THE PLAN; e.g. (6) INDICATES 6 CUBIC YARDS OF CONCRETE ARE REQUIRED.
3. IF NOT SHOWN ON PLANS, REQUIRED VOLUMES AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) STATED IN THE SPECIAL SPECIFICATIONS.
4. VOLUMES AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER VOLUMES AND THE BLOCKING DETAIL SHOWN ON THIS STANDARD DETAIL.
5. THRUST BLOCKS FOR VERTICAL UP-BENDS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.

FITTING SIZE	VOLUME OF THRUST BLOCK IN CU. YD.			
	90° BEND	45° BEND	22½° BEND	11¼° BEND
4	--	--	--	--
6	1.3	--	--	--
8	2.3	1.1	--	--
10	3.7	1.8	--	--
12	5.5	2.8	1.2	--
14	7.6	3.9	1.7	--
16	9.9	5.1	2.3	0.9

NOTE:

ABOVE VOLUMES BASED ON TEST PRESSURE OF 150 psi. AND THE WEIGHT OF CONCRETE = 4050 LBS/CU. YD. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME = (TEST PRESSURE /150) × (TABLE VALUE).

STANDARD DETAIL NO. 111

THRUST BLOCK DETAILS FOR VERTICAL DOWN-BENDS

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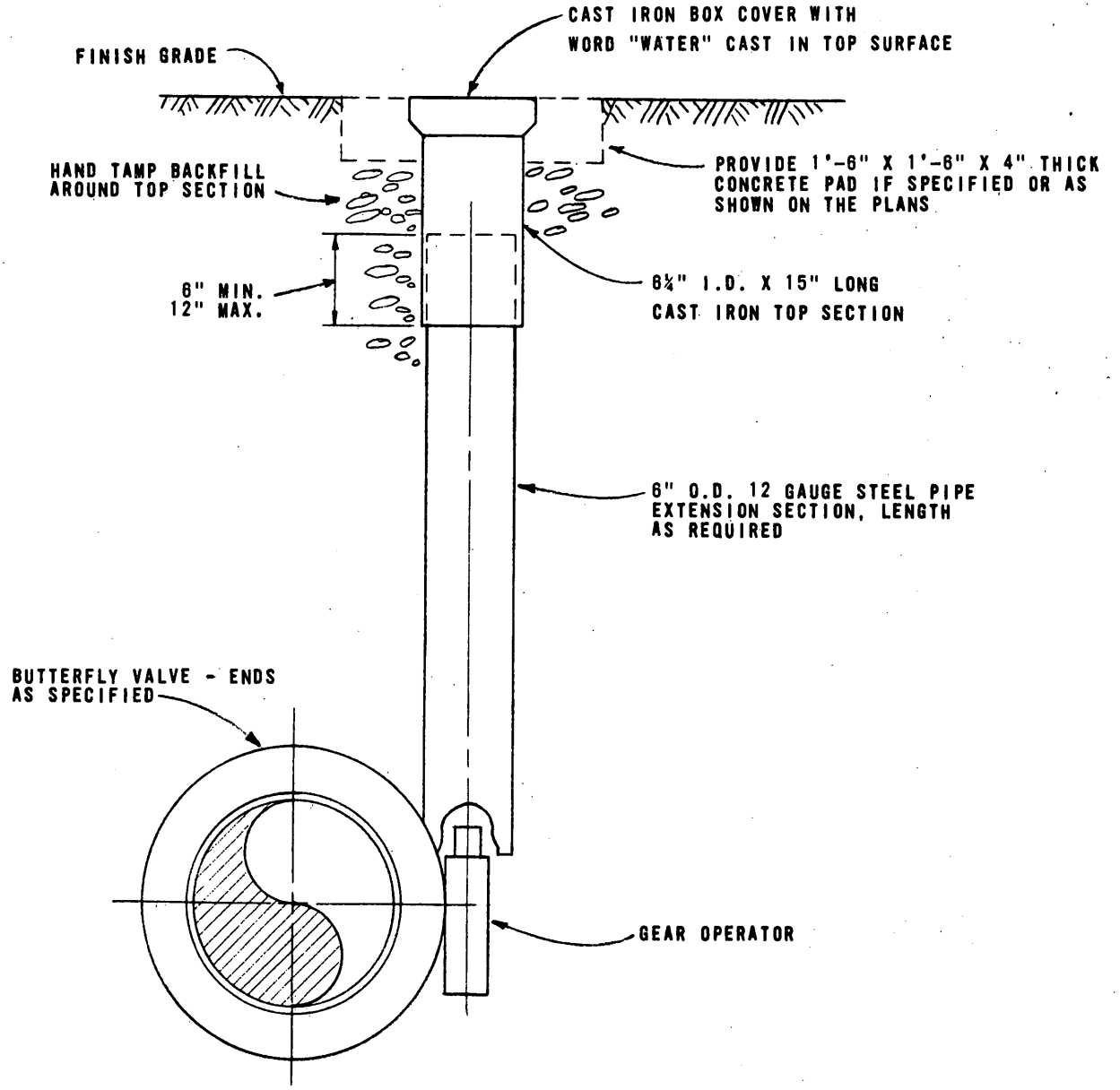
SEATTLE CORVALLIS BOISE PORTLAND
CH2M



STANDARD DETAIL NO. 113

BURIED BUTTERFLY VALVE
AND
VALVE BOX SETTING DETAILS

A-0-269

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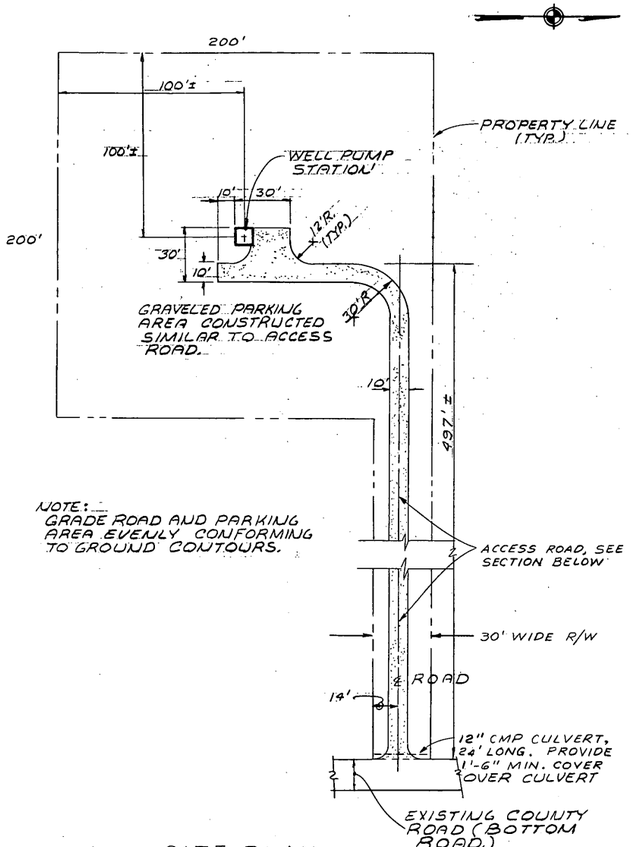
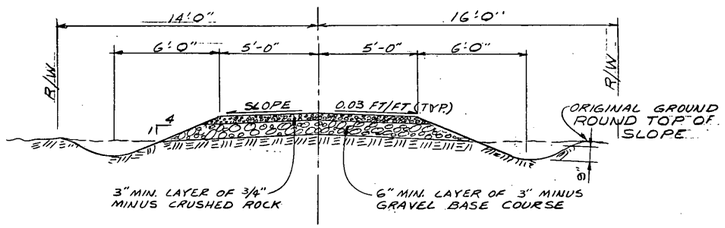
Engineers and Planners
SEATTLE CORVALLIS BOISE PORTLAND
CH2M



SITE PLAN

SCALE: 1"=40'



TYPICAL SECTION OF PUMP STATION ACCESS ROAD

N.T.S

SCHEDULE A

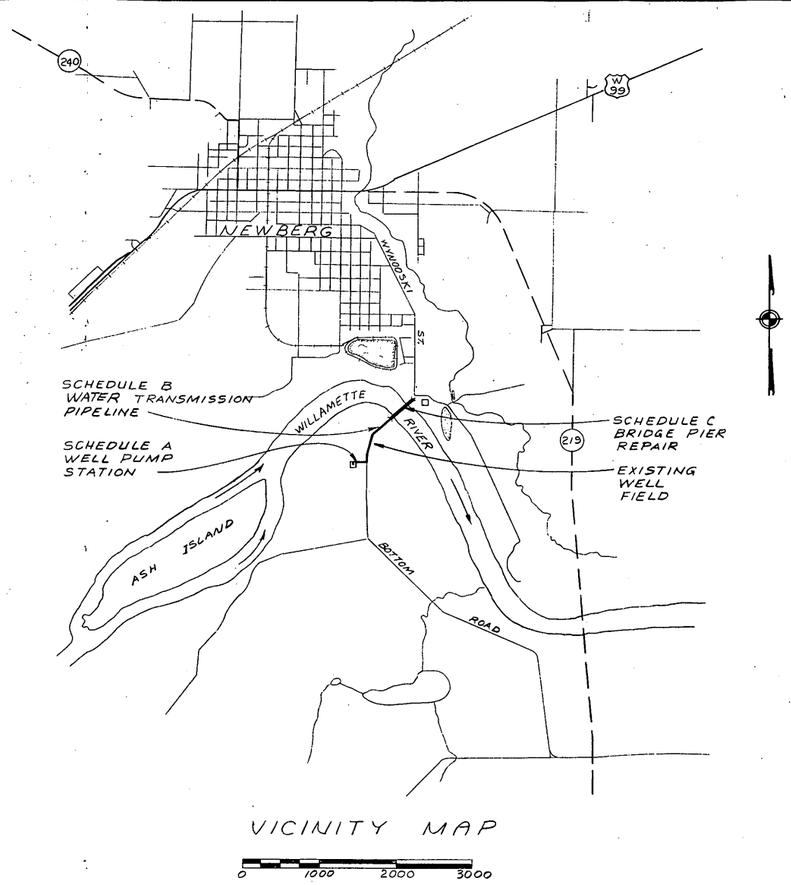
SCHEDULES A, B & C

INDEX TO DRAWINGS

STANDARD DETAILS

(CONSIDERED A PART OF DRAWING C5509-4, SHEET NO. 1 OF 6)

DETAIL NO.	TITLE
100	THRUST BLOCKING DETAILS
104	TRENCH BACKFILL ABOVE THE PIPE ZONE
109	LINE SYMBOLS FOR UTILITY LINE CONSTRUCTION
111	THRUST BLOCK DETAILS FOR VERTICAL DOWN-BENDS
113	BURIED BUTTERFLY VALVE AND VALVEBOX SETTING DETAILS



VICINITY MAP

0 1000 2000 3000

SECTION OR DETAIL DESIGNATION

SHEET WHERE SECTION OR DETAIL IS SHOWN

SHEET WHERE SECTION OR DETAIL IS TAKEN

SECTION DESIGNATION

THIS PRINT IS REDUCED TO ONE-HALF OF THE ORIGINAL SCALE

IF THE SCALE READS:

1"= 1'-0" USE ½"= 1'-0" OR 1"= 10' USE 1"= 20'

REGISTERED PROFESSIONAL ENGINEER 5946 OREGON JULY 14, 1967 ARCHIE E. MEADOWS

CORNELL, HOWLAND, HAYES & MERRYFIELD

ENGINEERS PLANNERS ECONOMISTS

CITY OF NEWBERG, OREGON

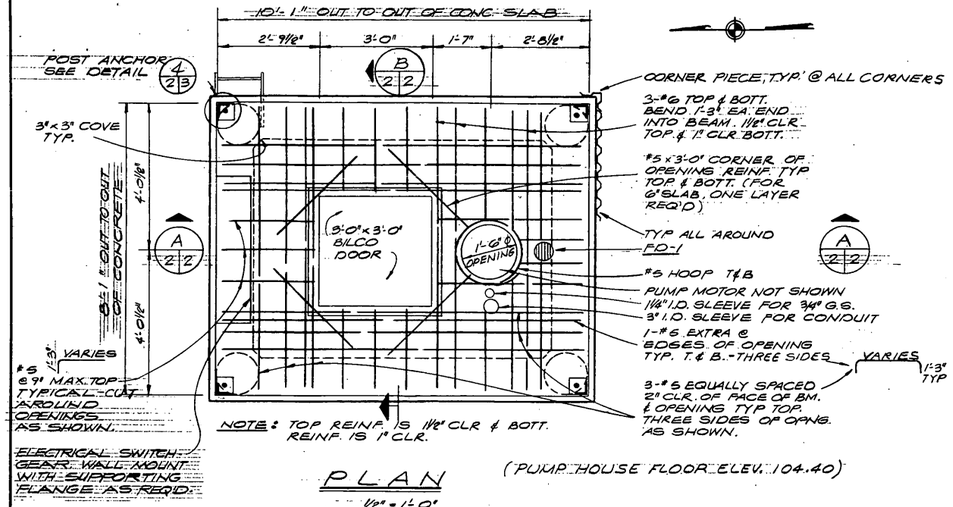
WATER SUPPLY IMPROVEMENTS

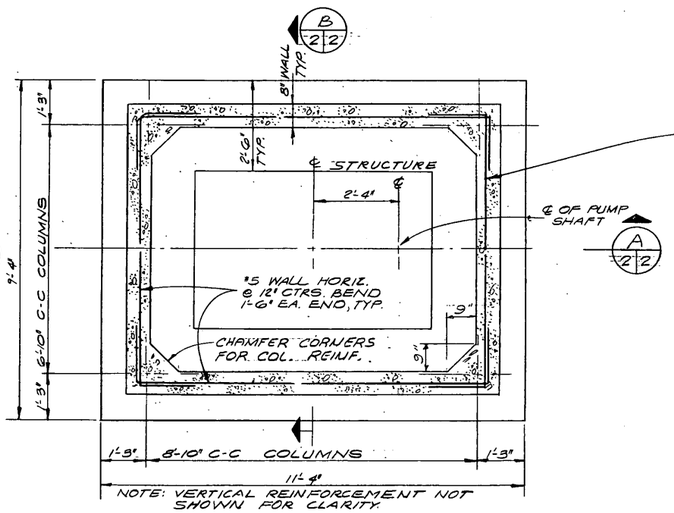
SCHEDULES A,B & C

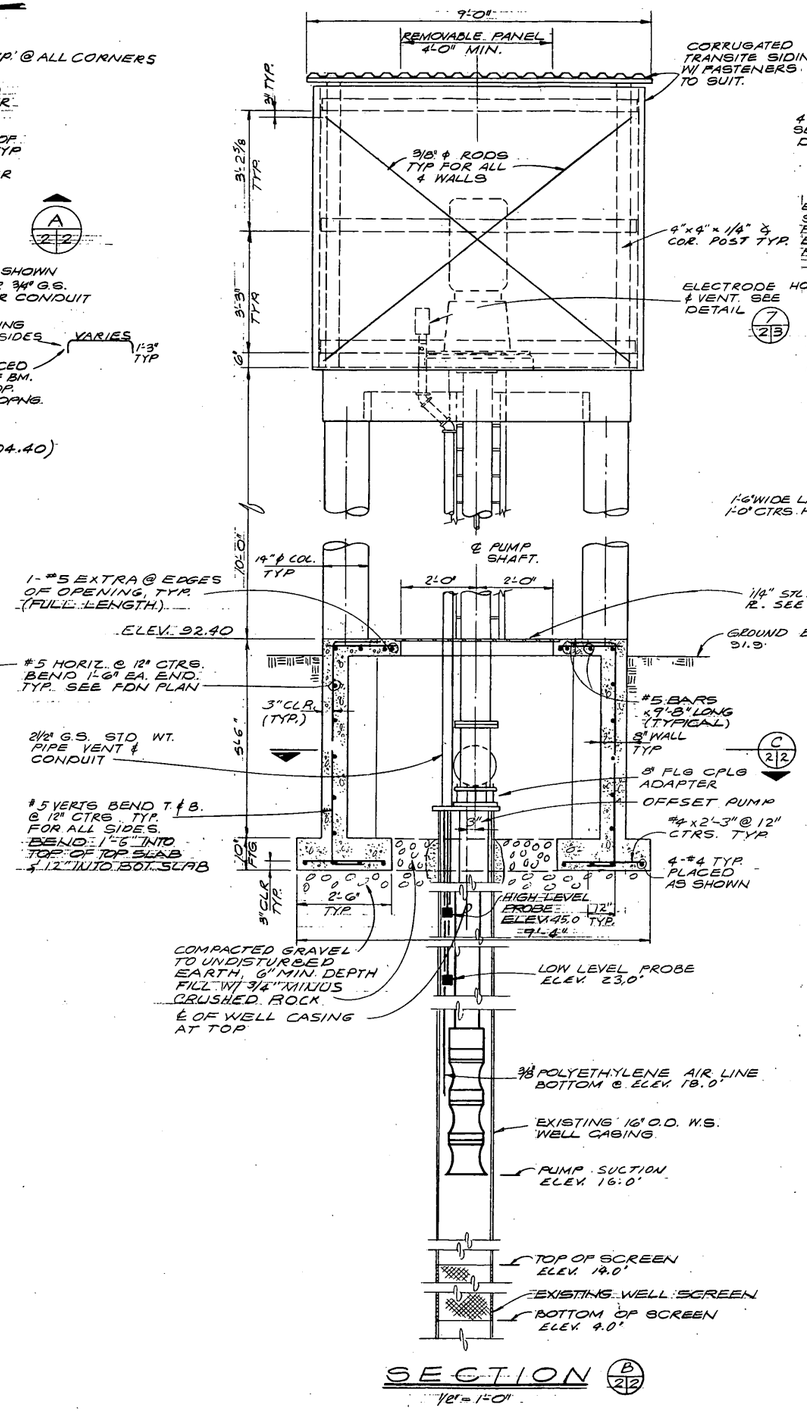
VICINITY MAP & INDEX TO DRAWINGS

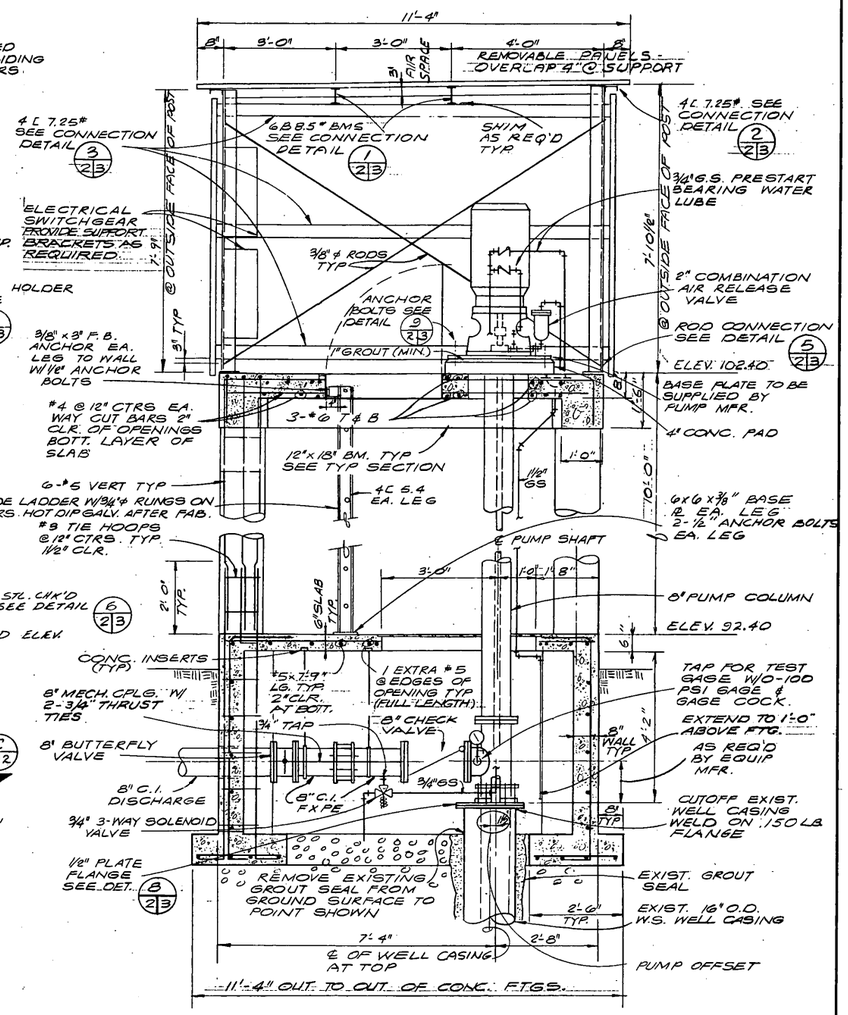
SCHEDULE A-SITE PLAN & MISC. DETAILS

DES AEM	SHEET 1
DR GGS	OF 6
CK FEH	DATE SEPT. 1970
INV C5509.1	SCALE AS SHOWN
DWG C 5509-4	









THIS PRINT IS REDUCED TO ONE-HALF OF THE ORIGINAL SCALE
IF THE SCALE READS:
1" = 1'-0" USE 1/2" = 1'-0" OR 1" = 10' USE 1" = 20'

REGISTERED PROFESSIONAL ENGINEER 6268 OREGON JULY 12, 1968 RICHARD S. REID

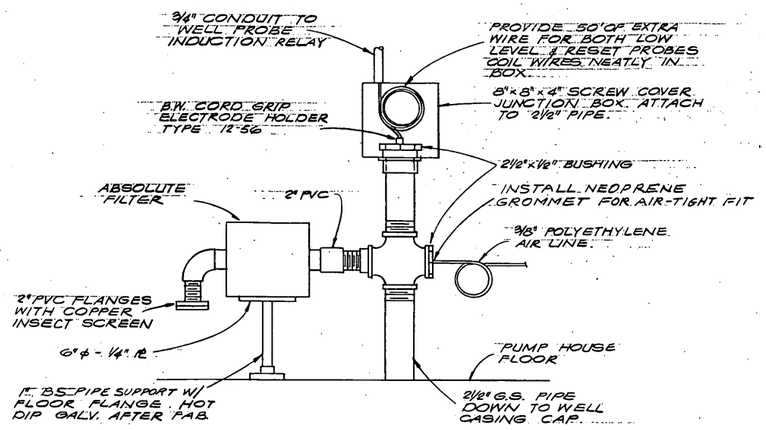
CH2M

CORNELL, HOWLAND, HAYES & MERRYFIELD
ENGINEERS PLANNERS ECONOMISTS

CITY OF NEWBERG, OREGON
WATER SUPPLY IMPROVEMENTS

SCHEDULE A-WELL PUMP STATION
PLAN, SECTIONS & DETAILS

DES	RSR	SHEET	2
DR	DK	OF	6
CK	AEM	DATE	SEPT. 1970
EN	C5509.1	SCALE	AS SHOWN
DWG	C 5509-4		



ELECTRODE HOLDER & VENT DETAIL (7/2|3)

1½" = 1'-0"

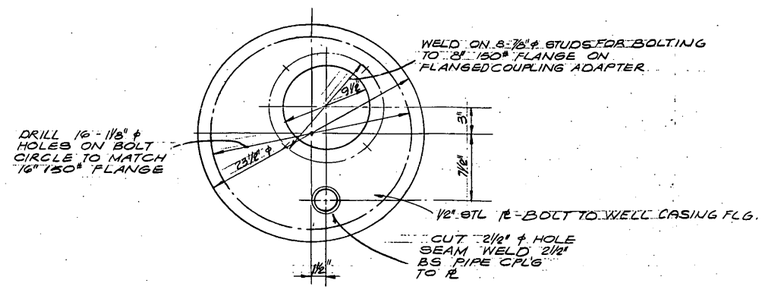
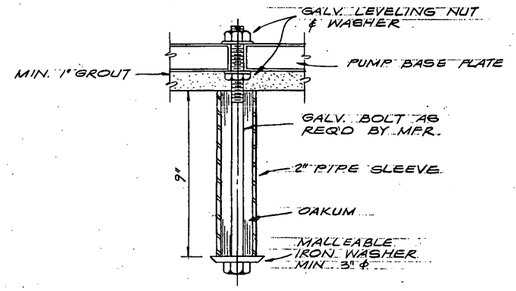


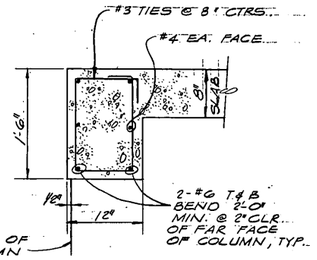
PLATE FLANGE DETAIL (8/2|3)

1½" = 1'-0"



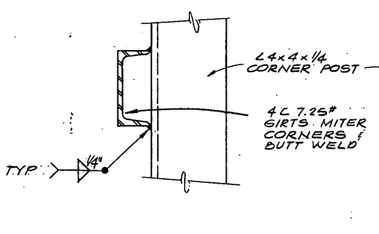
PUMP ANCHOR BOLT DETAIL (9/2|3)

3" = 1'-0"



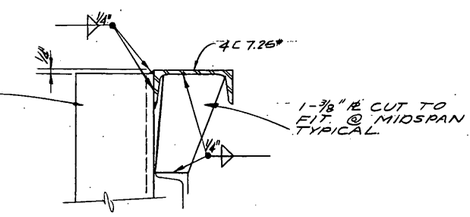
TYP BM. SECTION

1" = 1'-0"



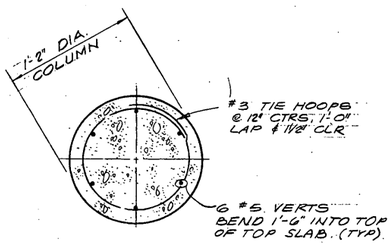
DETAIL (3/2|3)

3" = 1'-0"



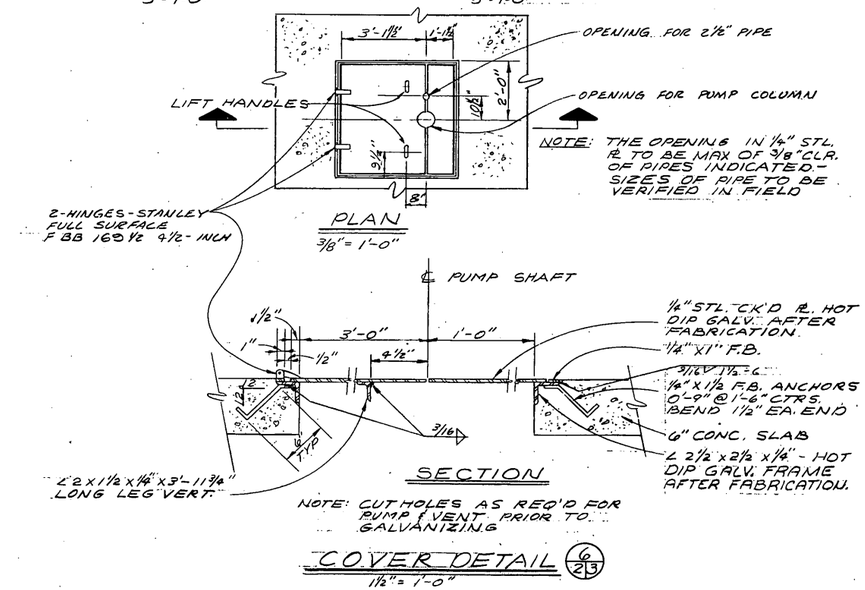
DETAIL (2/2|3)

3" = 1'-0"



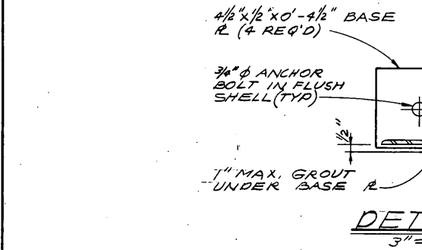
TYP COLUMN SECTION

1½" = 1'-0"



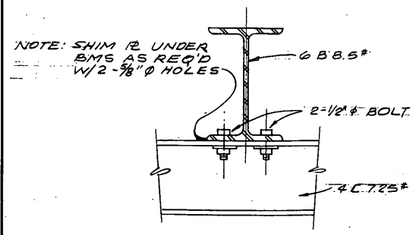
COVER DETAIL (6/2|3)

1½" = 1'-0"



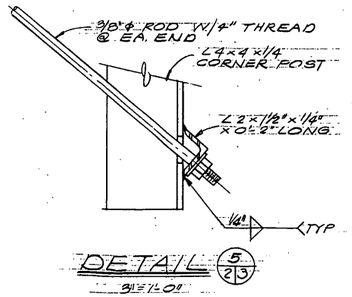
DETAIL (4/2|3)

3" = 1'-0"



DETAIL (1/2|3)

3" = 1'-0"



DETAIL (5/2|3)

3" = 1'-0"

THIS PRINT IS REDUCED TO ONE-HALF OF THE ORIGINAL
IF THE SCALE ℄
1" = 1'-0" USE ½" = 1'-0" OR 1" = 10' USE 1" = 20'

REGISTERED PROFESSIONAL ENGINEER 6260 OREGON JULY 12, 1968 RICHARD S. REID

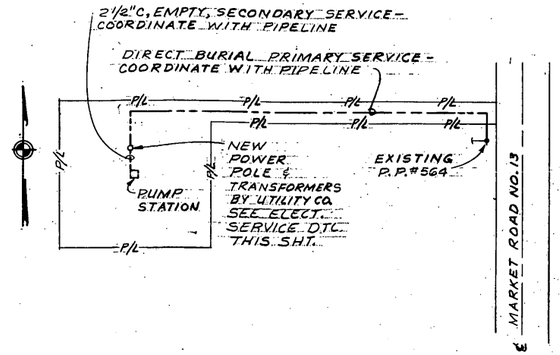
CH2M

CORNELL, HOWLAND, HAYES & MERRYFIELD
ENGINEERS PLANNERS ECONOMISTS

CITY OF NEWBERG, OREGON
WATER SUPPLY IMPROVEMENTS

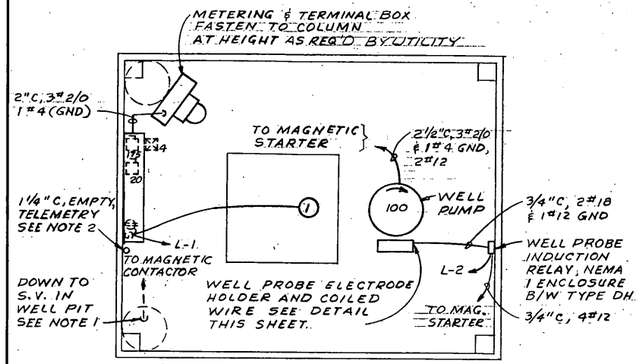
SCHEDULE A-WELL PUMP STATION
SECTIONS AND DETAILS

DES RSR	SHEET 3		
DR JOK	OF 8		
CK AEM	DATE SEPT. 1970		
EN C5509-B	SCALE AS SHOWN		
DWG C 5509-4			



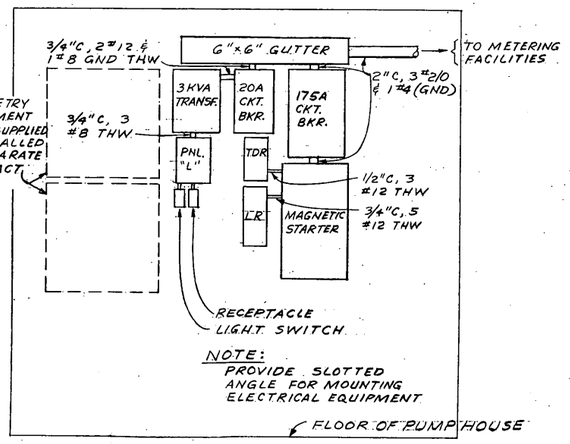
SITE PLAN

SCALE: 100'=1'-0"



PLAN ~ LIGHTING & POWER

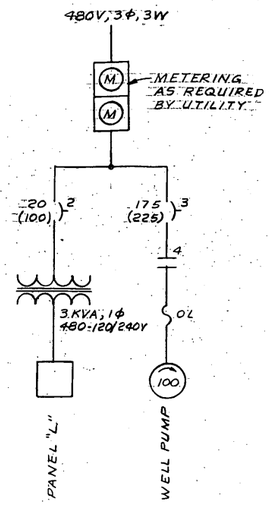
SCALE: 1/2"=1'-0"



ELEVATION

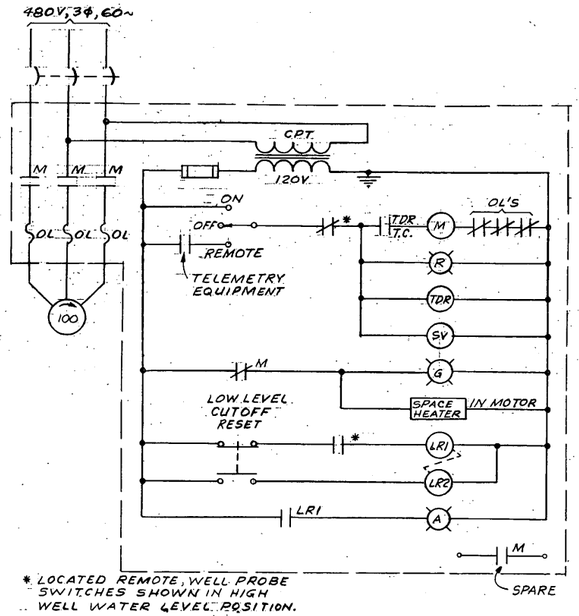
ELECTRICAL EQUIPMENT

SCALE: 3/4"=1'-0"



ONE LINE DIAGRAM

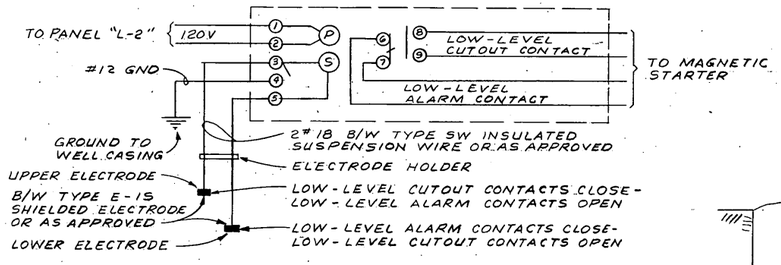
N.T.S.



* LOCATED REMOTE, WELL PROBE SWITCHES SHOWN IN HIGH WELL WATER LEVEL POSITION.

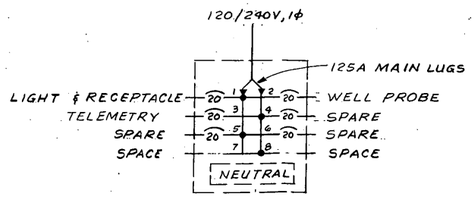
CONTROL DIAGRAM

N.T.S.

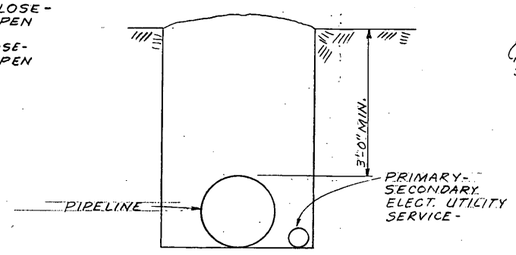


WELL PROBE SCHEMATIC DIAGRAM

N.T.S.



PANEL "L"



TRENCH DETAIL

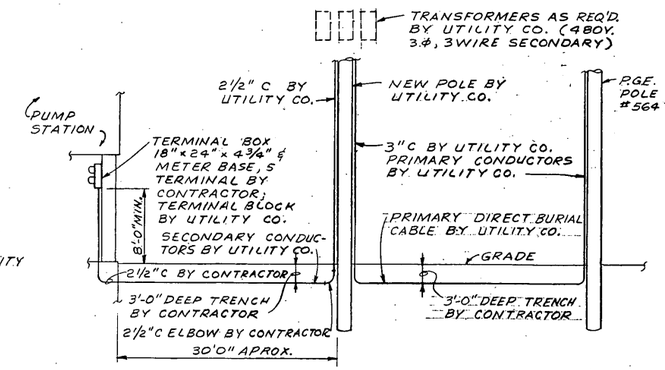
N.T.S.

LEGEND

- (I) LIGHTING FIXTURE, INCANDESCENT, APPLETON #V2050-A, 150W OR EQUAL
- S SINGLE POLE, SINGLE THROW SWITCH
- ⊕ DUPLEX, CONVENIENCE OUTLET
- (TDR) PNEUMATIC TIME DELAY RELAY; ON DELAY, 1 N.O.- 1 N.C. NEMA 1 ENCLOSURE
- (SV) SOLENOID VALVE (SEE MECHANICAL SHEET)
- || OR o o CONTACTS - NORMALLY OPEN
- ⊬ OR o o CONTACTS - NORMALLY CLOSED
- (M) MAGNETIC STARTER COIL
- ▭ FUSE
- (LR1) LATCHING RELAY COIL; (LR2) LATCHING RELAY COIL } PART OF SAME ASSEMBLY, NEMA 1
- (100) MOTOR - HORSEPOWER INDICATED
- (R) INDICATING LIGHT - COLOR INDICATED- R = RED, G = GREEN, A = AMBER
- (P) WELL PROBE PRIMARY COIL
- (S) WELL PROBE SECONDARY COIL
- ——— CONDUIT - EXPOSED; CONDUIT, HOME RUN, EXPOSED } ½"C, 2#12 UNLESS SPECIFIED OTHERWISE
- - - - - UNDERGROUND CONDUIT
- (20/100) CIRCUIT BREAKER, SIZE INDICATED, FRAME SIZE INDICATED
- —→ CONDUIT DOWN
- TRANSFORMER, 1φ, 480-120/240V 3 KVA
- ⊠4 MAGNETIC STARTER, NEMA 1, SIZE 4
- ⊡20 SERVICE ENTRANCE ENCLOSURE, NEMA 1, CIRCUIT BREAKER SIZE INDICATED
- ⊡175 SERVICE ENTRANCE ENCLOSURE, NEMA 1, CIRCUIT BREAKER SIZE INDICATED

NOTES:

1. SOLENOID VALVE IS LOCATED IN WELL PIT. REFER TO SHEET 2 FOR EXACT LOCATION. RUN CONDUIT IN CONCRETE.
2. PROVIDE A 1¼" C EMPTY (FOR TELEMETRY) WHICH SHALL STUB UP INTO PUMP STATION AND END 5-FOOT FROM PUMP STATION. LAY IN SAME TRENCH AS POWER CONDUIT. CAP BOTH ENDS OF CONDUIT.



ELECTRICAL SERVICE DETAIL

N.T.S.

THIS PRINT IS REDUCED TO ONE-HALF OF THE ORIGINAL
IF THE SCALE IS
1"=1'-0" USE ½"=1'-0" OR 1"=10' USE 1"=20'

REGISTERED PROFESSIONAL ENGINEER 6228 OREGON JULY 12, 1960 WARREN G. TOBLER

CH2M

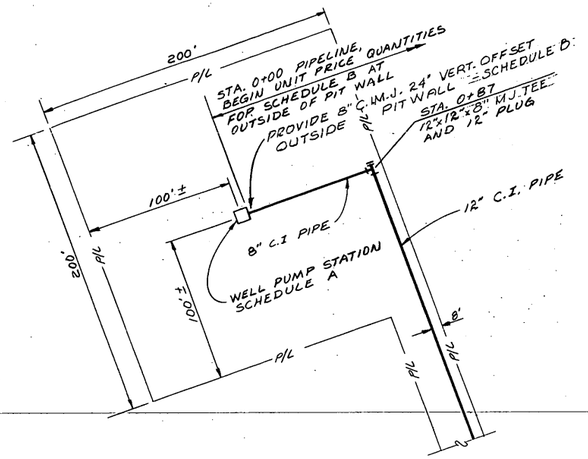
CORNELL, HOWLAND, HAYES & MERRYFIELD
ENGINEERS PLANNERS ECONOMISTS

CITY OF NEWBERG, OREGON
WATER SUPPLY IMPROVEMENTS

SCHEDULE A-WELL PUMP STATION
ELECTRICAL

DES	SHEET
ABC	4
DR ABC	OF 8
CK WGE	DATE SEPT. 1970
BN C5509.1	SCALE AS SHOWN
DWG C 5509-4	

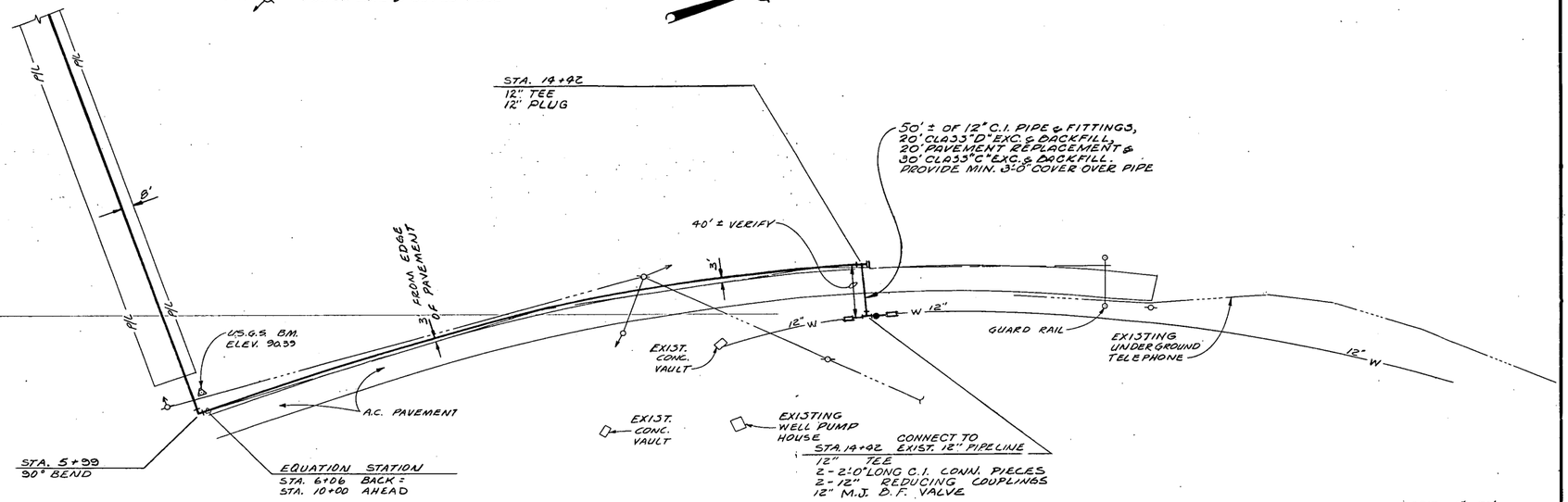
THIS PRINT IS REDUCED TO ONE-HALF OF THE ORIGINAL SCALE
IF THE SCALE READS:
.1"= 1'-0" USE 1/2"= 1'-0" OR 1"= 10' USE 1"= 20'



LEGEND:

NOTE: SEE STD. DETAIL # 104 IN SPECS FOR UTILITY LINE SYMBOLS.

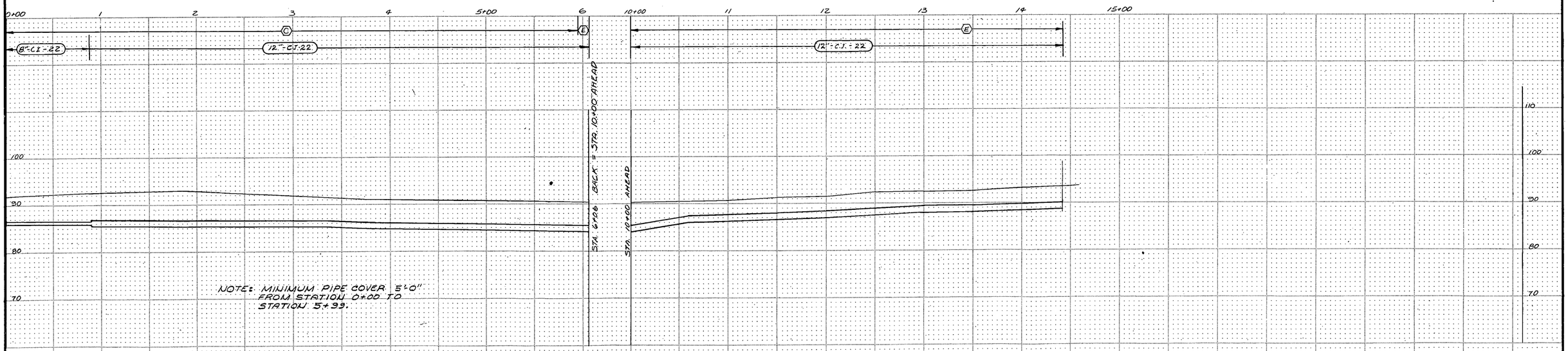
POWER LINE & GUYED POLE



NOTES:

1. ALL FITTINGS C.I.M.J.
2. THRUST BLOCK ALL BENDS AS SPECIFIED SEE STD. DETAILS Nº 100 & Nº 111 IN SPECS.
3. MIN. DEPTH OF BURY EXCEPT WHERE OTHERWISE SHOWN = 3'-0
4. SEE LEGEND NOTE ABOVE

HORIZ. 1" = 50'
VERT. 1" = 5'



NOTE: MINIMUM PIPE COVER 5'-0" FROM STATION 0+00 TO STATION 5+99.

REGISTERED PROFESSIONAL ENGINEER 5946 OREGON JULY 14, 1967 ARCHIE E. MEADOWS

CH2M

CORNELL, HOWLAND, HAYES & MERRYFIELD
ENGINEERS PLANNERS ECONOMISTS

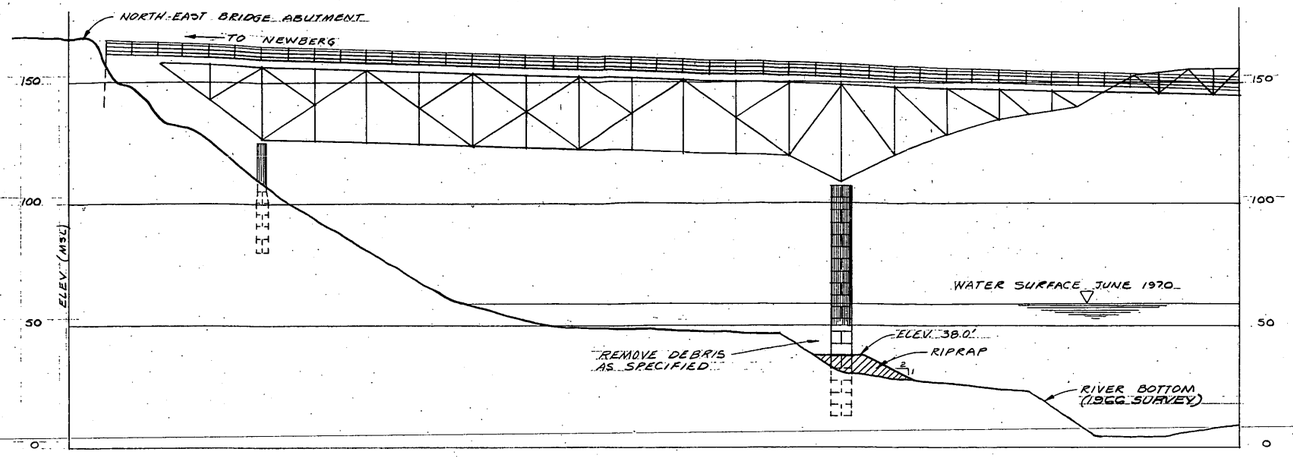
CITY OF NEWBERG, OREGON
WATER SUPPLY IMPROVEMENTS

SCHEDULE B-WATER TRANSMISSION PIPELINE

PLAN AND PROFILE

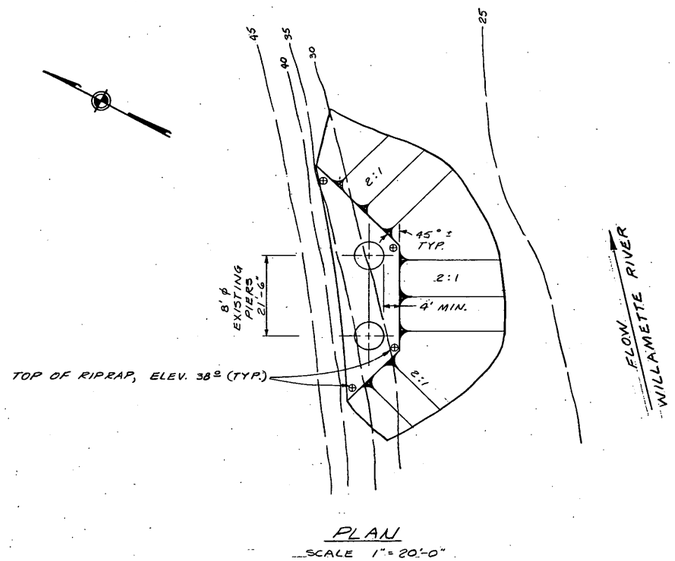
STA. 0+00 TO STA. 19+10

DES. AEM	SHEET 5
DR. GGS	OF 6
CK. FEH	DATE SEPT. 1970
EN. C5509.1	SCALE AS SHOWN
DWG. D 5509-4	



SECTION

SCALE 1" = 30'-0"



PLAN

SCALE 1" = 20'-0"

SCHEDULE C
REPAIRS TO WILLAMETTE RIVER BRIDGE PIER

THIS PRINT IS REDUCED TO ONE-HALF OF THE ORIGINAL SCALE
IF THE SCALE READS:
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REGISTERED PROFESSIONAL ENGINEER 5946 OREGON JULY 14, 1967 ARCHIE E. MEADOWS

CH2M

CORNELL, HOWLAND, HAYES & MERRYFIELD
ENGINEERS PLANNERS ECONOMISTS

CITY OF NEWBERG, OREGON
WATER SUPPLY IMPROVEMENTS

SCHEDULE C-BRIDGE PIER REPAIR

PLAN & SECTION

DES RWL	SHEET 6
DR CRS	OF 8
CK AEM	DATE SEPT. 1970
RM C5509.1	SCALE AS SHOWN
DWG C 5509-4	

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Address reply to:
COMMANDER (oan)
Thirteenth Coast Guard District
618 Second Ave.
Seattle, Wash. 98104

RECEIVED
JUL 24 1970
CITY OF NEWBERG, ORE.
OFFICE OF RECORDER

3271
Ser 503
21 July 1970

Mr. M. C. Gilbert
City of Newberg
414 East First Street
Newberg, Oregon 97132

Dear Mr. Gilbert:

Your request of 17 July 1970 to the U.S. Army District Engineer, Portland, for a permit to repair your bridge at Mile 50.0 Willamette River has been forwarded to this office as a matter under Coast Guard jurisdiction. The bridge permit responsibility, formerly a Corps of Engineers duty, was transferred to the Coast Guard under the Department of Transportation in July 1967.

A permit to repair the bridge by placement of riprap is not required because the riprap fill will be a replacement in kind and will not reduce the navigation clearance originally approved. 33 CFR 115.40 concerning bridge repairs reads as follows:

> Repairs to a bridge which do not alter the clearances, type of structure, or any integral part of the substructure or superstructure or navigation conditions, but which consist only in the replacement of worn or obsolete parts, may, if the bridge is a legally approved structure, be made as routine maintenance without approval of the U.S. Coast Guard.

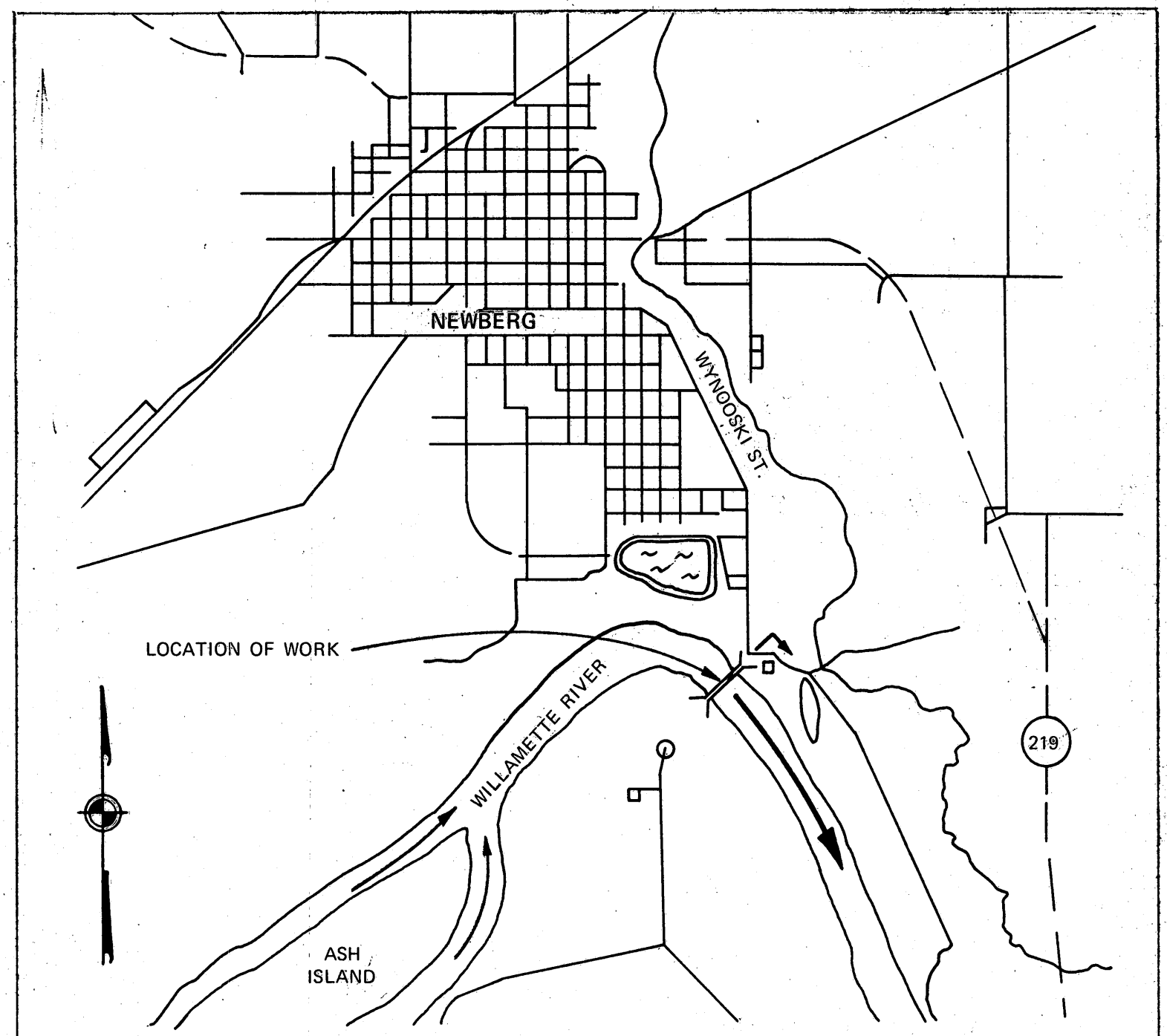
The drawings you submitted are returned herewith along with a copy of the drawing we have on file for the bridge. Overlaying the two different drawings will show the navigation opening will not be reduced.

Your submission of a request to perform work on the bridge is appreciated. In the future if you have any questions concerning bridge permits or associated matters, please feel free to call Mr. J. E. Shields of this office at Area Code 206, MAin 4-2902, extension 246.

Sincerely,

F. A. GOETTEL
Captain, U.S. Coast Guard
Chief, Operations Division
By direction of the District Commander

Encl: (1) Drawings



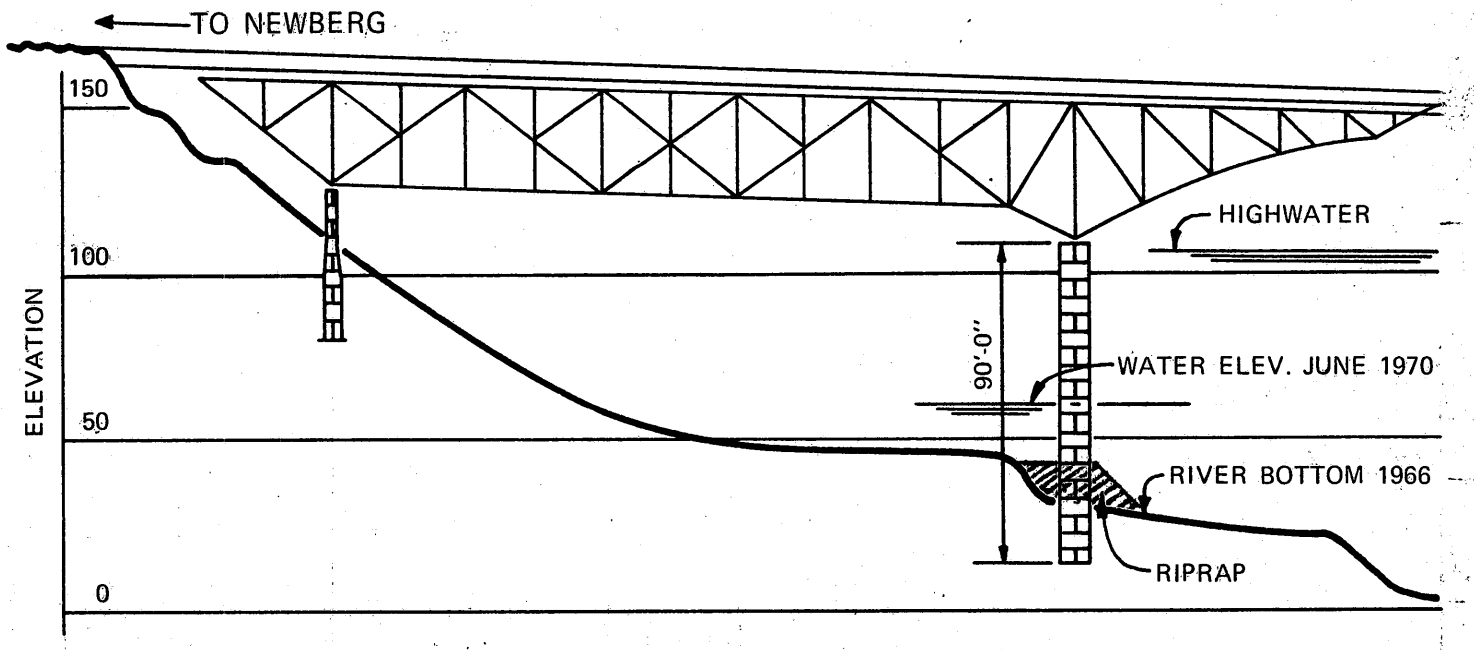
VICINITY MAP

0 1000 2000

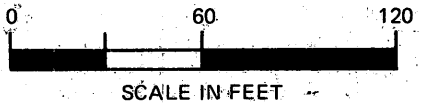
SCALE IN FEET

PROPOSED REPAIRS TO BRIDGE PIER
IN THE WILLAMETTE RIVER
YAMHILL COUNTY, OREGON

APPLICATION BY THE CITY OF
NEWBERG, OREGON



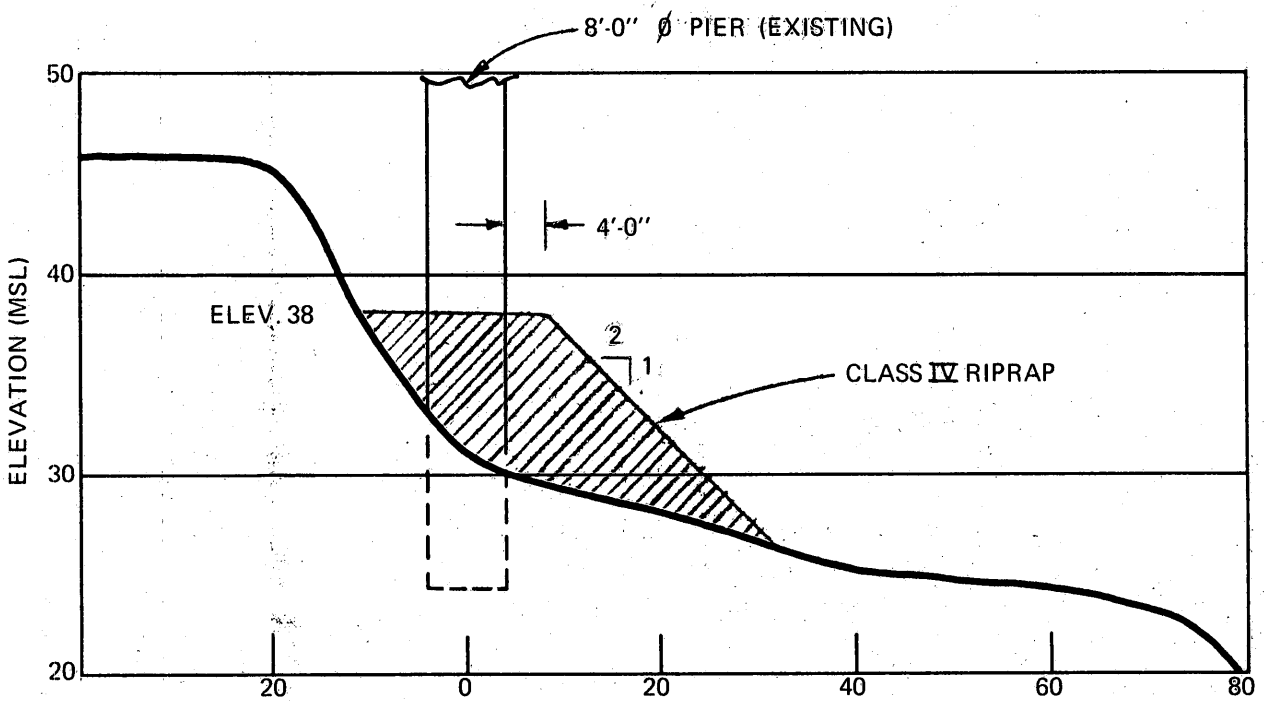
SECTION A

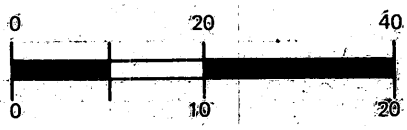


PROPOSED REPAIRS TO BRIDGE PIER
IN THE WILLAMETTE RIVER
YAMHILL COUNTY, OREGON

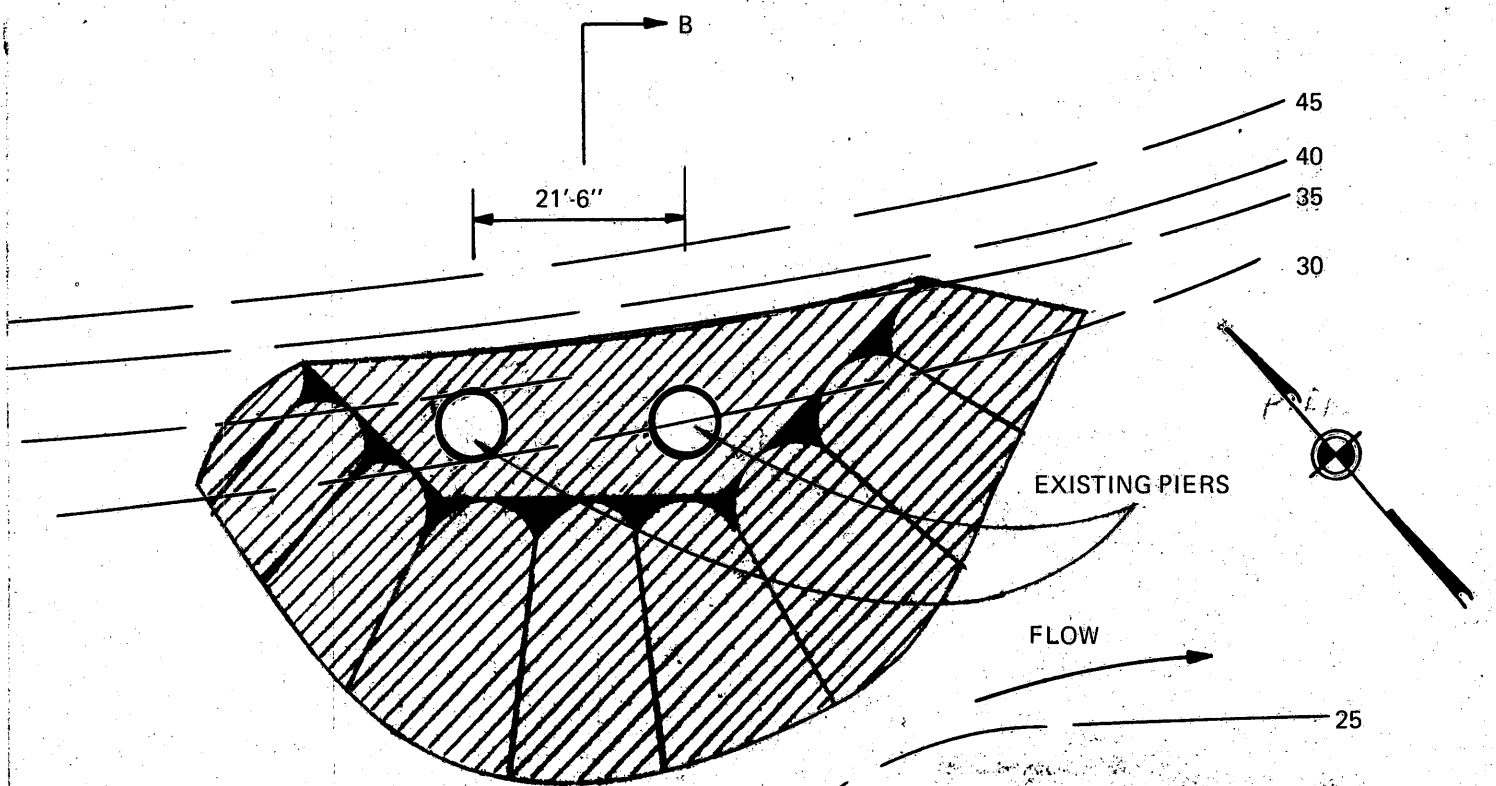
APPLICATION BY THE CITY OF
NEWBERG, OREGON

DATUM: ELEVATIONS BASED ON USCGS
MSL 1947 ADJ.





SECTION B



DATUM: ELEVATIONS BASED ON USCGS MSL 1947 ADJ.

PLAN

PROPOSED REPAIRS TO BRIDGE PIER IN THE WILLAMETTE RIVER YAMHILL COUNTY, OREGON

APPLICATION BY THE CITY OF NEWBERG, OREGON

CH2M

CORNELL, HOWLAND, HAYES & MERRYFIELD

ENGINEERS AND PLANNERS

1600 WESTERN AVENUE • CORVALLIS, OREGON 97330
TELEPHONE: AREA CODE 503/752-4271
OTHER OFFICES IN: SEATTLE • BOISE • PORTLAND

3 April 1968

Record No. C4356.6

Mr. Myrland Gilbert
City Recorder
City Hall
Newberg, Oregon

Dear Myrland:

Enclosed is a copy of the report you requested which we prepared for H. A. Simons International, Ltd., on a foundation and structural investigation of the old Willamette River bridge at Newberg. As you know, Simons designed the recent expansion to the Publishers Paper Co. plant. Mr. S. W. Forstrom of Publishers Paper has generously authorized the release of this report to you.

Very truly yours,

CORNELL, HOWLAND, HAYES & MERRYFIELD

George C. Houck

George C. Houck

GCH/kc

Enclosure

cc: Publishers Paper Co.

FOUNDATION AND STRUCTURAL INVESTIGATION

OF THE

OLD WILLAMETTE RIVER BRIDGE

AT

NEWBERG, OREGON

H. A. SIMONS

INTERNATIONAL, LTD.

Cornell, Howland, Hayes & Merryfield
Engineers and Planners
Corvallis, Oregon

August 1966

Record No. C4321.0

Copy No. ____

17 August 1966

Record No. C4321.0

H. A. Simons
International, Ltd.
16 East Hastings
Vancouver, B. C.
CANADA

Attention: Mr. Irv Robinson and
Mr. Murray Swallow

Gentlemen:

In accordance with our proposal dated 28 July 1966, we have completed the investigation of the Willamette River Bridge at Newberg, Oregon, the results of which are reported herein. The purpose of this investigation is to determine the structural capability of the existing bridge members with regard to installing pumps near one of the bridge piers. Also to be included in the investigation is the stability of the center pier with regard to erosion.

FIELD INVESTIGATIONS

Bridge Deck. The bridge deck is constructed of 4-inch thick planking, mostly T&G 4" x 6", but some 4" x 12" S, and topped with a 3/8-inch thick asphaltic wearing surface, as shown on Figure 2, Photo No. 3. The decking is supported by 6" x 18" stringers on 24-inch to 30-inch centers. (Some spans had 9 stringers while others had 10.) Several 1/8-inch core samples were extracted from the stringers in checking for deterioration. The stringers appear to be in average condition for a bridge of this age, but the 4" x 6" decking shows some deterioration in the areas where the asphaltic covering has been worn away. (See Photo No. 3) We feel that a planked runway of 4-inch material, a minimum of 30 inches wide, for each wheel track would supply adequate reinforcement for the deck. The 4" x 6" handrail posts have dry rot and are in poor condition, structurally.

Structural Steel. The steel structural members of the bridge appear to be in average condition, with a considerable amount of rust due to the lack of maintenance during the past 10 years. No loose rivets or other structural defects were found during our field investigation.

River Channel. After reviewing aerial photographs of the river at the papermill in Newberg (taken about 1940), it appears that the river has moved approximately 25 feet northward since that time. This yields an average migration rate of about one foot per year horizontally. The overall depth of the main channel has not changed substantially, but has moved northward approximately 40 feet since 1913, which yields a migration rate of somewhat less than one foot per year. The main channel is now approximately 100 feet south of Pier No. 2; therefore, the apparent erosion progression would not involve the pier in question during the anticipated service life of 25 years.

Pier Footings. The pier investigation to determine the depth of the pier base below the river bed was carried out by two scuba divers using hand jetting equipment. A boat was used to carry the equipment to the site and to serve as a working platform for the divers. Considerable difficulty was encountered in working around the pier near the river bottom due to sunken logs, snags, etc. The jetting took place between the two 8-foot diameter columns, which form the pier, as this was the most accessible area. The apparent base of the upstream column was located approximately 6 feet below the river bottom at that point, and the downstream column 3-1/2 feet below the river bottom. The base of each column appears to be at the same elevation and the difference in depth is due to the slope of the river bottom. (It drops 2-1/2 feet in the direction of flow between the columns.) The river bottom material in this area appears to be a light gray silty clay. The hand-operated jet went down with considerable difficulty for the first 4 to 6 feet, and then considerably easier, indicating a more sandy type material may be found below the silty clay.

STRUCTURAL ANALYSIS

An overall analysis of the structural components of the Newberg Bridge indicates that the moving live load on the bridge should be limited to 14,500 pounds, using the additional decking and the foundation protection shown on Figure 1.

COST ESTIMATE

Removal of Snags and Debris Around Pier	$1,500
Raise Present Pump Intake 5 Ft.	700
Deck Reinforcement (Planking)	1,050
Place Riprap Around Pier	2,750
Engineering, Supervision, and Inspection	1,500
TOTAL	$7,500

MISCELLANEOUS

It would seem advisable at this point to recommend that some type of a barricade be installed at the lower (south) end of the bridge. As it stands now, there is nothing in the form of a warning at the 52-foot vertical drop to the field below.

CONCLUSIONS AND RECOMMENDATIONS

The depth of the column footing below the present river bed in the area investigated varied from 3-1/2 to 6 feet. Erosion appears to have taken place in around the footing, leaving a steep slope upward from the footing on both the north and upstream sides of the pier. See contour map on Figure 1. There is also a considerable amount of debris (deadheads, snags, etc.) lodged in around the pier that must be removed before the riprap should be placed.

It appears that the area around the pier in question could be protected from further erosion by placing riprap in the eroded void. It is estimated that 250 cubic yards of U. S. Army Corps of Engineers' Class II type riprap would provide the protection necessary against further erosion. The average depth of riprap around the pier would be 7 feet. (Elevation 36, R. A. S. Datum) This would necessitate the raising of the present suction intake by approximately 5 feet to Elevation 40. (It is presently 6 feet above the bottom at Elevation 35.)

The analysis of the structural members of the bridge indicates that the moving live load on the bridge should be limited to 14,500 pounds, using the additional decking and foundation protection shown on Figure 1.

We would also recommend that a maintenance program for the bridge be established, possibly with the City of Newberg, to provide a minimum of maintenance to insure the protection of personnel and equipment on the structure.

A cost estimate of $7,500 is proposed as the estimated cost to remove the sunken debris, place riprap, install additional deck reinforcing, and provide the supervision and inspection for the bridge revampments.

If we can be of further help to you on this project, please call. We appreciate having had the opportunity to work with you and look forward to working with you in the future.

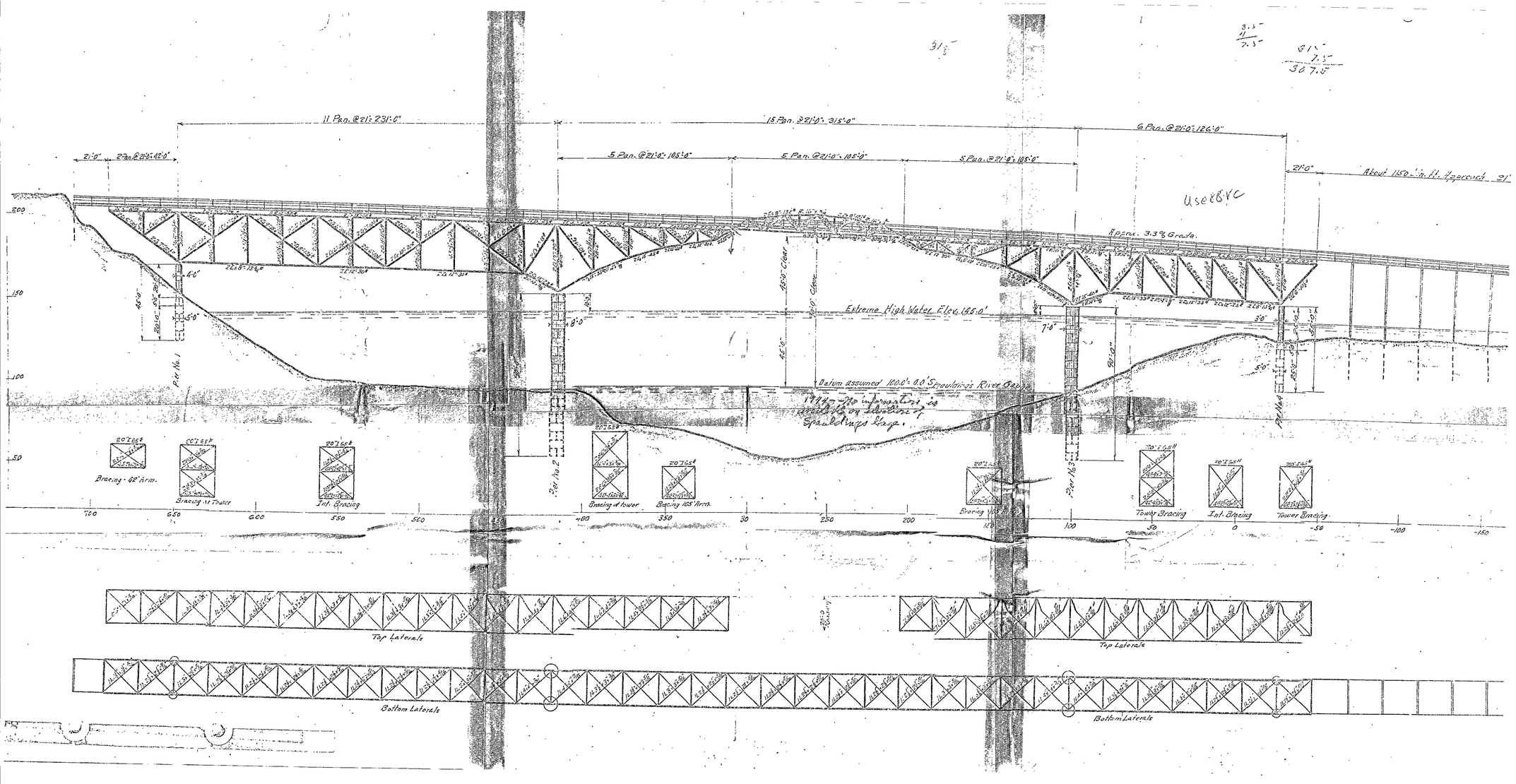
Very truly yours,

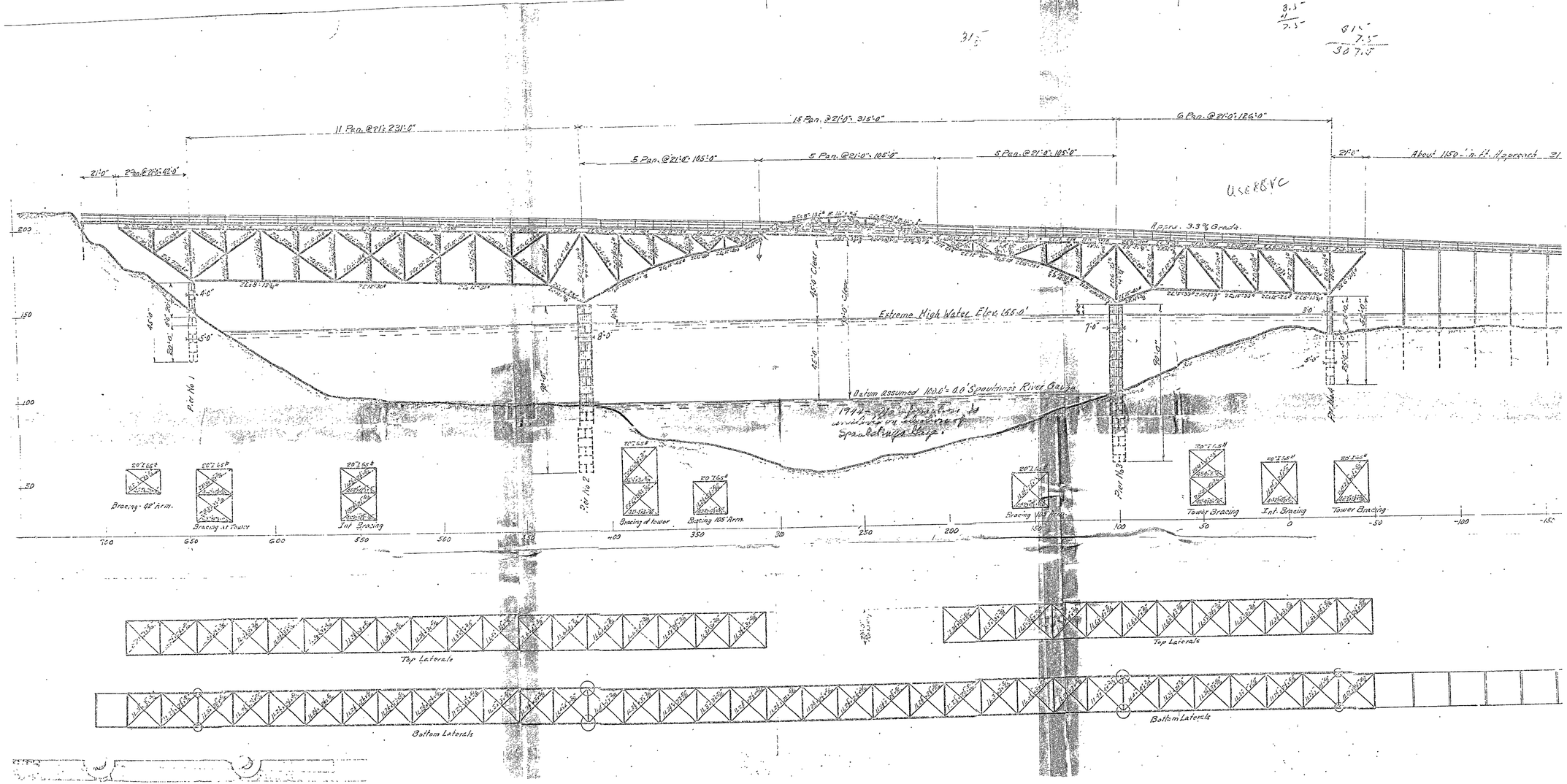
CORNELL, HOWLAND, HAYES & MERRYFIELD

Harold D. Pritchett

Harold D. Pritchett

HDP/me


11 Pan. @ 21'-0" = 231'-0"
15 Pan. 321'-0" = 315'-0"
6 Pan. @ 21'-0" = 126'-0"
5 Pan. @ 21'-0" = 105'-0"
5 Pan. @ 21'-0" = 105'-0"
5 Pan. @ 21'-0" = 105'-0"
21'-0"
2 Pan. @ 21'-0" = 42'-0"
21'-0"
About 1150 Lin. Ft. Approach
Approx. 3.3% Grade.
Extreme High Water Elev. 145.0'
Datum assumed 1000'-0" Spaulding's River Gage
1944 - No information is available on elevation of Spaulding's Gage.
Pier No. 1
Pier No. 2
Pier No. 3
Pier No. 4
Bracing - 42' Arm.
Bracing - 41' Tower
Int. Bracing
Bracing of Tower
Bracing 105' Arm.
Bracing 105' Arm.
Tower Bracing
Int. Bracing
Tower Bracing
Top Laterals
Top Laterals
Bottom Laterals
Bottom Laterals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About 1150 - in Ft. Approved
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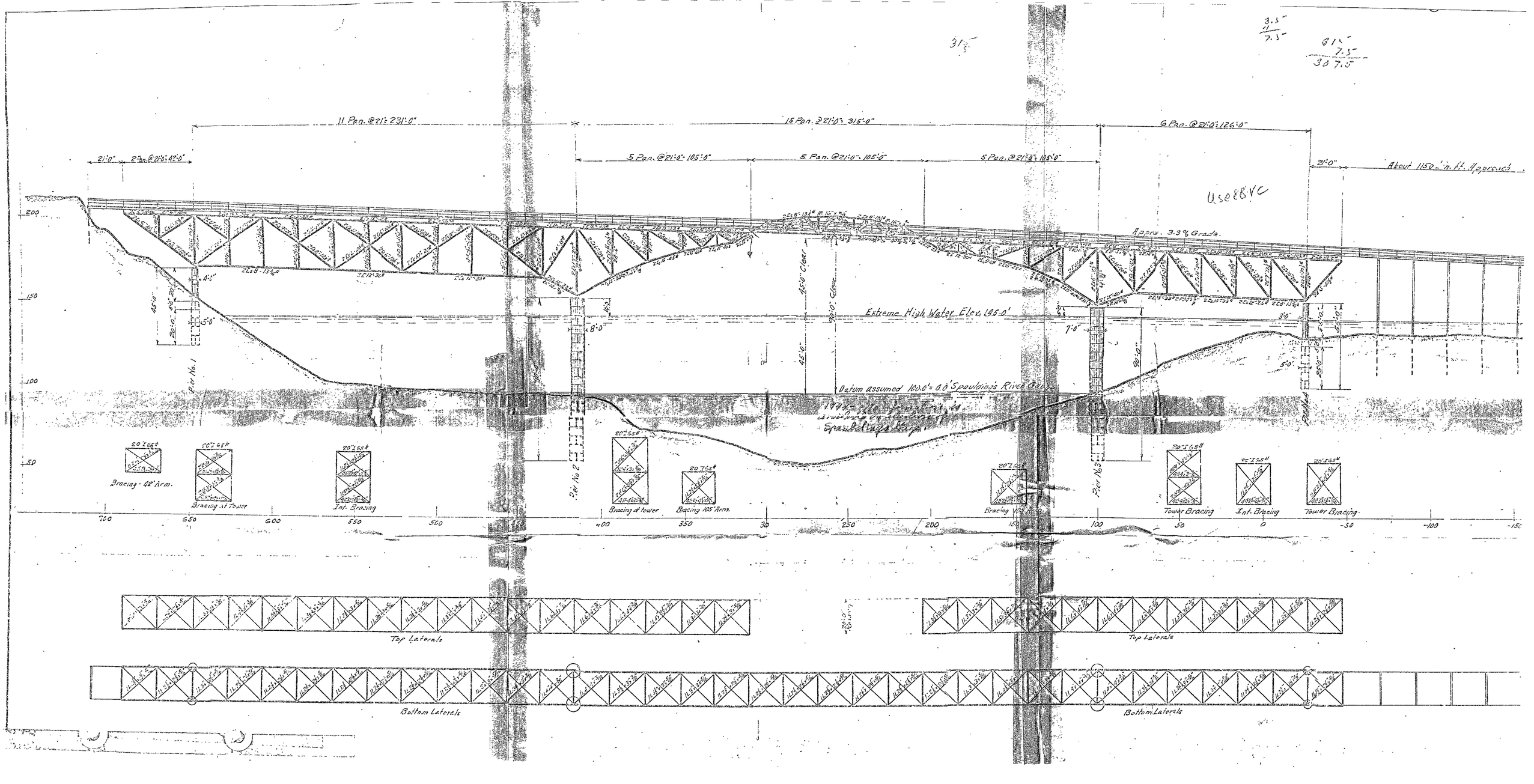
Extreme High Water Elev. 145.0'
Datum assumed 100.0' = 0.0' Spaulding's River Gauge
Pier No 1
Pier No 2
Pier No 3
Bracing - 48" Arm.
Bracing at Tower
Inf. Bracing
Bracing at Tower
Bracing 105° Arm.
Bracing 105° Arm.
Tower Bracing
Inf. Bracing
Tower Bracing
Top Laterals
Top Laterals
Bottom Laterals
Bottom Laterals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21'-0"
About 1150'-in Ft. Approach
Use 88 RC
Appro. 3.3% Grade.
Extreme High Water Elev. 145.0'
Datum assumed 100.0' = 0.0' Spaulding's River Datum
Pier No. 1
Pier No. 2
Pier No. 3
Bracing - 42' Arm.
Bracing at Tower
Int. Bracing
Bracing at Tower
Bracing 105' Arm.
Bracing at Tower
Tower Bracing
Int. Bracing
Tower Bracing
Top Laterals
Top Laterals
Bottom Laterals
Bottom Laterals

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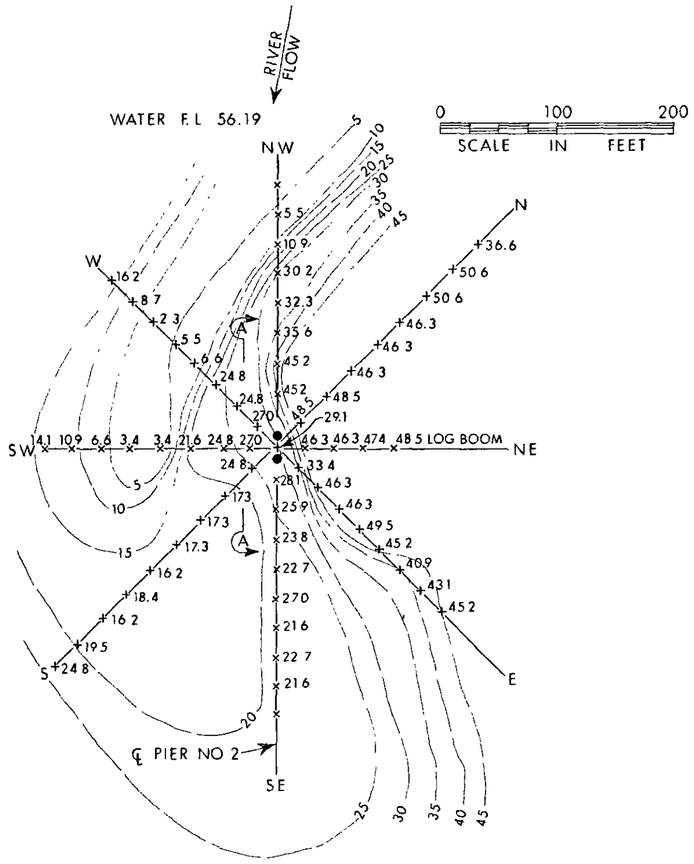
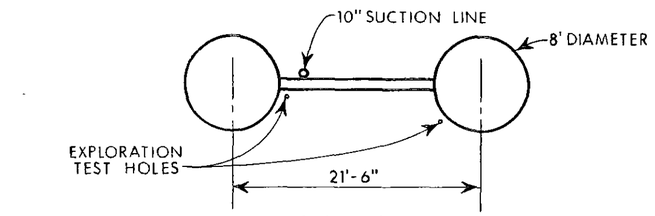
Tower Bracing
Top Laterals
Top Laterals
Bottom Laterals
Bottom Laterals

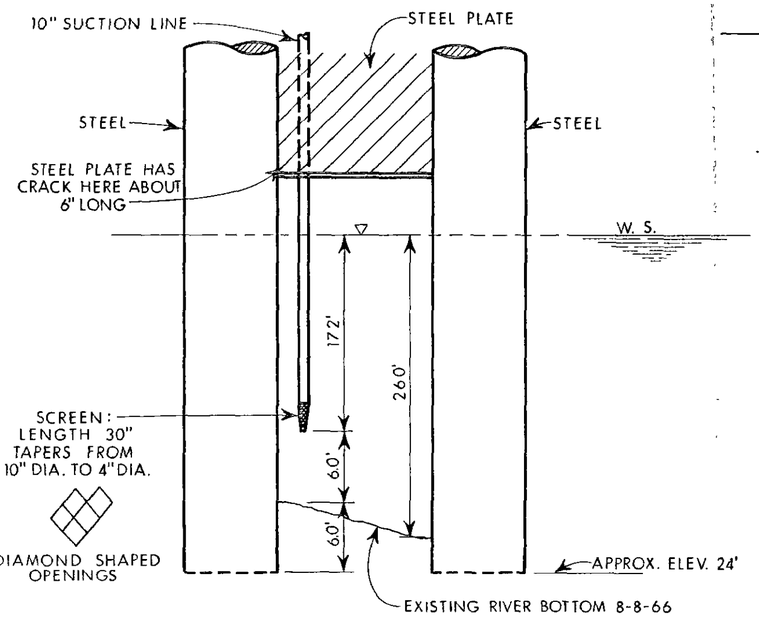


NOTE : CONTOURS BASED ON INFORMATION & ELEVATIONS PROVIDED BY MR RAY SIMMONDS.

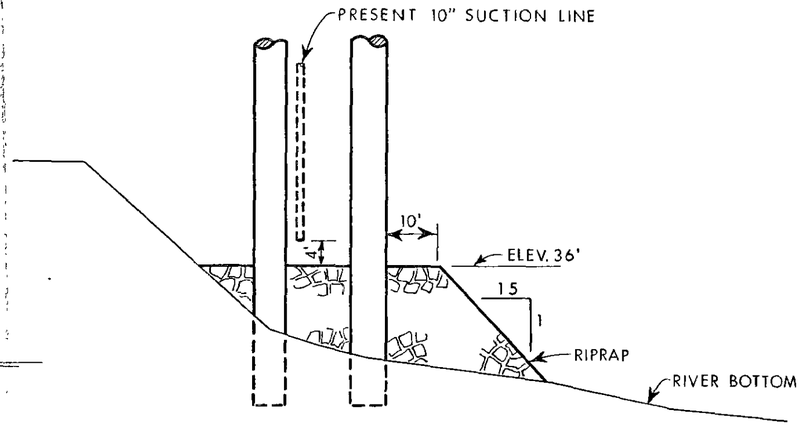
CONTOUR MAP



PLAN VIEW

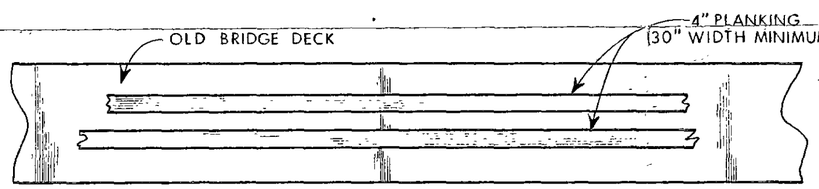


ELEVATION VIEW
LOOKING TOWARDS PAPER MILL



SECTION A-A
N.T.S

MEASUREMENTS AT EXISTING SUCTION INTAKE
N.T.S.



TYPICAL PLAN VIEW
N.T.S.

FIGURE 1

CORNELL, HOWLAND, HAYES & MERRYFIELD
SEATTLE PORTLAND CORVALLIS BOISE

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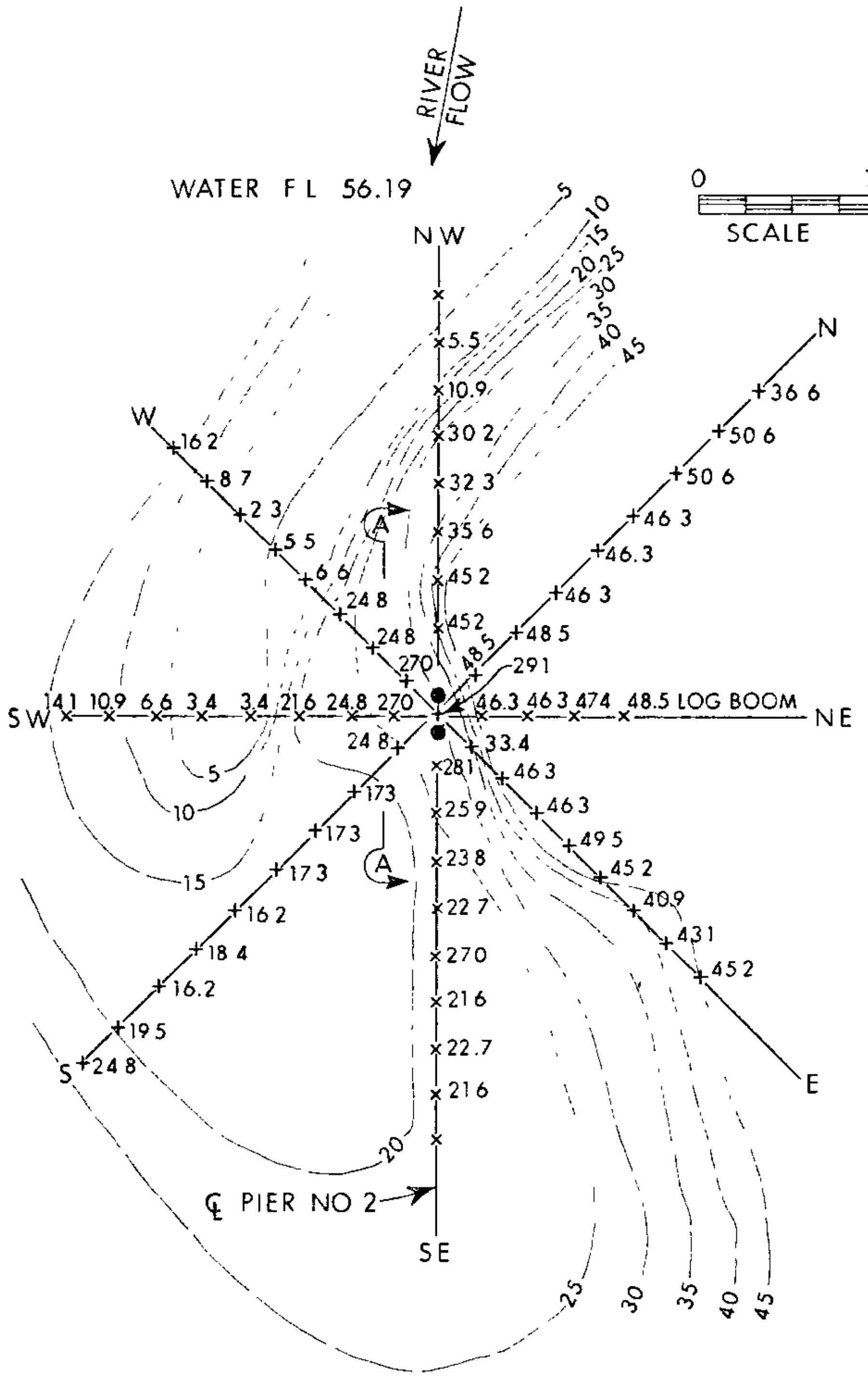

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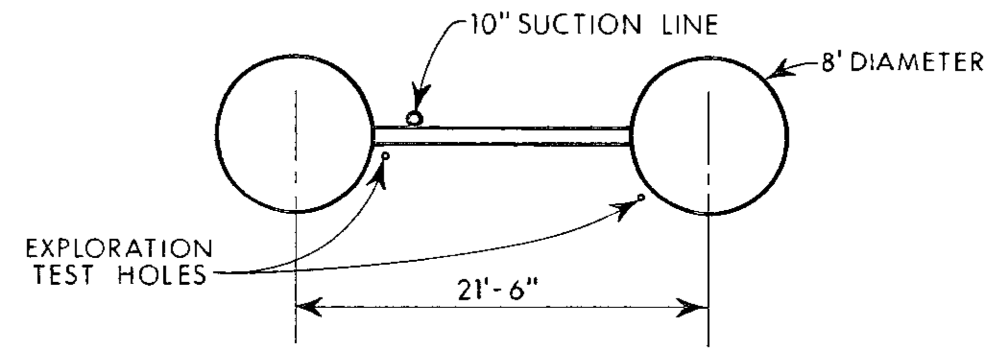
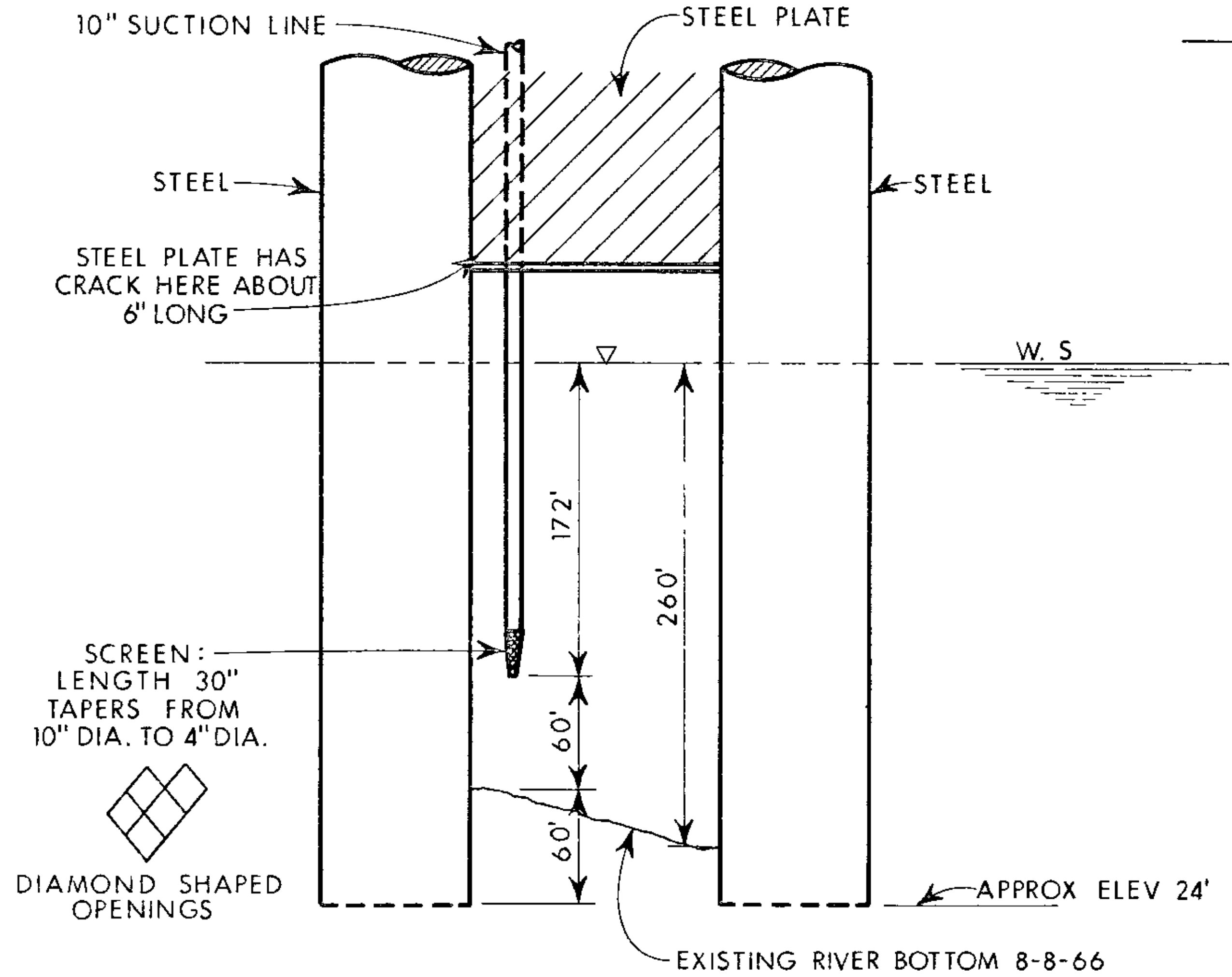
CONTOUR MAP

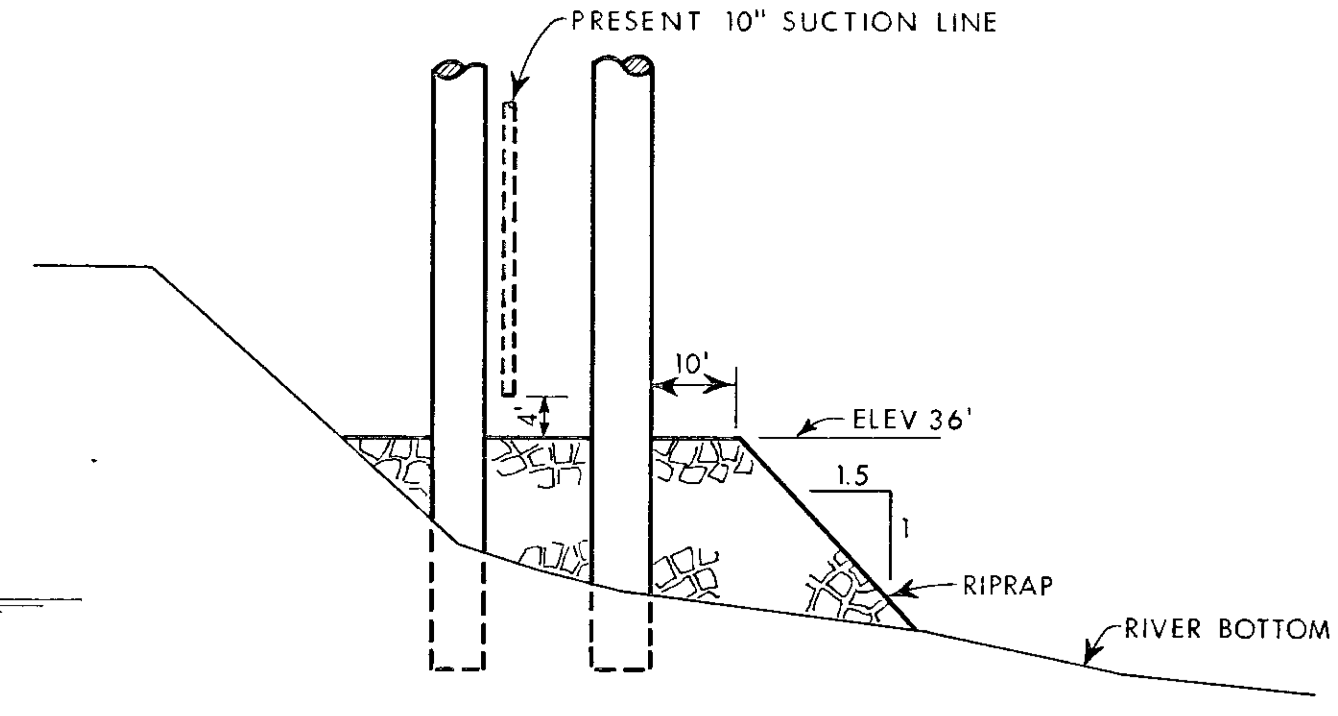


PLAN VIEW

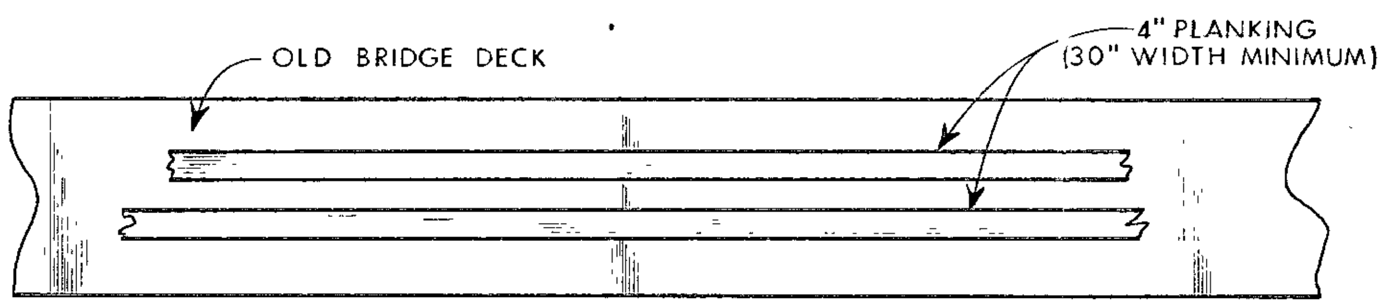


ELEVATION VIEW
LOOKING TOWARDS PAPER MILL

MEASUREMENTS AT EXISTING SUCTION INTAKE
N.T.S.



SECTION A-A
N.T.S



TYPICAL PLAN VIEW
N.T.S.

FIGURE 1

CORNELL, HOWLAND, HAYES & MERRYFIELD
SEATTLE PORTLAND CORVALLIS BOISE

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