#1-1764

CITY OF NEWBERG
CONTRACT CHANGE ORDER NO. 4
February 26, 2002

Project: Fernwood Road Utilities & Pump Station Project Section II
Contractor: Northwest Earthmovers, Inc.
Bid Item: G-4
Account #: 04-5150-706339

THE CONTRACT IS HEREBY CHANGED AS FOLLOWS:

1. **Description:** Authorize payment for material handling portion of bid item not included in replacement of select fill with granular fill. Cost of granular fill is in CO-3.

ITEM #	ITEM	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	Embankment remainder	1	1,631.00	$ 1,631.00
	NET CHANGE			$ 1,631.00

2. Cost Summary	Original Contract Amount		$ 547,075.00
	Net Change by Previous Change Orders	#1, #2 & #3	$ 31,954.14
	Previous Total		$579,029.14
	This Change Order		$ 1,631.00
	New Contract Amount to Date		$ 580,660.14

3. **Time Extension:** None

4. **Contract Completion Date:** No Change

All other provisions of the contract documents remain in full force.

5. **ACCEPTANCE SIGNATURES:**

4 10 02
Project Manager *Date*

FOR MIKE SOD. 4/19/02
Community Development Director *Date*

Project Manager
Title

4/22/02
City Manager, Pro Tem *Date*

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CITY OF NEWBERG
CITY RECORDER INDEX NO. 1764

CITY OF NEWBERG
CONTRACT CHANGE ORDER NO. 3
October 10, 2001

Project: Fernwood Road Pump Station & Utilities Section II
Contractor: Northwest Earthmovers, Inc.
Bid Item:
Account #: 04-5150-706339

THE CONTRACT IS HEREBY CHANGED AS FOLLOWS:

1. Description:

Replace "Double check" with RP Device–$1,596.00	1 day
Change field inlet to ODOT Ditch inlet and rip rap slope–$560.58	4 days
Provide Cat 5 cable in conduit from VFD's to Telemetry panel–$988.00	2 days
Install Conduit for irrigation system control wiring–$411.00	1 day
Change telephone conduit from 2" to 4"–$988.00	2 days
Sawcut for and install motorized louver–$1.642.56	20 days
Schedule impact Air Compressor–$0	15 days

ITEM #	ITEM	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	See Description	1	6,156.14	$ 6,156.14
	NET CHANGE			$ 6,156.14

2. Cost Summary	Original Contract Amount		$ 547,075.00
	Net Change by Previous Change Orders	#1 &2	$ 25,798.00
	Previous Total		$572,873.00
	This Change Order		$ 6,156.14
	New Contract Amount to Date		$ 579,029.14

3. Time Extension: 45 days (see description above)

4. Contract Completion Date: November 2, 2001

All other provisions of the contract documents remain in full force.

5. ACCEPTANCE SIGNATURES:

10 18 01
Contractor Representative *Date*

Project Manager
Title

11/2/01
Community Development Director *Date*

11/5/01
City Manager, Pro Tem *Date*

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ORIGINAL

CITY OF NEWBERG, OREGON

CITY OF NEWBERG
CITY RECORDER INDEX NO. 1764

COMMUNITY DEVELOPMENT DEPARTMENT

FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

#48

VOLUME ONE---SPECIFICATIONS

JULY 2000

CONSULTANT OTAK, INC.

PROJECT MANAGER ROBERT BIELMAN
503-537-0514

ACORD CERTIFICATE OF LIABILITY INSURANCE

CSR KP NORTH-1

DATE (MM/DD/YY): 10/03/00

PRODUCER

Anchor Insurance & Surety, Inc
1201 SW 12th Ave., Suite 500
Portland OR 97205-2030
Phone: 503-224-2500 Fax: 503-224-9830

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE

INSURED

Northwest Earthmovers, Inc.
P O Box 1467
Tualatin OR 97062

INSURER A:	Charter Oak Fire
INSURER B:	Travelers Indemnity Co. of IL
INSURER C:	
INSURER D:	
INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC	DTCO347K9191COF00	03/31/00	03/31/01	EACH OCCURRENCE FIRE DAMAGE (Any one fire) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 300,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [ ] HIRED AUTOS [ ] NON-OWNED AUTOS	DT810347K9191TIL00	03/31/00	03/31/01	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
	GARAGE LIABILITY [ ] ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EA ACC AGG	$ $ $
B	EXCESS LIABILITY [X] OCCUR [ ] CLAIMS MADE [ ] DEDUCTIBLE [ ] RETENTION $	DTSMCUP347K9191TIL00	03/31/00	03/31/01	EACH OCCURRENCE AGGREGATE	$ 4,000,000 $ 4,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				[ ] WC STATUTORY LIMITS [ ] OTHER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ $ $
A	OTHER CONTRACTOR'S JOBSITE POLLUTION	DTCO347K9191COF00	03/31/00	03/31/01	LIMIT	$1,000,000

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

RE: FERNWOOD ROAD UTILITIES AND PUMP STATION PROJECT. THE CITY OF NEWBERG, ITS OFFICERS, AGENTS AND EMPLOYEES ARE ADDITIONAL INSUREDS PER ATTACHED BLANKET ADDITIONAL INSURED ENDORSEMENT.

CERTIFICATE HOLDER | Y | ADDITIONAL INSURED; INSURER LETTER: ____

NEWBE-2

CITY OF NEWBERG, OREGON
414 E. FIRST ST.
NEWBERG OR 97132

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

John D. Klump

©ACORD CORPORATION 1988

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

BLANKET ADDITIONAL INSURED (CONTRACTORS)

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
COMMERCIAL GENERAL LIABILITY – CONTRACTORS COVERAGE PART

1. WHO IS AN INSURED – (Section II) is amended to include any person or organization you are required to include as an additional insured on this policy by a written contract or written agreement in effect during this policy period and executed prior to the occurrence of any loss.
2. The insurance provided to the additional insured is limited as follows:
   a) The person or organization is only an additional insured with respect to liability arising out of "your work" for that additional insured.
   b) In the event that the limits of liability stated in the policy exceed the limits of liability required by the written contract or written agreement, the insurance provided by this endorsement shall be limited to the limits of liability required by the written contract. This endorsement shall not increase the limits stated in Section III – LIMITS OF INSURANCE.
   c) The insurance provided to the additional insured does not apply to "bodily injury", "property damage", "personal injury" or "advertising injury" arising out of an architect's, engineer's or surveyor's rendering of or failure to render any professional services including:
      I. The preparing, approving or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders, or drawings and specifications; and
      II. Supervisory or inspection activities performed as part of any related architectural or engineering activities.
   d) Except when required by written contract or written agreement, the coverage provided to the additional insured by this endorsement does not apply to "bodily injury" or "property damage" arising out of acts or omissions of the additional insured other than in connection with the general supervision of "your work".
   e) This insurance does not apply to "bodily injury" or "property damage" arising out of "your work" included in the "products-completed operations hazard" unless you are required to provide such coverage by written contract or written agreement and then only for the period of time required by the contract and in no event beyond the expiration date of the policy.
   f) This insurance does not apply to any person or organization for whom you have procured separate liability insurance while such insurance is in effect, regardless of whether the scope or limits of insurance in this policy exceed those of such other insurance or whether such other insurance is valid or collectable.
3. Subpart (1)(a) of the Pollution exclusion under Paragraph 2., Exclusions of Bodily Injury and Property Damage Liability Coverage (Section I – Coverages) does not apply to you if the "bodily injury" or "property damage" arises out of "your work" performed on premises which are owned or rented by the additional insured at the time "your work" is performed.
4. Any coverage provided by this endorsement to an additional insured shall be excess over any other valid and collectible insurance available to the additional insured whether primary, excess, contingent or on any other basis unless a written contract or agreement specifically requires that this insurance apply on a primary or contributory basis.
5. As soon as practicable, each additional insured must give us prompt notice of any "occurrence" which may result in a claim, forward all legal papers to us, cooperate in the defense of any actions, and otherwise comply with policy conditions.

Copyright, The Travelers Indemnity Company, 1998

009431

ACORD EVIDENCE OF PROPERTY INSURANCE

OP ID KP

DATE (MM/DD/YY) 10/03/00

THIS IS EVIDENCE THAT INSURANCE AS IDENTIFIED BELOW HAS BEEN ISSUED, IS IN FORCE, AND CONVEYS ALL THE RIGHTS AND PRIVILEGES AFFORDED UNDER THE POLICY.

PRODUCER

PHONE/FAX (A/C, No, Ext): 503-224-2500/503-224-9830

Anchor Insurance & Surety, Inc
1201 SW 12th Ave., Suite 500
Portland OR 97205-2030
John D. Klump

CODE: 02061620 SUB CODE:

AGENCY CUSTOMER ID #: NORTH-1

COMPANY

Zurich Commercial
PO Box 17176
Baltimore MD 21297-0469

INSURED

Northwest Earthmovers, Inc.
P O Box 1467
Tualatin OR 97062

LOAN NUMBER

POLICY NUMBER

ECA55853098-FERNWOOD

EFFECTIVE DATE	EXPIRATION DATE	CONTINUED UNTIL TERMINATED IF CHECKED
10/16/00	08/31/01	☐

THIS REPLACES PRIOR EVIDENCE DATED:

PROPERTY INFORMATION

LOCATION/DESCRIPTION

001

Fernwood Rd
Newberg OR

Fernwood Road Utilities and Pump Station Project, located 3300 ft E of Springbrook Rd on N side of Fernwood Rd. in City of Newberg

COVERAGE INFORMATION

COVERAGE/PERILS/FORMS	AMOUNT OF INSURANCE	DEDUCTIBLE
"ALL RISK" BUILDERS RISK, EXCLUDING EARTHQUAKE AND FLOOD		
ON SITE	$ 548,000	$1,000
IN TRANSIT	50,000	$1,000
STORED OFF SITE	50,000	$1,000

REMARKS (Including Special Conditions)

NAMED INSURED: NORTHWEST EARTHMOVERS, INC.; CITY OF NEWBERG; SUBCONTRACTORS OF EVERY TIER

CANCELLATION

THE POLICY IS SUBJECT TO THE PREMIUMS, FORMS, AND RULES IN EFFECT FOR EACH POLICY PERIOD. SHOULD THE POLICY BE TERMINATED, THE COMPANY WILL GIVE THE ADDITIONAL INTEREST IDENTIFIED BELOW _____ DAYS WRITTEN NOTICE, AND WILL SEND NOTIFICATION OF ANY CHANGES TO THE POLICY THAT WOULD AFFECT THAT INTEREST, IN ACCORDANCE WITH THE POLICY PROVISIONS OR AS REQUIRED BY LAW.

ADDITIONAL INTEREST

NAME AND ADDRESS

CITY OF NEWBERG

414 E. FIRST ST.
NEWBERG OR 97132

☐ MORTGAGEE ☒ ADDITIONAL INSURED
☐ LOSS PAYEE ☐

LOAN #

AUTHORIZED REPRESENTATIVE

John D. Klump

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Preconstruction Conference
CITY OF NEWBERG
Fernwood Road Utilities and Pump Station Section II

Project No. 706339

Meeting Time: **10:00 AM October 10, 2000**
Meeting Location: 414 E. First St.(City Hall Lower)
Newberg, OR.

AGENDA

0 ATTENDANCE LOG & INTRODUCTIONS

0 PROJECT SCOPE

- Location: 4651 Fernwood Road, NEWBERG, OR.
- Work Description: Construct Wastewater Pumping station.
- UNIT PRICE
- ~~Lump~~ Sum Contract Amount: $547,075.00
- Contract Time: Complete by August 31, 2001
- Liquidated Damages: Late Project Completion $150/Calendar day

0 **PRIME CONTRACTOR: Northwest Earthmovers, Inc.**

- Management and Supervision
- Emergency Contacts
- Business Address, Telephone, FAX
- Subcontractors FARNHAM ELEC.

0 WAGE RATES & DOCUMENTATION

- Prevailing Wage Rate Standards DO apply.
- Submit wage certification forms to BOLI and Project Manager with first application for progress payment and at 3-month intervals thereafter.

CITY'S MANAGEMENT AND INSPECTION

- Project Manager: Bob Bielman
- Business Address: City of Newberg Community Development Department
  P.O.Box 970
  Newberg, Oregon 97132
  Attn: Bob Bielman—nwwtp@ci.newberg.or.us
  Tel 503-537-0514 HM 360-882-3564
  FAX: (503)-537-1277 PERS. CELL 360-798-2398
  CEL: 503-550-1571
- Project Inspector: Steve Biddle
  Tele 503-538-4370

0 COMMUNICATION BETWEEN CONTRACTOR AND CITY

- All correspondence through Prime Contractor and Project Manager
- Documentation of Agreements

0 PROGRESS PAYMENTS AGREEMENTS W/ STEVE

- Submit schedule of quantities extended with unit prices
- Review Quantities with Project Manager
- Payment for Work Completed by the end of each month -
- Submit Progress Estimate/Invoice to Bob Bielman at 414 E. First St.
- Payment Will be processed immediately

0 SUBMITTALS

- Submit FOUR copies (2 for City, 2 returned to Contractor)

0 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

Not Applicable for this Project

0 PERMITS

- Permit for work in the street has been applied for with Yamhill County. Approval was expected October 6, 2000.

0 **WORK AREA AND SAFETY**

- Worker I.D. All on-site employees to have name and company name in clear view.
- Material Safety Data Sheets - SUBMIT ALL MSDS WITH SUBMITTALS
- Sanitary Facilities provided by Contractor –
- Daily cleanup, reopen vehicle access at the close of work each day.
- Comply with OR-OSHA Construction Code

0 **CONTRACTOR REQUESTS FOR INFORMATION AND/OR DIRECTION**
Submit in writing a clear description of the information requested. Include schedule impacts.

0 **CHANGE ORDERS**
- Format –
- Field Agreements –

0 **CONTRACTOR'S SEQUENCE OF OPERATIONS & CONSTRUCTION SCHEDULE** –

0 **COORDINATION OF WORK WITH OTHERS**
- Other County or City crews
- Other Contractors

0 **PLANS**
- As-builts
- Additional plan sets

0 **PROJECT DETAILS:** Questions/comments by Meeting Participants

0 **CITY/CONTRACTOR PROJECT COORDINATION MEETINGS**
- Meet at least once a week → GET BACK WITH BOB [TUESDAY 10:00 A.M. ON-SITE]

0 **NOTICE TO PROCEED: Completion Date= August 21, 2001**

_____End of Meeting_____

SOAKING

CITY OF NEWBERG
FERNWOOD ROAD UTILITIES AND PUMP STATON PROJECT

CERTIFICATION BY ENGINEER

CERTIFICATION

RECEIVED
OCT - 2 2000
NORTHWEST EARTHMOVERS

I hereby certify that the Project Drawings and the Contract Documents were prepared by me or under my direct supervision and that I am a duly registered Engineer under the laws of the State of Oregon.

Professional Engineer's License No. OR 59553

Name: Robert N. Vaught, PE

Date: 5-24-2000

OTAK, INC.
17355 SW Boones Ferry Road
Lake Oswego, OR 97035

REGISTERED PROFESSIONAL ENGINEER
59553PE
OREGON
SEP. 22, 1998
ROBERT N. VAUGHT

EXPIRATION DATE: 06/30/2000

CITY OF NEWBERG

FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

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JULY, 2000

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NOTICE TO BIDDERS

FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

NOTICE TO BIDDERS

The City of Newberg Community Development Department requests proposals for the FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT. Sealed bids will be accepted until **10:00 A.M.local time on Wednesday, the 16th day of August 2000**. Address bids to Robert Bielman, Project Manager, at the Community Development Department Office, P.O. BOX 970 (414 E. First St.) Newberg, Oregon 97132. At 2:00 P.M., at this location all bids will be opened and publicly read aloud. Clearly mark the project title and a complete return address on the outside of the envelope.

PREQUALIFICATION

Prequalification of bidders will be required for this project in accordance with ORS Chapter 279.047. Documentation of State of Oregon approval must be submitted to the City Of Newberg at least seven (7) days prior to the bid opening date.

ACCEPTANCE OF BIDS

Any determinations of the lowest responsible bidder and award are subject to review and determination by the City Attorney as to legal sufficiency of any bid submitted. The City of Newberg reserves the right to reject any or all bids, to waive informalities and to accept the bid which is in the best interest of the City.

All bids must be submitted on the enclosed "Proposal" form completely filled out, signed and accompanied by a certified check or bid bond payable to the City Of Newberg, Oregon for an amount not less than10 percent of the total amount of the bid submitted.

INSTRUCTIONS FOR FIRST-TIER SUBCONTRACTOR DISCLOSURE

Bidders are required to disclose information about certain first-tier subcontractors when the contract value for a Public Improvement is greater than $75,000 (see ORS 279.027). Specifically, when the contract amount of a first-tier subcontractor is greater than or equal to: (1) 5% of the project bid, but at least $15,000, or (2) $500,000 regardless of the percentage, you must disclose the following information about that subcontract within four (4) hours of bid closing:

a) The subcontractor's name and address,
b) The subcontractor's Construction Contractor Board registration number, if one is required, and
c) The subcontract dollar value.

If you will not be using any subcontractors that are subject to the above disclosure requirements, you are required to indicate "NONE" on the accompanying form.

THE CITY Of NEWBERG **MUST REJECT** A BID IF THE BIDDER FAILS TO SUBMIT THE DISCLOSURE FORM WITH THIS INFORMATION BY THE STATED DEADLINE (see OAR 137-040-0017).

To determine disclosure requirements, the City recommends that you disclose subcontract information for any subcontractor as follows:

1. Determine the lowest possible contract price. That price will be the base bid amount less all alternate deductive bid amounts (exclusive of any options that can only be exercised after contract award).

2. Provide the required disclosure information for any first-tier subcontractor whose potential contract services (i.e. subcontractor's base bid amount plus all alternate additive bid amounts, exclusive of any options that can only be exercised after contract award) are greater than or equal to: (1) 5% of that lowest contract price, but at least $15,000, or (2) $500,000 regardless of the percentage. Total all possible work for each subcontractor in making this determination (e.g., if a subcontractor will provide $15,000 worth of services on the base bid and $40,000 on an additive alternate, then the potential amount of subcontractor's services is $55,000. Assuming that $55,000 exceeds 5% of the lowest contract price, provide the disclosure for both the $15,000 services and the $40,000 services).

3. **Submission.** A Bidder shall submit the disclosure form required by this rule within four (4) working hours of Bid Closing in the manner specified herein.

4. **Responsiveness.** Compliance with the disclosure and submittal requirements of ORS 279.027(2) and this rule is a matter of Responsiveness. Bids which are submitted by Bid Closing, but for which the separate disclosure submittal has not been made by the specified deadline, are not Responsive and shall not be considered for Contract award.

5. **Substitution.** Substitution of affected first-tier subcontractors shall be made only in accordance with ORS279 [Oregon Laws 1999, chapter 689, section 6 (HB 2895)]. Agencies do not have a statutory role or duty to review, approve or resolve disputes concerning such substitutions. However, Agencies are not precluded from making related inquiries or investigating complaints in order to enforce Contract provisions that require compliance generally with laws, rules and regulations.

6. **Effective Date.** This rule shall apply to Public Improvement Contracts first advertised on or after January 1, 2000.

EXAMINATIONS AND INSPECTIONS

Bidders must determine for themselves, to their own satisfaction, all of the conditions and circumstances affecting the project or the cost of the proposed work by personal examination of the site and the specifications and by such other means as they may choose. It is understood and agreed that information as to conditions or obstructions indicated in the plans or specifications has been obtained by the City from data at hand. There is no express or implied agreement that such conditions are fully or correctly shown and the Bidder must take into consideration the possibility that conditions affecting the cost or quantity of work may differ from those indicated.

PERFORMANCE BOND

The successful Bidder will be required to furnish a performance bond for the full amount of the contract prior to the execution of the Contract.

The Bond, in an amount equal to 100 percent of the Contract sum, shall be satisfactory to the Owner and shall be executed by a corporate surety licensed to do business in the State of Oregon. The attorney in fact who executes the Bond on behalf of the surety shall affix thereto a certified and current copy of his power of attorney and shall indicate the monetary limit of such power.

PREVAILING WAGES

The latest issue of the "Prevailing Wage Rates for Public Works Contracts in Oregon" shall apply to all work done under this contract. The rates which are applicable, those effective July 1, 2000 will be incorporated in the final contract documents. The successful Bidder will be responsible for compliance with all requirements of the Oregon State Bureau of Labor and Industries.

INSURANCE – PROOF OF COVERAGE

Work shall not commence until all insurance requirements have been met and certificates thereof have been filed with and accepted by the Project Manager.

INSURANCE – PUBLIC LIABILITY AND PROPERTY DAMAGE

See section 107.05-D for detailed information including required limits.

The policy shall not be terminated or be canceled prior to completion of the Contract without 30 days' written notice to the Finance Department of the City Of Newberg, which notice shall be subject to approval by the City Attorney. Effective date of the notice is the date the notice is actually received in the Finance Department.

WORKER'S COMPENSATION INSURANCE

1. The Contractor shall provide worker's compensation coverage for all persons employed in performing the services under the agreement, in accordance with ORS 656.001 to 655.794, either as:

(a) A carrier insured employer; or

(b) A selfinsured employer as provided by ORS 656.407.

Evidence of such coverage shall be filed with the City and maintained for the duration of this contract.

END OF SECTION

CONTRACT DOCUMENTS

City of Newberg
Fernwood Road Utilities
and Pump Station Project

Sealed bids for the construction of the Fernwood Road Utilities and Pump Station Project in the City of Newberg, Oregon addressed to the Community Development Director, P.O. Box 970, 414 E. First Street, Newberg, Oregon 97132, will be received by Community Development Director, until **10:00 a.m.** prevailing time on the **16th day of August, 2000** at the Newberg City Hall, 414 E. First Street, Newberg, Oregon at which time and place all bids will be opened and publicly read aloud by the undersigned or his designated representative.

The project generally consists of: 2.5 mgd sewage pump station, 4,000 feet of gravity sewer, 6,500 feet of force main (dual), and 5,400 feet of 12 and 24-inch water main.

Plans and Specifications may be **obtained and examined** at the office of the Community Development Director, 414 E. First Street, Newberg, Oregon 97132 (503) 537-1273 upon receipt of a non-refundable payment of $50.00 for each set.

Contractors eligible to bid on this project shall have completed the Special Contractor Prequalification submittal and have achieved Passing status.

Each bid must contain a statement as to whether the Bidder is a resident Bidder, as defined in ORS 279.029. No bid for a construction shall be considered unless the Bidder is registered with the Construction Contractors Board as required by ORS 701.035 to 701.055.

No proposal will be received or considered unless the bid contains statements by the bidder as a part of his bid, that the provisions required by ORS 279.348 through 279.363, and the Davis-Bacon Act, as may be applicable are to be complied with. Applicable state wage rates are included with the contract documents.

When applicable all bidding shall comply with Presidents Executive Order No. 11246. All bidders shall comply with the applicable provisions of the Equal Employment Opportunity Act of 1972 and the Civil Rights Act of 1964.

Each bid must be submitted on the prescribed form in a sealed envelope, and clearly marked on the outside that it is a bid. Each bid must be accompanied by a certified check or bid bond payable to the City of Newberg, Oregon, in an amount of not less than 10 percent of the total amount of the bid submitted. The successful Bidder will be required to furnish a bond for faithful performance on the contract in the full amount of the contract price.

The City of Newberg reserves the right to reject any or all bids, to waive informalities, and to accept the bid which is in the best interest of the City. No bidder may withdraw his bid for a period of thirty (30) calendar days after the date set for opening.

Mike Soderquist
Community Development Director

Date Published: July 19 and 26, 2000

BID

PLACE: CITY OF NEWBERG, OREGON

PROJECT: FERNWOOD ROAD UTILITIES AND PUMP STATION PROJECT

TO: MAYOR AND CITY COUNCIL
CITY OF NEWBERG, OREGON
414 E. FIRST STREET
NEWBERG, OREGON 97132

The undersigned, hereinafter called the Bidder, in compliance with your advertisement for bid offers to enter into a Contract with the City of Newberg, Oregon, hereinafter referred to as the Owner, to furnish all labor, materials, equipment, supplies and machinery to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

The Bidder declares that he has carefully examined the plans and specifications with related documents, that he has personally inspected the site of the proposed work; that he has satisfied himself as to the quantities involved including materials and equipment, and is familiar with all of the conditions surrounding the construction of the proposed project including availability of materials and labor.

The Bidder further declares that the Bid is made according to the provisions and under the terms of the Contract Documents, which are hereby made a part of this Bid, and that the prices below are to cover all expenses incurred in performing the work required under the Contract Documents of which this Bid is a part.

The Bidder agrees that if this Bid is accepted, he will, within ten calendar days after notification of acceptance, execute the Contract with the Owner; and will at that time deliver to the Owner the Performance and Payment Bond and insurance documents required herein, and will, to the extent of his Bid, furnish all labor, equipment and 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 Community Development Director.

The Bidder further agrees to begin work within ten calendar days after receipt of written "Notice to Proceed" of the owner and to fully complete the project within sixty (60) consecutive calendar days thereafter. Bidder further agrees to pay as liquidated damages, the sum of one hundred and fifty dollars ($150.00) for each consecutive calendar day thereafter until the work shall have been finished. Sundays and legal holidays shall be excluded in determining days in default.

The Bidder further proposes to accept as full payment for the work proposed herein the amounts computed under the provisions of the General Provisions and based on the following schedule of 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 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 undersigned Bidder hereby agrees that the provisions of ORS 279.348 to 279.356 will be complied with, so that the undersigned Bidder and Bidder's subcontractors will pay to their employees not less than the specified minimum prevailing rate of wage as determined by the Oregon Commissioner of the Bureau of Labor and Industries, and further agrees to pay such wages not less

than once per week.

The Bidder shall pay a fee equal to one-tenth of one percent (.1 percent) of the price of this contract. The fee shall be paid on or before the first progress payment or 60 days from the date work first began on the contract, whichever comes first. The fee is payable to the Bureau of Labor and Industries and shall be mailed or otherwise delivered to the Bureau at: Bureau of Labor and Industries, Wage and Hour Division, Prevailing Wage Unit, 800 NE Oregon Street, #32, Portland, Oregon 97232.

The above unit prices shall include all labor, materials, equipment, tools, overhead, profit, insurance, etc., to complete the work called for.

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 required Performance and Payment Bond within the time herein proposed, then, in that event, the bid security deposited herewith shall be retained by the Owner as liquidated damages.

The Bidder understands that the Owner may reject any or all bids and waive any informalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of thirty (30) calendar days after the scheduled closing time for receiving bids.

The Bidder acknowledges receipt of the following addendum.

NO. 1	DATE 8-1-00 (RECD)	NO. 3	DATE 8-15-00 (RECD)
NO. 2	DATE 8-8-00	NO. _____	DATE _____

The name of the Bidder submitting this Proposal is NORTHWEST EARTHMOVERS, INC.

doing business at P.O. BOX 1467 (Street), TUALATIN (City), OR (State), 97062 (Zip)

which is the address to which all communications shall be sent.

RESIDENT/NONRESIDENT BIDDER STATUS

Oregon law requires that the Owner, in determining the lowest responsible Bidder, must add a percent increase on the Bid of a nonresident Bidder equal to the percent, if any, of the preference given to that Bidder in the state in which that Bidder resides. Consequently, each Bidder must indicate whether it is a resident or nonresident Bidder. A resident Bidder is a Bidder that has paid unemployment taxes or income taxes in the state of Oregon during the 12 calendar months immediately preceding submission of this Bid, has a business address in Oregon, and has stated in its Bid whether the Bidder is a "resident Bidder". A "nonresident Bidder" is a Bidder who is not a resident Bidder.

The undersigned states that it is: (check one)

1. A resident Bidder XX

2. A nonresident Bidder _____

Indicate state in which Bidder resides: _____

BIDDER'S PERFORMANCE BOND STATEMENT

NORTHWEST EARTHMOVERS, Inc. , hereinafter referred to as Contractor, is
(Name of Contractor)
submitting a bid to the City of Newberg pursuant to the latter's advertisement for bids dated July, 2000 for Fernwood Road Utilities and Pump Station Project.

Contractor certifies that if awarded the Contract, Contractor has the financial ability to obtain a good and sufficient bond issued by a surety to Owner in a sum equal to the amount of the bid providing for the faithful performance of the Contract.

Contractor understands and agrees if Contractor fails to provide the performance bond, the Owner will reject such bid and the bid bond or security submitted with the subject bid will be forfeited. The Surety requested to issue the Performance Bond will be THE AMERICAN INS. CO.
(Surety Company)
Contractor hereby authorizes THE AMERICAN INS. CO. to disclose any information to the Owner
(Surety Company)
to the Owner concerning Contractor's ability to supply a performance bond in the amount of the Contract.

In witness thereto the undersigned has set his hand this 5TH day of OCTOBER 2000.

Craig Smith
Signature of Bidder

2ND VICE PRESIDENT
Title

(If Corporation)

In witness whereof the undersigned corporation has caused this instrument to be executed and the seal affixed by its duly authorized officers this 5TH day of OCTOBER 2000.

NORTHWEST EARTHMOVERS, Inc.
Name of Corporation

By _____

2ND VICE PRESIDENT
Title

Attest _____
Secretary

CONTRACT FOR CONSTRUCTION

THIS CONTRACT, made and entered into this 5th day of October, 2000, by and between the CITY OF NEWBERG, OREGON, a municipal corporation, hereinafter called the "OWNER", and

Northwest Earthmovers, Inc.

of Tualatin, OR

hereinafter called the "CONTRACTOR".

WITNESS:

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 the **Fernwood Road Utilities and Pump Station Project** to the extent of the Bid made by the Contractor on the 21 day of Aug., 2000, all full compliance with Contract Documents referred to herein.

The Advertisement for Bid, the signed copy of the Bid made by the Contractor, the fully executed Performance and Payment Bond, the General Provisions, the Special Provisions, the Technical Provisions, and the Plans entitled **Fernwood Road Utilities and Pump Station Project** dated May 25, 2000, are hereby referred to and, by reference, made a part of this Contract as fully as if the same were completely set forth herein.

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 Community Development Director and to his satisfaction to the extent provided in the Contract Documents, or as otherwise herein provided and based on the said Bid made by the Contractor, and to make such payments in the manner at the times provided in the Contract Documents.

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

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 year or such other time as applicable law may allow after the date of acceptance of the work in the Contract by the Owner.

In the event that the Contractor shall fail to complete the work within the time limits or the extended time limit agreed upon, as more particularly set forth in the Contract Documents, liquidated damages shall be paid at the rate of One Hundred and Fifty Dollars per consecutive calendar day. Sundays and legal holidays shall be excluded in determining days in default.

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be executed the day and year first herein above written.

CITY OF NEWBERG, OREGON

By Terrence D. Mahr

Acting City Manager

Title

CONTRACTOR

Northwest Earthmovers, Inc.

By Craig Smelley 10/5/00

2nd Vice President

Title

APPROVED AS TO FORM:

City Attorney

BID BOND

BID BOND
FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

KNOW ALL MEN BY THESE PRESENTS that we, Northwest Earthmovers, Inc., as Principal, and The American Insurance Company, a corporation organized and existing under the laws of the State of Nebraska and duly authorized to transact a surety business in the State of Oregon, as surety, are held and firmly bound unto the CITY OF NEWBERG OREGON, a municipal corporation of the State of Oregon, in the penal sum of 10% of Bid*** lawful money of the United States of America, for the payment whereof well and duly to be made, we and each of us, jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH that whereas the Principal has submitted or is about to submit a proposal irrevocable for the period specified in the proposal to the Obligee on a contract for the FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT, Schedule I & II

NOW THEREFORE, in the event the Principal seeks to revoke his offer for any reason not authorized by law and not consented to by Obligee within the irrevocable period and if awarded the contract and said Principal fails, neglects, or refuses to enter into a contract to perform said work and furnish said labor, equipment and/or material, and to furnish performance and labor material payment bonds as required within the time specified, then the amount herein stated shall be declared to be forfeited and become due and payable to the City of NEWBERG OREGON.

SIGNED, SEALED AND DATED this 21st day of August, 2000

Principal Northwest Earthmovers, Inc.
Address PO Box 1467 TUALATIN OR 97062

BY Craig Smelt
Title 2nd V.P.
Surety The American Insurance Company

BY Gloria Bruning
Attorney in Fact
Gloria Bruning

Anchor Insurance & Surety, Inc.
Oregon Agent for Service
1201 SW 12th Ave., Portland, OR 97205
address

CORPORATE SEAL (PRINCIPAL)

CORPORATE SEAL (SURETY)

NOTE

If Principal is operating under an assumed business name, there must also be set forth in the first paragraph of the bond the names of all the partners of the individual owning the business, and the bond must be executed by one of them.

If the Principal is a corporation, the bond must be executed by one of the officers authorized to execute bonds, showing his official title and the seal of the corporation.

BID BOND

The bond must be executed by an attorney-in-fact for the surety company, show on the face thereof the Oregon agent for service, and bear the seal of the surety company. Where the bond is executed by a person outside the State of Oregon, his authority to execute bonds must be shown.

FIREMAN'S FUND INSURANCE COMPANY

NATIONAL SURETY CORPORATION

ASSOCIATED INDEMNITY CORPORATION

THE AMERICAN INSURANCE COMPANY

AMERICAN AUTOMOBILE INSURANCE COMPANY

GENERAL POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That FIREMAN'S FUND INSURANCE COMPANY, a California corporation, NATIONAL SURETY CORPORATION, an Illinois corporation, THE AMERICAN INSURANCE COMPANY, a New Jersey corporation redomesticated in Nebraska, ASSOCIATED INDEMNITY CORPORATION, a California corporation, and AMERICAN AUTOMOBILE INSURANCE COMPANY, a Missouri corporation, (herein collectively called "the Companies") does each hereby appoint K. C. Kraig, James P. Dooney, John D. Klump, Vicki Nicholson, Gene M. Dietzman, Gloria Bruning, Pamela S. Frazier, Philip Forker, Ray M. Paiement and Karen A. Pierce of Portland, OR.

their true and lawful Attorney(s)-in-Fact, with full power of authority hereby conferred in their name, place and stead, to execute, seal, acknowledge and deliver any and all bonds, undertakings, recognizances or other written obligations in the nature thereof ----------

and to bind the Companies thereby as fully and to the same extent as if such bonds were signed by the President, sealed with the corporate seals of the Companies and duly attested by the Companies' Secretary, hereby ratifying and confirming all that the said Attorney(s)-in-Fact may do in the premises.

This power of attorney is granted under and by the authority of Article VII of the By-laws of FIREMAN'S FUND INSURANCE COMPANY, NATIONAL SURETY CORPORATION, THE AMERICAN INSURANCE COMPANY, ASSOCIATED INDEMNITY CORPORATION and AMERICAN AUTOMOBILE INSURANCE COMPANY which provisions are now in full force and effect.

This power of attorney is signed and sealed under the authority of the following Resolution adopted by the Board of Directors of FIREMAN'S FUND INSURANCE COMPANY, NATIONAL SURETY CORPORATION, THE AMERICAN INSURANCE COMPANY, ASSOCIATED INDEMNITY CORPORATION and AMERICAN AUTOMOBILE INSURANCE COMPANY at a meeting duly called and held, or by written consent, on the 19th day of March, 1995, and said Resolution has not been amended or repealed:

> "RESOLVED, that the signature of any Vice-President, Assistant Secretary, and Resident Assistant Secretary of the Companies, and the seal of the Companies may be affixed or printed on any power of attorney, on any revocation of any power of attorney, or on any certificate relating thereto, by facsimile, and any power of attorney, any revocation of any power of attorney, or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Companies."

IN WITNESS WHEREOF, the Companies have caused these presents to be signed by their Vice-President, and their corporate seals to be hereunto affixed this 03 day of August, 1999.

FIREMAN'S FUND INSURANCE COMPANY
NATIONAL SURETY CORPORATION
THE AMERICAN INSURANCE COMPANY
ASSOCIATED INDEMNITY CORPORATION
AMERICAN AUTOMOBILE INSURANCE COMPANY

By _____
Vice-President

STATE OF CALIFORNIA }
COUNTY OF MARIN } ss.

On this 03 day of August, 1999, before me personally came Harold N. Marsh to me known, who, being by me duly sworn, did depose and say: that he is a Vice-President of each company, described in and which executed the above instrument; that he knows the seals of the said Companies; that the seals affixed to the said instrument are such company seals; that they were so affixed by order of the Board of Directors of said companies, and that he signed his name thereto by like order.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year herein first above written.

L. OCAMPO
Commission # 1163726
Notary Public - California
Marin County
My Comm. Expires Nov 28, 2001

CERTIFICATE

_____
Notary Public

STATE OF CALIFORNIA }
COUNTY OF MARIN } ss.

I, the undersigned, Resident Assistant Secretary of each company, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked; and furthermore that Article VII of the By-laws of each company, and the Resolution of the Board of Directors; set forth in the Power of Attorney, are now in force.

Signed and sealed at the County of Marin. Dated the 21st day of August, 2000.

_____
Resident Assistant Secretary

360791-11-98

Bond No. 11141721354

PERFORMANCE - PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we Northwest Earthmovers, Inc.

A corporation hereinafter called "Principal" and The American Insurance Company
(Corp., Partnership, or Individual)
of Omaha, State of Nebraska, herein after called "Surety", are held firmly bound unto the City of Newberg, Oregon, hereinafter called "Owner" in the penal sum of Five Hundred Forty Seven Thousand Seventy Five ~~and No/100***~~ Dollars ($547,075.00) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated this 5th day of October, 2000, a copy of which is hereto attached and made a part hereof for the construction of the **Fernwood Road Utilities and Pump Station Project.**

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extension thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, and shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contracts and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools consumed or used in connection with the construction of such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition of the terms of the contract or the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation 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 specification.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed this 5th day of October 2000.

Northwest Earthmovers, Inc.
Principal

SAME
(Principal) Secretary

Craig Smith (s)
PO Box 1467
Tualatin, OR 97062
(Address - Zip Code)

(SEAL)

Witness as to Principal

(Address - Zip Code)

ATTEST

The American Insurance Company
Surety

Power of Attorney Attached
(Surety) Secretary

By Gloria Bruning
Attorney-in-fact Gloria Bruning
PO Box 3825, Portland, OR 97208

(SEAL) John D. Klump

Witness as to Surety
John D. Klump, Agent
1201 SW 12th Ave., Suite 500
(Address - Zip Code)
Portland, OR 97205

Note: Date of Bond must not be prior to the date of Contract. If Contractor is Partnership, all partners should execute bond.

FIREMAN'S FUND INSURANCE COMPANY

NATIONAL SURETY CORPORATION
THE AMERICAN INSURANCE COMPANY

ASSOCIATED INDEMNITY CORPORATION
AMERICAN AUTOMOBILE INSURANCE COMPANY

GENERAL POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That FIREMAN'S FUND INSURANCE COMPANY, a California corporation, NATIONAL SURETY CORPORATION, an Illinois corporation, THE AMERICAN INSURANCE COMPANY, a New Jersey corporation redomesticated in Nebraska, ASSOCIATED INDEMNITY CORPORATION, a California corporation, and AMERICAN AUTOMOBILE INSURANCE COMPANY, a Missouri corporation, (herein collectively called "the Companies") does each hereby appoint K. C. Kraig, James P. Dooney, John D. Klump, Vicki Nicholson, Gene M. Dietzman, Gloria Bruning, Pamela S. Frazier, Philip Forker, Ray M. Paiement, Karen A. Pierce or J. Patrick Dooney, II of Portland, OR

their true and lawful Attorney(s)-in-Fact, with full power of authority hereby conferred in their name, place and stead, to execute, seal, acknowledge and deliver any and all bonds, undertakings, recognizances or other written obligations in the nature thereof ----------

and to bind the Companies thereby as fully and to the same extent as if such bonds were signed by the President, sealed with the corporate seals of the Companies and duly attested by the Companies' Secretary, hereby ratifying and confirming all that the said Attorney(s)-in-Fact may do in the premises.

This power of attorney is granted under and by the authority of Article VII of the By-laws of each of the Companies which provisions are now in full force and effect.

This power of attorney is signed and sealed under the authority of the following Resolution adopted by the Board of Directors of each of the Companies at a meeting duly called and held, or by written consent, on the 19th day of March, 1995, and said Resolution has not been amended or repealed:

> "RESOLVED, that the signature of any Vice-President, Assistant Secretary, and Resident Assistant Secretary of the Companies, and the seal of the Companies may be affixed or printed on any power of attorney, on any revocation of any power of attorney, or on any certificate relating thereto, by facsimile, and any power of attorney, any revocation of any power of attorney, or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Companies."

IN WITNESS WHEREOF, the Companies have caused these presents to be signed by their Vice-President, and their corporate seals to be hereunto affixed this 23 day of August, 2000.

FIREMAN'S FUND INSURANCE COMPANY
NATIONAL SURETY CORPORATION
THE AMERICAN INSURANCE COMPANY
ASSOCIATED INDEMNITY CORPORATION
AMERICAN AUTOMOBILE INSURANCE COMPANY

By Donn R. Kolbeck
Vice-President

STATE OF CALIFORNIA } SS.
COUNTY OF MARIN }

On this 23 day of August, 2000, before me personally came Donn R. Kolbeck to me known, who, being by me duly sworn, did depose and say: that he is a Vice-President of each company, described in and which executed the above instrument; that he knows the seals of the said Companies; that the seals affixed to the said instrument are such company seals; that they were so affixed by order of the Board of Directors of said companies and that he signed his name thereto by like order.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year herein first above written.

L. OCAMPO
Commission # 1163726
Notary Public - California
Marin County
My Comm. Expires Nov 28, 2001

Notary Public

STATE OF CALIFORNIA } SS.
COUNTY OF MARIN }

I, the undersigned, Resident Assistant Secretary of each company, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked; and furthermore that Article VII of the By-laws of each company, and the Resolution of the Board of Directors; set forth in the Power of Attorney, are now in force.

Signed and sealed at the County of Marin. Dated the 5th day of October 2000.

Loretta E. Bradley
Resident Assistant Secretary

6-99

PROPOSAL

FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

CITY OF NEWBERG

PROPOSAL

The undersigned agrees to accept as full payment for the work proposed for the **Fernwood Road Utilities & Pump Station Project** as herein specified and as shown on the plans, based upon the undersigned's own estimate of quantities and costs, the following:

(i) TOTAL SECTION I BID PRICE (Total Section I Bid" from page 3 of unit bid schedule)

$ 636,186.70
amount in figures

SIX HUNDRED THOUSAND THIRTY SIX THOUSAND ONE HUNDRED TWENTY SIX Dollars and SEVENTY Cents
amount written in words (has precedence)

(ii) TOTAL SECTION II BID PRICE (Total Section II Bid from page 11 of unit bid schedule)

$ 547,075.00
amount in figures

FIVE HUNDRED FORTY SEVEN THOUSAND SEVENTY FIVE DOLLARS Dollars and NO Cents
amount written in words (has precedence)

(iii) TOTAL SECTION I AND II BID PRICE (Total Section I and II Bid from page 22 of unit bid schedule)

$ 1,183,201.70
amount in figures

ONE MILLION ONE HUNDRED THOUSAND EIGHTY THREE THOUSAND TWO HUNDRED ONE Dollars and SEVENTY Cents
amount written in words (has precedence)

Award of bid is based on **"(A) TOTAL SECTION I BID PRICE" or "(B) TOTAL SECTION II BID PRICE" or (C) TOTAL SECTIONS I AND II BID PRICES."**

The Section I Bid is composed of the following components:

"Schedule of Prices" Schedule A through C of the unit bid schedules.

FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

The Section II Bid is composed of the following components:

"Schedule of Prices" Schedule D through K of the unit bid schedules.

The Sections I and II Bid is composed of the following components:

"Schedule of Prices" Schedule A through K of the unit bid schedules.

The completed "Schedule of Prices" shall serve as basis of progress payments and is hereby incorporated into the contract for construction. In the event of errors in the bid calculation, the individual unit prices shall govern.

I agree that this bid shall be irrevocable for at least 30 calendar days after the bid opening date and time, and if accepted, to construct said project at the prices bid within the time specified.

The undersigned bidder hereby represents as follows: That this bid is made without connection with any person, firm, or corporation making a bid for the same project, and is in all respects fair and without collusion or fraud.

Bidder NORTHWEST EARTHMOVERS, INC.

Licensed to do business in Oregon? Yes X No _____

Contractor's Board Registration Number 062761

Form of Organization S-CORP.

State of Incorporation OREGON

Names of Partners (if Co-Partnership) _____

_____

By (Signature) Craig Smelter Date 8-21-00

Name (Typed) CRAIG SMELTER

Title 2nd VICE PRESIDENT

Address P.O. BOX 1467

City TUALATIN State OREGON Zip 97062

Phone Number (503) 624-0363
include area code

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N.E.I.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SECTION I SCHEDULES						
SCHEDULE A - GRAVITY SANITARY SEWER (FERNWOOD ROAD AND BRUTSCHER)						
A-1	Construct 10" PVC 3034 pipe with pipe bedding and pipe zone material	2050	LF	FORTY DOLLARS	40.00	82,000.00
A-2	Construct 12" PVC 3034 pipe with pipe bedding and pipe zone material	1950	LF	FIFTY-NINE DOLLARS	59.00	115,050.00
A-3	Construct 48" diameter manhole, complete in place including excavation and backfill, 8' deep	15	EA	TWO THOUSAND DOLLARS	2,000.00	30,000.00
A-4	Additional manhole depth including excavation and backfill, over 8' deep	76	FT	ONE HUNDRED THIRTY DOLLARS	130.00	9,880.00
A-5	Install manhole drop assembly (12' drop)	1	EA	TWO THOUSAND EIGHT HUNDRED DOLLARS	2,800.00	2,800.00
A-6	Trench Excavation and Backfill (42" wide pay limit)	4000	LF	ONE DOLLAR	1.00	4,000.00
A-7	Trench Excavation and Backfill (60" wide pay limit)	50	LF	ONE DOLLAR	1.00	50.00
A-8	Construct 24" PVC 3034 pipe with pipe bedding and pipe zone material	50	LF	ONE HUNDRED FORTY-EIGHT DOLLARS	148.00	7,400.00
	TOTAL SCHEDULE A					251,180.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N. E. I.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE B - SANITARY FORCE MAIN (FERNWOOD ROAD AND BRUTSCHER)						
B-1	Construct 12" C-900, Class 200 pipe with pipe bedding and pipe zone material	3210	LF	THIRTY ONE DOLLARS	31.00	99,510.00
B-2	Construct 6" C-900, Class 200 pipe with pipe bedding and pipe zone material	3255	LF	TWENTY DOLLARS	20.00	65,100.00
B-3	Construct 12" C-900, Class 200 Restrained Joint pipe with pipe bedding and pipe zone material (to right of way line at the pump station)	115	LF	FIFTY FOUR DOLLARS	54.00	6,210.00
B-4	Construct 6" C-900, Class 200 Restrained Joint pipe with pipe bedding and pipe zone material (to right of way line at the pump station)	73	LF	THIRTY NINE DOLLARS	39.00	2,847.00
B-5	Construct 48" diameter manhole over existing 15" concrete sanitary line, including excavation and backfill, complete in place	1	EA	FOUR THOUSAND ONE HUNDRED DOLLARS	4,100.00	4,100.00
B-6	AC Removal and Replacement	837	SY	THIRTY TWO DOLLARS	32.00	26,784.00
B-7	Temporary Cold Mix AC Replacement	1023	LF	FOUR DOLLARS	4.00	4092.00
B-8	Trench Excavation and Backfill, 54" wide pay limit)	3330	LF	ONE DOLLAR	1.00	3330.00
	TOTAL SCHEDULE B					211,973.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N.E.I.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE C - WATER SYSTEM (FERNWOOD ROAD AND BRUTSCHER)						
C-1	Construct 12" D.I.P., CL. 50 pipe- polyethylene encased, with Select backfill, complete in place	3684	LF	THIRTY TWO DOLLARS THIRTY CENTS	32.30	118,993.20
C-2	Construct 12" D.I.P., CL. 50 Restrained Joint pipe-polyethylene encased, with Select backfill, complete in place	180	LF	FORTY FIVE DOLLARS	45.00	8,100.00
C-3	Connect 12" water line to existing 12" water line in Brutscher Street, complete in place. (Includes removal of 2" blowoff assembly and deliver to City maintenance shops	1	EA	FIVE HUNDRED THIRTY DOLLARS	530.00	530.00
C-4	Furnish and install 12" Butterfly Valve	9	EA	NINE HUNDRED	900.00	8,100.00
C-5	Install Corrosion Control Test Station assembly	2	EA	FOUR THOUSAND FIVE HUNDRED	4500.00	9,000.00
C-6	Install Combination 2" Air Release Valve assembly and vault	2	EA	EIGHT HUNDRED THIRTY DOLLARS	830.00	1,660.00
C-7	Install 2" Blowoff assembly	2	EA	EIGHT HUNDRED THIRTY DOLLARS	830.00	1,660.00
C-8	AC Removal and Replacement	595	SY	THIRTY FIVE DOLLARS	35.00	20,825.00
C-9	Temporary Cold Mix AC Replacement	1785	LF	TWO DOLLARS THIRTY CENTS	2.30	4105.50
	TOTAL SCHEDULE C					172,973.70
(I) TOTAL SECTION I BID (SCHEDULES A, B, AND C)						636126.70

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N121		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SECTION II SCHEDULES						
SCHEDULE D - GRAVITY COMBINED SEWER (PUMP STATION SITE)						
D-1	Construct 24" PVC 3034 pipe with pipe bedding and pipe zone material	188	LF	EIGHTY ONE DOLLARS	81.00	15,228.00
D-2	Construct 18" PVC 3034 pipe with pipe bedding and pipe zone material	117	LF	FORTY ONE DOLLARS	41.00	4,797.00
D-3	Construct 8" PVC 3034 pipe with pipe bedding and pipe zone material	4	LF	TWENTY DOLLARS	20.00	80.00
D-4	Construct 4" HDPE perf. pipe with pipe bedding and pipe zone material	130	LF	FOUR DOLLARS	4.00	520.00
D-5	Construct 60" diameter manhole, complete in place including excavation and backfill, 8' deep	2	EA	TWO THOUSAND NINE HUNDRED DOLLARS	2,900.00	5,800.00
D-6	Additional manhole depth including excavation and backfill, over 8' deep	10	FT	TWO HUNDRED DOLLARS	200.00	2,000.00
D-7	Construct 36" Field inlet including excavation and backfill, complete in place	1	EA	NINE HUNDRED DOLLARS	900 00	900 00
D-8	Construct Lynch type catch basin including excavation and backfill, complete in place	1	EA	SEVEN HUNDRED DOLLARS	700 00	700 00
D-9	Construct ODOT CL. 100 Rip Rap outfall, complete in place	11	CY	FIFTY DOLLARS	50 00	550 00
D-10	Trench Excavation and Backfill	439	LF	ONE DOLLAR	1.00	439.00
	TOTAL SCHEDULE D					31,014.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N.W.I.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE E - SANITARY SEWER FORCE MAIN (PUMP STATION SITE)						
E-1	Construct 12" C-900 Restrained Joint pipe with pipe bedding and pipe zone material	69	LF	FORTY SIX DOLLARS	46.00	3,174.00
E-2	Construct 6" C-900 Restrained Joint pipe with pipe bedding and pipe zone materials	69	LF	THIRTY DOLLARS	30.00	2,070.00
E-3	Trench Excavation and Backfill, 54" wide pay limit)	69	LF	ONE DOLLAR	1.00	69.00
	TOTAL SCHEDULE E					5313.00 ✓

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: NEL.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE F - WATER SYSTEM (PUMP STATION SITE)						
F-1	Construct 1" copper pipe with Select backfill, complete in place	136	LF	ELEVEN DOLLARS	11.00	1496,00
F-2	Install Backflow Prevention Assembly and vault	1	EA	THREE HUNDRED TEN DOLLARS	310.00	310,00
F-3	Install Frost Free Yard Hydrant	1	EA	TWO HUNDRED SEVENTY DOLLARS	270,00	270,00
F-4	Install Irrigation Sleeve	35	LF	TEN DOLLARS	10,00	350,00
	TOTAL SCHEDULE F					2,426.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: NEI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE G - SITE STRUCTURES (PUMP STATION SITE)						
G-1	Clearing and Grubbing	1	LS	SEVENTEEN THOUSAND SIX HUNDRED DOLLARS	17600.00	17600.00
G-2	Cast in Place Concrete Curb	130	LF	EIGHTEEN ~~AND~~ DOLLARS	18.00	2,340.00
G-3	3" over 12" Pavement Section	5900	SF	TWO DOLLARS EIGHTY CENTS	2.80	16,520.00
G-4	Imported Select Backfill (neatline) w/material from wet well excavation	1300	CY	SEVEN DOLLARS TWENTY CENTS	7.20	9360.00
G-5	CMU Building (Complete)	140	SF	TWO HUNDRED FIFTY DOLLARS	250.00	35000.00
G-6	Ultrablock Retaining Wall	1300	SF	TWELVE DOLLARS FORTY CENTS	12.40	16,120.00
G-7	Premium for Custom Wall Block Fabrication	1	LS	ONE THOUSAND EIGHT HUNDRED DOLLARS	1,800.00	1800.00
G-8	Drain Rock for Wall	80	CY	THIRTY SEVEN DOLLARS FIFTY CENTS	37.50	3000.00
G-9	Transformer Pad	24	SF	EIGHT DOLLARS	8.00	192.00
G-10	Generator Pad	120	SF	NINE DOLLARS	9.00	1080.00
G-11	Site Restoration and Landscaping	1	LS	TWELVE THOUSAND THREE HUNDRED DOLLARS	12,300.00	12,300.00
G-12	Fencing and Gate, Complete	1	LS	NINE THOUSAND SEVEN HUNDRED DOLLARS	9700.00	9700.00
G-13	Handrail	130	LF	FIFTY SEVEN DOLLARS SIXTY CENTS	57.60	7488.00
G-14	Removable Bollards	8	EA	TWO HUNDRED THIRTY DOLLARS	230.00	1840.00
	TOTAL SCHEDULE G					134340.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N.E.I.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE H - WET WELL (PUMP STATION SITE)						
H-1	Wet Well Top (includes 48" x 103" lid and 24" frame and cover)	1	EA	FIFTY THREE HUNDRED DOLLARS	5300.00	5,300.00
H-2	12' Diameter Wet Well Sections	27	FT	NINE HUNDRED THIRTY DOLLARS	930.00	25,110.00
H-3	Wet Well Bottom (reinforced)	1	EA	ELEVEN THOUSAND FIVE HUNDRED DOLLARS	11,500.00	11,500.00
H-4	Wet Well Common Excavation	155	CY	FORTY ONE DOLLARS	41.00	6355.00
H-5	Wet Well Rock Excavation	30	CY	EIGHTY SEVEN DOLLARS	87.00	2610.00
H-6	Wetwell Backfill and Base Rock	50	CY	FIFTY SIX DOLLARS	56.00	2,800.00
H-7	Pipe Supports (Fabricated)	3	EA	EIGHTY NINE DOLLARS	89.00	267.00
	TOTAL SCHEDULE H					53,942.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: NEI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE I - VALVES AND EQUIPMENT (PUMP STATION SITE)						
I-1	Vault (w/ Ladder and Double Doors)	1	LS	TWO THOUSAND NINE HUNDRED DOLLARS	2,900.00	2,900.00
I-2	Vault Installation	1	LS	ONE THOUSAND THREE HUNDRED DOLLARS	1,300.00	1,300.00
I-3	4" Drain (PVC)	10	LF	TWENTY FOUR DOLLARS	24.00	240.00
I-4	Compressor and Appurtenances	2	EA	ELEVEN THOUSAND DOLLARS	11,000.00	22,000.00
I-5	Compressor Installation (2)	1	LS	ONE THOUSAND SIX HUNDRED DOLLARS	1,600.00	1,600.00
I-6	6" Eccentric Plug Valves	4	EA	ONE THOUSAND DOLLARS	1,000.00	4,000.00
I-7	12" R.W. Gate Valve	1	EA	ONE THOUSAND THREE HUNDRED DOLLARS	1,300.00	1,300.00
I-8	6" Swing Check Valves	3	EA	ONE THOUSAND FOUR HUNDRED DOLLARS	1400.00	4,200.00
I-9	Pressure Gauge Assembly	2	EA	ONE THOUSAND DOLLARS	1,000.00	2000.00
I-10	Ductile Iron Spools & Couplings	1	LS	TEN THOUSAND SEVEN HUNDRED DOLLARS	10,700.00	10,700.00
	TOTAL SCHEDULE I					50,240.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: NEI.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE J - PUMPING EQUIPMENT (PUMP STATION SITE)						
J-1	Furnish and Install Flygt Model CP3170-464 Submersible 30 HP Duplex Pumps and Ancillary Equipment, or equal	1	LS	FORTY THREE THOUSAND THREE HUNDRED DOLLARS	43,300.00	43,300.00
J-2	Furnish and Install Contractor Provided Pump Station Equipment	1	LS	THIRTY FOUR THOUSAND FIVE HUNDRED DOLLARS	34,500.00	34,500.00
TOTAL SCHEDULE J						77,800.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8-21-2000		
SCHEDULE OF PRICES				Bidder: N.P.I.		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE K- ELECTRICAL AND CONTROLS						
K-1	Three Phase Extension - PGE	1	LS	Thirty-Five Thousand and no/100ths Dollars	$35,000.00	$35,000
K-1A	Pump Station Site	1	LS	SEVENTY TWO THOUSAND TWO HUNDRED DOLLARS	72,200.00	72,200.00
K-2	Pump Station Controls and Telemetry, Complete	1	LS	FORTY THOUSAND FIVE HUNDRED DOLLARS	40,500.00	40,500.00
K-3	Weatherproof Generator, Complete	1	LS	FORTY FOUR THOUSAND THREE HUNDRED DOLLARS	44,300.00	44,300.00
TOTAL SCHEDULE K						192,000.00 ✓
(ii) TOTAL SECTION II BID (SCHEDULES D THROUGH K)						547,075.00 ✓

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NEI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SECTION I SCHEDULES						
SCHEDULE A - GRAVITY SANITARY SEWER (FERNWOOD ROAD AND BRUTSCHER)						
A-1	Construct 10" PVC 3034 pipe with pipe bedding and pipe zone material	2050	LF	FORTY DOLLARS	40.00	$82000.00
A-2	Construct 12" PVC 3034 pipe with pipe bedding and pipe zone material	1950	LF	FIFTY NINE DOLLARS	59.00	115050.00
A-3	Construct 48" diameter manhole, complete in place including excavation and backfill, 8' deep	15	EA	TWO THOUSAND DOLLARS	2000.00	30000.00
A-4	Additional manhole depth including excavation and backfill, over 8' deep	76	FT	ONE HUNDRED THIRTY DOLLARS	130.00	9880.00
A-5	Install manhole drop assembly (12' drop)	1	EA	TWO THOUSAND EIGHT HUNDRED DOLLARS	2800.00	2800.00
A-6	Trench Excavation and Backfill (42" wide pay limit)	4000	LF	ONE DOLLAR	1.00	4000.00
A-7	Trench Excavation and Backfill (60" wide pay limit)	50	LF	ONE DOLLAR	1.00	50.00
A-8	Construct 24" PVC 3034 pipe with pipe bedding and pipe zone material	50	LF	ONE HUNDRED FORTY EIGHT DOLLARS	148.00	7400.00
	TOTAL SCHEDULE A					251180.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NPI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE B - SANITARY FORCE MAIN (FERNWOOD ROAD AND BRUTSCHER)						
B-1	Construct 12" C-900, Class 200 pipe with pipe bedding and pipe zone material	3210	LF	THIRTY ONE DOLLARS	31.00	99510.00
B-2	Construct 6" C-900, Class 200 pipe with pipe bedding and pipe zone material	3255	LF	TWENTY DOLLARS	20.00	65100.00
B-3	Construct 12" C-900, Class 200 Restrained Joint pipe with pipe bedding and pipe zone material (to right of way line at the pump station)	115	LF	FIFTY FOUR DOLLARS	54.00	6210.00
B-4	Construct 6" C-900, Class 200 Restrained Joint pipe with pipe bedding and pipe zone material (to right of way line at the pump station)	73	LF	THIRTY NINE DOLLARS	39.00	2847.00
B-5	Construct 48" diameter manhole over existing 15" concrete sanitary line, including excavation and backfill, complete in place	1	EA	FOUR THOUSAND ONE HUNDRED DOLLARS	4100.00	4100.00
B-6	AC Removal and Replacement	837	SY	THIRTY TWO DOLLARS	32.00	26784.00
B-7	Temporary Cold Mix AC Replacement	1023	LF	FOUR DOLLARS	4.00	4092.00
B-8	Trench Excavation and Backfill, 54" wide pay limit)	3330	LF	ONE DOLLAR	1.00	3330.00
	TOTAL SCHEDULE B					211973.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NK1		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE C - WATER SYSTEM (FERNWOOD ROAD AND BRUTSCHER)						
C-1	Construct 12" D.I.P., CL. 50 pipe- polyethylene encased, with Select backfill, complete in place	3684	LF	THIRTY TWO DOLLARS AND 30/100	32.30	118993.20
C-2	Construct 12" D.I.P., CL. 50 Restrained Joint pipe-polyethylene encased, with Select backfill, complete in place	180	LF	FORTY FIVE DOLLARS	45.00	8100.00
C-3	Connect 12" water line to existing 12" water line in Brutscher Street, complete in place. (Includes removal of 2" blowoff assembly and deliver to City maintenance shops	1	EA	FIVE HUNDARED THIRTY DOLLARS	530.00	530.00
C-4	Furnish and install 12" Butterfly Valve	9	EA	NINE HUNDARED DOLLARS	900.00	8100.00
C-5	Install Corrosion Control Test Station assembly	2	EA	FORTY FIVE HUNDARED DOLLARS	4500.00	9000.00
C-6	Install Combination 2" Air Release Valve assembly and vault	2	EA	EIGHT HUNDARED THIRTY DOLLARS	830.00	1660.00
C-7	Install 2" Blowoff assembly	2	EA	EIGHT HUNDARED THIRTY DOLLARS	830.00	1660.00
C-8	AC Removal and Replacement	595	SY	THIRTY FIVE DOLLARS	35.00	20825.00
C-9	Temporary Cold Mix AC Replacement	1785	LF	TWO DOLLARS AND 30/100	2.30	4105.50
	TOTAL SCHEDULE C					172973.70
SECTION II SCHEDULES						

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NW1		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE D - GRAVITY COMBINED SEWER (PUMP STATION SITE)						
D-1	Construct 24" PVC 3034 pipe with pipe bedding and pipe zone material	188	LF	EIGHTY ONE DOLLARS	81.00	15228.00
D-2	Construct 18" PVC 3034 pipe with pipe bedding and pipe zone material	117	LF	FORTY ONE DOLLARS	41.00	4797.00
D-3	Construct 8" PVC 3034 pipe with pipe bedding and pipe zone material	4	LF	TWENTY DOLLARS	20.00	80.00
D-4	Construct 4" HDPE perf. pipe with pipe bedding and pipe zone material	130	LF	FOUR DOLLARS	4.00	520.00
D-5	Construct 60" diameter manhole, complete in place including excavation and backfill, 8' deep	2	EA	TWENTY NINE HUNDRED DOLLARS	2900.00	5800.00
D-6	Additional manhole depth including excavation and backfill, over 8' deep	10	FT	TWO HUNDRED DOLLARS	200.00	2000.00
D-7	Construct 36" Field inlet including excavation and backfill, complete in place	1	EA	NINE HUNDRED DOLLARS	900.00	900.00
D-8	Construct Lynch type catch basin including excavation and backfill, complete in place	1	EA	SEVEN HUNDRED DOLLARS	700.00	700.00
D-9	Construct ODOT CL. 100 Rip Rap outfall, complete in place	11	CY	FIFTY DOLLARS	50.00	550.00
D-10	Trench Excavation and Backfill	439	LF	ONE DOLLAR	1.00	439.00
TOTAL SCHEDULE D						31014.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: N & I		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE E - SANITARY SEWER FORCE MAIN (PUMP STATION SITE)						
E-1	Construct 12" C-900 Restrained Joint pipe with pipe bedding and pipe zone material	69	LF	FORTY SIX DOLLARS	46.00	3174.00
E-2	Construct 6" C-900 Restrained Joint pipe with pipe bedding and pipe zone materials	69	LF	THIRTY DOLLARS	30.00	2070.00
E-3	Trench Excavation and Backfill, 54" wide pay limit)	69	LF	ONE DOLLAR	1.00	69.00
TOTAL SCHEDULE E						5313.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NR1		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE F - WATER SYSTEM (PUMP STATION SITE)						
F-1	Construct 1" copper pipe with Select backfill, complete in place	136	LF	ELEVEN DOLLARS	11.00	1496.00
F-2	Install Backflow Prevention Assembly and vault	1	EA	THREE HUNDRED TEN DOLLARS	310.00	310.00
F-3	Install Frost Free Yard Hydrant	1	EA	TWO HUNDRED SEVENTY DOLLARS	270.00	270.00
F-4	Install Irrigation Sleeve	35	LF	TEN DOLLARS	10.00	350.00
	TOTAL SCHEDULE F					2426.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NEI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE G - SITE STRUCTURES (PUMP STATION SITE)						
G-1	Clearing and Grubbing	1	LS	SEVENTEEN THOUSAND SIX HUNDRED DOLLARS	17600.00	17600.00
G-2	Cast in Place Concrete Curb	130	LF	EIGHTEEN DOLLARS	18.00	2340.00
G-3	Pump Station Pavement Section (includes 3" AC over 12" Crushed Rock)	5900	SF	TWO DOLLARS AND 80/100	2.80	16520.00
G-4	Imported Select Backfill (neatline) w/material from wet well excavation	1300	CY	SEVEN DOLLARS AND 20/100	7.20	9360.00
G-5	CMU Building (Complete)	140	SF	TWO HUNDRED FIFTY DOLLARS	250.00	35000.00
G-6	Ultrablock Retaining Wall	1300	SF	TWELVE DOLLARS FORTY CENTS	12.40	16120.00
G-7	Premium for Custom Wall Block Fabrication	1	LS	EIGHTEEN HUNDRED DOLLARS	1800.00	1800.00
G-8	Drain Rock for Wall	80	CY	THIRTY SEVEN DOLLARS AND 50/100	37.50	3000.00
G-9	Transformer Pad	24	SF	EIGHT DOLLARS	8.00	192.00
G-10	Generator Pad	120	SF	NINE DOLLARS	9.00	1080.00
G-11	Site Restoration and Landscaping	1	LS	TWELVE THOUSAND THREE HUNDRED DOLLARS	12300.00	12300.00
G-12	Fencing and Gate, Complete	1	LS	NINE THOUSAND SEVEN HUNDRED DOLLARS	9700.00	9700.00
G-13	Handrail	130	LF	FIFTY SEVEN DOLLARS AND 60/100	57.60	7488.00
G-14	Removable Bollards	8	EA	TWO HUNDRED DOLLARS	230.00	1840.00
	TOTAL SCHEDULE G					134340.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NRI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE H - WET WELL (PUMP STATION SITE)						
H-1	Wet Well Top (includes 48" x 103" lid and 24" frame and cover)	1	EA	FIFTY THREE HUNDRED	5300.00	5300.00
H-2	12' Diameter Wet Well Sections	27	FT	NINE HUNDRED THIRTY DOLLARS	930.00	25110.00
H-3	Wet Well Bottom (reinforced)	1	EA	ELEVEN THOUSAND THREE HUNDRED DOLLARS	11500.00	11500.00
H-4	Wet Well Common Excavation	155	CY	FORTY ONE DOLLARS	41.00	6355.00
H-5	Wet Well Rock Excavation	30	CY	EIGHTY SEVEN DOLLARS	87.00	2610.00
H-6	Wetwell Backfill and Base Rock	50	CY	FIFTY SIX DOLLARS	56.00	2800.00
H-7	Pipe Supports (Fabricated)	3	EA	EIGHTY NINE DOLLARS	89.00	267.00
TOTAL SCHEDULE H						53942.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: N&I		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE I - VALVES AND EQUIPMENT (PUMP STATION SITE)						
I-1	Vault (w/ Ladder and Double Doors)	1	LS	TWENTY NINE HUNDRED DOLLARS	2900.00	2900.00
I-2	Vault Installation	1	LS	THIRTEEN HUNDRED DOLLARS	1300.00	1300.00
I-3	4" Drain (PVC)	10	LF	TWENTY FOUR DOLLARS	24.00	240.00
I-4	Compressor and Appurtenances	2	EA	ELEVEN THOUSAND DOLLARS	11000.00	22000.00
I-5	Compressor Installation (2)	1	LS	SIXTEEN HUNDRED DOLLARS	1600.00	1600.00
I-6	6" Eccentric Plug Valves	4	EA	ONE THOUSAND DOLLARS	1000.00	4000.00
I-7	12" R.W. Gate Valve	1	EA	THIRTEEN HUNDRED DOLLARS	1300.00	1300.00
I-8	6" Swing Check Valves	3	EA	FOURTEEN HUNDRED DOLLARS	1400.00	4200.00
I-9	Pressure Gauge Assembly	2	EA	ONE THOUSAND DOLLARS	1000.00	2000.00
I-10	Ductile Iron Spools & Couplings	1	LS	TEN THOUSAND SEVEN HUNDRED DOLLARS	10700.00	10700.00
	TOTAL SCHEDULE I					50240.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NRI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE J - PUMPING EQUIPMENT (PUMP STATION SITE)						
J-1	Furnish and Install Flygt Model CP3170-464 Submersible 30 HP Duplex Pumps and Ancillary Equipment, or equal	1	LS	FORTY THREE THOUSAND THREE HUNDRED DOLLARS	43300.00	43300.00
J-2	Furnish and Install Contractor Provided Pump Station Equipment	1	LS	THIRTY FOUR THOUSAND FIVE HUNDRED DOLLARS	34500.00	34500.00
	TOTAL SCHEDULE J					77800.00

City of Newberg Fernwood Road Utilities and Pump Station Project				Date: 8/21/00		
SCHEDULE OF PRICES				Bidder: NEI		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL AMOUNT
SCHEDULE K- ELECTRICAL AND CONTROLS						
K-1	Three Phase Extension - PGE	1	LS	Thirtyfive Thousand dollars and no/100	$35,000.00	$35,000
K-1A	Pump Station Site	1	LS	SEVENTY TWO THOUSAND TWO HUNDRED DOLLARS	72200.00	72200.00
K-2	Pump Station Controls and Telemetry, Complete	1	LS	FORTY THOUSAND FIVE HUNDRED DOLLARS	40500.00	40500.00
K-3	Weatherproof Generator, Complete	1	LS	FORTY FOUR THOUSAND THREE HUNDRED DOLLARS	44300.00	44300.00
TOTAL SCHEDULE K						192000.00
(iii) TOTAL SECTIONS I AND II BID (SCHEDULES A THROUGH K)						1,183,201.70

SECTION I

FERNWOOD ROAD UTILITIES AND PUMP STATIONS
DISCLOSURE STATEMENT

PRIMARY BIDDER

Bidders Name	CCB Number	Mailing Address	Phone/Fax	Dollar Value
NORTHWEST EARTHMOVERS, INC.	062761	P.O. BOX 1467, TUALATIN OR 97062	624-0363 P 639-1634 F	636,126.70

SUB-TOTAL PRIMARY BID _____

SUBCONTRACTORS

Sub-bidders Name	CCB Number	Mailing Address	Phone/Fax	Sub-contract Dollar Value
NONE				

SUB-TOTAL OF SUB-BIDS _____

TOTAL BID _____

SECTION I+II

FERNWOOD ROAD UTILITIES AND PUMP STATIONS
DISCLOSURE STATEMENT

PRIMARY BIDDER

Bidders Name	CCB Number	Mailing Address	Phone/Fax	Dollar Value
NORTHWEST EARTHMOVERS INC.	62761	PO BOX 1467 TUALATIN OR 97062	624-0363 e 639-1634 F	1,183,201.70

SUB-TOTAL PRIMARY BID 1,183,201.70

SUBCONTRACTORS

Sub-bidders Name	CCB Number	Mailing Address	Phone/Fax	Sub-contract Dollar Value
FAHNHAM ELECTRIC Co.	01217	3140 22nd ST. S.E. SALEM. OR 97302	373-9677	174 114 00

SUB-TOTAL OF SUB-BIDS _____

TOTAL BID _____

PREVAILING WAGE RATES

PREVAILING WAGE RATES

for

Public Works Contracts in Oregon

BOLI

OREGON BUREAU OF LABOR AND INDUSTRIES

Jack Roberts
Commissioner
Bureau of Labor and Industries

Effective July 1, 2000

JACK ROBERTS
COMMISSIONER

SUITE 1045
800 NE OREGON, # 32
PORTLAND, OREGON 97232
3865 WOLVERINE AVE. NE; E-1
SALEM, OREGON 97310
165 E 7TH, ROOM 220
EUGENE, OR 97401

BUREAU OF LABOR AND INDUSTRIES

July 1, 2000

Under Oregon law, the Commissioner of the Bureau of Labor and Industries publishes the state's prevailing wage rates twice annually, in January and July, with quarterly updates in April and October. The rates are determined using a statewide construction industry wage survey of occupations and crafts performing commercial, heavy and highway construction in 14 specific geographic regions of the state. The 1999 survey collected nearly 1.2 million hours of construction employment wage information for more than 200 craft occupations, reported by contractors for a peak week of employment between June 23 and August 11, 1999.

Prevailing wage rates are the minimum wages that must be paid to all workers employed in the construction, reconstruction, major renovation or painting of all public works, unless specifically exempted by state law. Copies of these rates must be incorporated into all bid specifications when the advertisement for such public works contracts is issued. A provision that prevailing wage rates must be paid must also appear in the contract. The rates in effect at the time the bid specifications are first advertised are those that apply for the duration of the project, with one exception: If, during the bidding process, the prevailing wage rates change, the public contracting agency has the option of amending the bid specifications to reflect such changes.

If you identify any errors in the rates published, please bring them to the attention of the Prevailing Wage Rate Coordinator in Portland at (503) 731-4709. If you have any questions about the manner in which the prevailing wage rates are enforced, contact the Wage and Hour Division in Portland at (503) 731-4074, or any of the bureau's field offices.

JACK ROBERTS
Commissioner
Bureau of Labor & Industries

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July 1, 2000

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The Appendix section is to be used only for regions/trades specified in pages 14 through 53. Refer to pages 14 through 53 before using rates in the Appendix section.

A list of debarred contractors and all forms necessary to comply with ORS 279.348 through ORS 279.375 may be found in the back of this booklet.

Contractors are encouraged to use and keep on file the forms provided as master copies for use on future prevailing wage rate projects.

THIS INFORMATION IS AVAILABLE IN AN ALTERNATE FORMAT

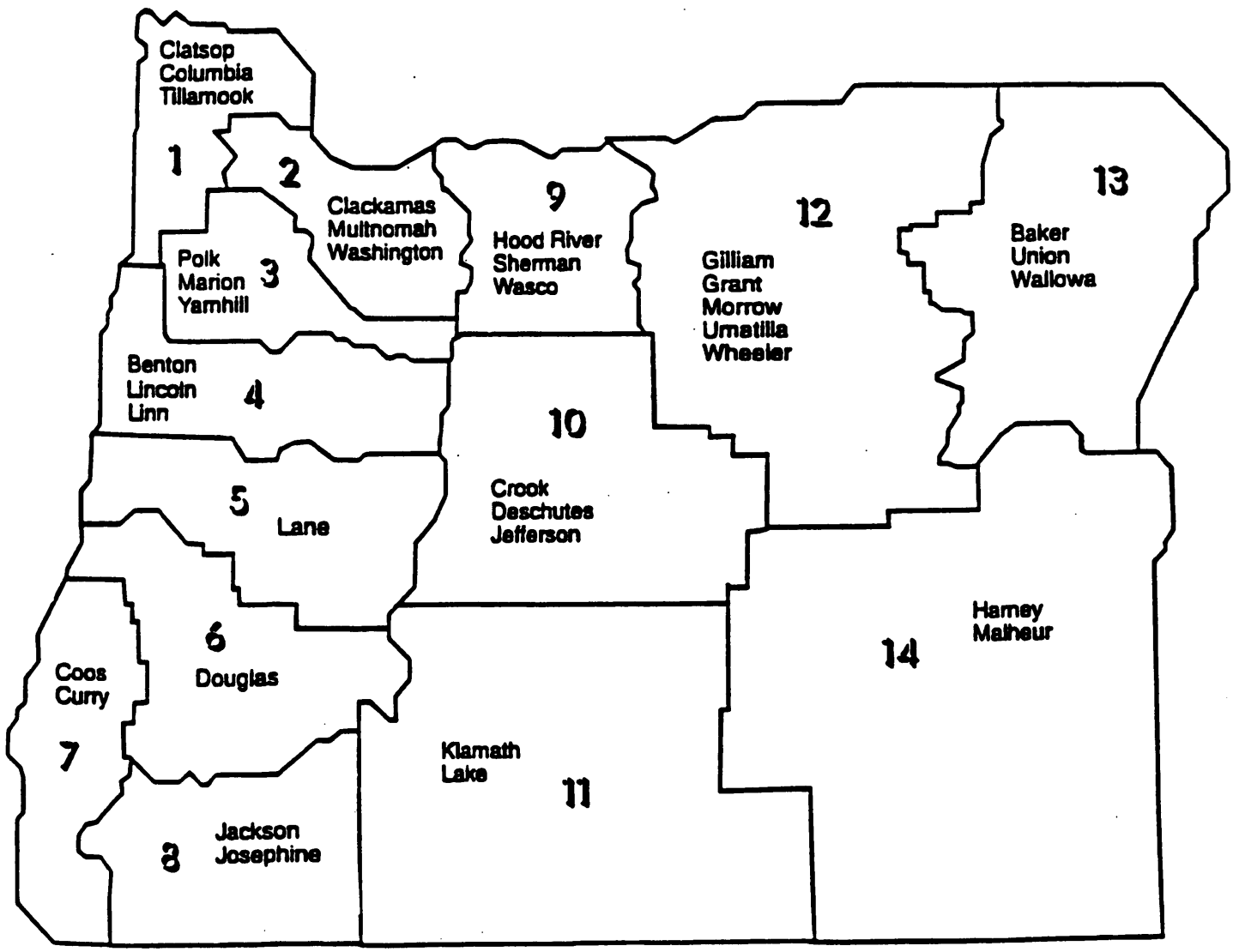
Pursuant to ORS 279.348 to ORS 279.380, the prevailing wage rates contained in this booklet have been adopted for use on public works contracts in Oregon. Additional copies of this booklet are available for $2.00 each.

For specific information or questions regarding prevailing wage law, you may obtain a "Prevailing Wage Rate Law" handbook by contacting the nearest Oregon Bureau of Labor and Industries office.

All of the information in this booklet can be accessed and printed from the Internet at:
www.boli.state.or.us

Bureau Offices		
Bend	1250 NE 3rd, #B-105, Bend, OR 97701	(541) 388-6330
Eugene	165 E. 7th, Room 220, Eugene, OR 97401	(541) 686-7623
Medford	700 E. Main, Suite 105, Medford, OR 97504	(541) 776-6270
Portland	800 NE Oregon St, # 32, Portland, OR 97232	(503) 731-4074
Salem	3865 Wolverine St. NE, Bldg. E-1, Salem, OR 97305	(503) 378-3292

PREVAILING WAGE RATE REGIONS



DEFINITIONS OF COVERED OCCUPATIONS

1. **Asbestos Workers/Insulators**

Installation of insulation on mechanical systems for thermal and acoustical purposes. Also the installation of fire stop penetrations on electrical and mechanical systems.

Mechanical systems include pipes, boilers, ducts, flues, breaching, grease ducts and acid ducts. This also includes all labor connected with the handling and distribution of materials for these systems.

Hazardous Materials Handler/Mechanic

The removal of all regulated materials from mechanical systems is exclusively the work of Hazardous Materials Handlers, unless the mechanical systems are going to be scrapped. Laborers do all removal of regulated materials on mechanical systems to be scrapped and any non-mechanical (walls, ceiling floors, beams, etc.) insulation. Laborers also do loading of any regulated material after it has been removed, bagged, and tagged, as well as cleanup at the removal site and all work done at the disposal site. Persons performing the removal of contained regulated materials are classified as Laborers (see #18).

NOTE: Regulated materials are those materials that are regulated for the purpose of protecting the environment or for personal protection by EPA, OSHA, DEQ, or Federal OSHA.

2. **Boilermakers**

Construct, assemble, maintain and renovate stationary steam boilers and boiler house auxiliaries. Align structures or plate sections to assemble boiler frame tanks or vats, following blueprints. Work involves use of hand and power tools, plumb bobs, levels, wedges, dogs or turnbuckles. Assist in testing assembled vessels. Direct cleaning of boilers and boiler furnaces. Inspect and reconstruct boiler fittings, such as safety valves, regulators, automatic-control mechanisms, water columns, and auxiliary machines.

3. **Bricklayers/Stonemasons**

Bricklayers

Lay building materials, such as brick, structural tile, concrete, cinder, glass, gypsum and terra cotta block (except stone), to construct or renovate walls, partitions, arches, sewers, and other structures. Include Refractory Brickmasons, when working on site of construction.

Stonemasons

Build stone structures, such as piers, walls, and abutments. Lay walks, curbstones, or special types of masonry for vats, tanks and floors.

4. **Carpenters**

Construct, erect, install and renovate structures, fixtures and equipment of wood, plywood and wallboard using carpentry tools and woodworking machines.

Carpenter 1

Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator. Includes Framers. Also scaffold erection if 14 feet or over, unless erecting for Masons or Plasterers. (See Tenders to Masons and Tenders to Plasterers)

Carpenter 2

Cabinet and Shelving Installers, Floor Finishers, Wall & Ceiling Insulators, Irritating insulation. Includes Finishers.

Drywall/Acoustical Carpenters

Ceiling Tile Installers and Acoustical Carpenters (exclude carpet, wood or hard tile installers); Drywall Installer (apply plasterboard or other wallboard to ceilings and interior walls)

Marine Carpenters

Bridge, Dock and Wharf Builders; Piledrivermen; Boom Men; Marine Piledrivers

5. **Millwrights/Machine Erectors**

Mechanics specializing in installing new heavy machinery.

6. **Cement Masons**

Apply cement, sand, pigment or marble chips to floors, stairways and cabinet fixtures to finish and attain durable and decorative surfaces, according to specifications and drawings. Finish surfaces to remove imperfections from freshly poured concrete walls, roads, walkways and ornamental stone facings of concrete structural products. Include Concrete Rubbers.

Cement Masons, finishing, hand chipping, patching, grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, planks, stakes, lines and grades. Grinding of concrete done as preparatory to patching or when done to produce a finished concrete product.

Composition workers (includes installation of epoxy and other resinous toppings), and power machine operators.

Cement Masons working on suspended, swinging and/or hanging scaffold.

(***NOTE:*** Tenders to Cement Masons are found in Concrete/Cement Laborers. See #18)

7. **Divers & Divers' Tenders**

Diver

An underwater worker supplied with air, usually by a pipeline from the surface, who lays foundations for bridge piers, reconstructs underwater walls, uses underwater cutting and welding tools and the cement gun; also may do underwater carpentry, steel plating and shipwright's work.

Divers' Tenders

Work on the surface to monitor gauges for divers.

8. **Dredging Operations**

Assistant Engineer (including Machinist, Mechanic, Oiler, Watch Engineer, Welder), Assistant Mate ("Deckhand"), Boatman, Fill Equipment Operator, and Leverman. Operate power-driven dredge to mine sand, gravel or other materials from bays, lakes, ponds, rivers or streams, and to excavate and maintain navigable channels in waterways (excludes Floating Construction Equipment - see Power Equipment Operators #23).

9. **Painters & Drywall Tapers**

Painters: Brush, Roller, Machine (Spray and Sandblasting)

Paint walls, equipment, buildings, bridges, and other structural surfaces, using brushes, rollers and spray guns. May mix colors or oils to obtain desired color or consistency. Also applies wall coverings.

Drywall Tapers

Seals joints between plasterboard and other wallboards to prepare wall surface for painting or papering.

10. **Lathers**

Fasten wooden, metal or rockboard lath to walls, ceilings and partitions of buildings to provide supporting base for plaster, fireproofing or acoustical material.

11. **Electricians**

Install, in new construction or reconstruction, electrical wiring, equipment and fixtures. Insure that work is in accordance with relevant codes. Includes all inside wiring or cable splicing. May read blueprints.

Electrical Material Handler

Handles and maintains order of all electrical material, tools and equipment on job site, delivering materials to licensed electricians. Must not install electrical material or utilize equipment (i.e. switch gear, motor control centers, transformers, motors, light fixtures, etc.). Note: This classification applies exclusively to electrical materials. If worker deploys and handles other types of materials, in addition to electrical materials, or performs general site cleanup see Laborer. (See #18)

12. **Limited Energy Electrician**

May only be used for electrical work not exceeding 100 va in class II and III installations (as defined in Article 725 of the National Electrical Code). Includes computer cabling.

13. **Line Construction**

Install and reconstruct cable or wires used in electrical power or distribution systems. Install insulators; erect wood poles and light or heavy-duty transmission towers. Includes cable splicers and troubleshooters. Excludes repairers of transformers and substation equipment and telephone and telegraph communications workers.

Cable Splicer, Leadman, Pole Sprayer

Splices and/or terminates power cables which are designed to be used for voltages above 2,000. Splices and/or terminates gas or liquid filled power cables, when part of a distribution system outside of buildings.

Certified Lineman Welder, Heavy Line Equipment Man, Lineman, Pole Sprayer
Tree Trimmer
Head Groundman, Jackhammer Man, Powderman
Line Equipment Man
Groundman

14. **Elevator Construction**

Installers and Mechanics
Assemble, install and renovate electric and hydraulic freight and passenger elevators, escalators and dumbwaiters.

Assistant to Mechanics
Works at direction of elevator mechanic.

15. **Glaziers**

Install glass in windows, skylights, storefronts or on surfaces such as building fronts, interior walls, or ceilings at construction sites.

16. **Highway and Parking Stripers**

Paint highway and parking structural surfaces of streets, highways, parking lots, airports, curbs, etc., using manually or mechanically propelled machines, brushes, rollers, and/or spray guns. Installation of any device or application of any material used in lieu of paint for traffic delineation, such as buttons, tapes, plastics, rumble bars, etc.

17. **Ironworkers**

Structural & Reinforcing Metal Workers

Raise, place and unite girders, columns and other structural steel members including prefabricated or precast concrete beams or structural steel member, to form completed structures and structural frameworks. Perform layout work for rods within project area. Fasten rods in place with wire or fasteners; bend or adjust as required, using cutting, welding or rod bending machine. Perform layout work and proper placing of steel in concrete forms, including prefabricated assembly for placement complete in forms. May spin suspension bridge cables or perform other related ironwork duties.

Fence Erectors

Erect and renovate ***metal*** fences, fence gates and ornamental metal fencing around highways, industrial and commercial establishments, using hand and power tools. (NOTE: Wooden fence erectors are classified as Laborers. (see #18)

18. **Laborers, Material Movers (Hand), Flaggers**

All general laborers and material movers, Flaggers, not classified separately. (NOTE: Use Laborer classifications for moving materials and incidental assistance. Use Tender classifications when the primary duty is to assist a particular occupational class. See #29 and #30 for Tender classifications.) Also includes Scaffold erection when scaffold isunder 14 feet and is not for the Mason or Plasterers trade. (See Tenders to Masons and Tenders to Plasterers)

Group 1 Laborer

Asphalt Spreaders
Batch Weighman
Broomers
Brush Burners/Cutters
Carpenter Tender
Car and Truck Loaders
Change-House Man
Chipper Operator
Choke Setter
Clean-Up Laborers
Concrete Curing
Demolition Wrecking, Industrial
Driller Assistant
Dry-Shack Man
Road Oiling Crew Dumpers
Dumpmen for Grading Crew
Elevator Feeders
Fine Graders
Fire Watch
Form Strippers
Material Yard Man
Powderman Assistant
Railroad Track Laborers
Ribbon Setters
Rip Rap Man (hand placed)
Road Pump Tender and Moving
Sewer Laborer
Signalman
Skipman
Slopers
Spraymen
Stake Chaser
Stockpiler
Tie Back Shoring
Timber Faller/Bucker (hand labor)
Toolroom Man (job site)
Weight Man-Crusher
Wood Fence Builder
NOTE: Landscape Laborer – see #19

Group 2 Laborer

Applicators
Brush Cutters
Burners
Cement/Concrete Laborers (hand)
Choker Splicer
Clary Power Spreader
Clean Up Nozzleman- Green Cutter
Concrete Power Buggyman
Crusher Feeder
Demolition/Wrecking
Doping and Wrapping Pipe
Gunite Nozzleman Tender
Gunite or Sandblasting Pot Tender
Handlers/Mixers
Post Hole Digger (air, gas or electric
Power Tool Operators
Sandblasting (wet)
Stake Setter
Tampers
Vibrating Screed

Laborers (Continued)

Group 3 Laborer

Scrapped and Contained Asbestos Removal
Bit Grinder
Concrete Saw Operator
Drill Doctor
Drill Operators
Gunite Nozzleman
Laser Beam
Manhole Builder
Nippers and Timbermen
Nuclear Plant Worker (lead shield)
Power Saw Operators
Sandblasting (dry)
Sewer Timberman
Strippers
Track Liners
Tugger Operator
Vibrators
Water Blaster
Welder

Group 4 Laborer

Asphalt Rakers
Concrete Nozzleman
Grade Checker
High Scalers
Laser Beam (tunnel), applicable when employee assigned to move, set up, align laser beam.
Motorman - Dinky Locomotive
Loop Installation
Pipe Layer
Powder Men
Pumpcrete Nozzleman
Shield Operator
Tunnel Miners
Tunnel Powderman
Tunnel Bull Gang (above ground)
Tunnel Muckers
Brakemen/Concrete Crew Bull Gang (underground)
Tunnel – Chuck Tenders

Cleanup Laborers (building only), demolition, wrecking & moving

Flagger (certified)

A Laborer who controls vehicular traffic by means of brightly colored flags and/or signs.

19. **Landscape Construction**

Beautification of a plot of land by changing its natural features through the addition or modification of lawns, trees and bushes.

Landscape Laborer/Technician

Performs seeding, planting, mulching, land clearing and topsoil spreading by the use of hand tools. With hand tools and power equipment less than 90 horsepower: clear land, trench to maximum depth of three feet below finish grade, hydroseed, apply chemicals and fertilizers. Till, spread and grade topsoil. Establish lawns and plant trees, shrubs and plants. Install, service or replace above ground and underground lawn or landscape irrigation systems. Install French drains or other subsurface water collection systems to a maximum depth of three feet below finish grade. Install, service or repair low voltage outdoor landscape lighting and irrigation valves; Assemble or place pre-manufactured and custom fabrication trellis work, play equipment, benches and picnic tables.

20. **Marble Setter**

Cuts, tools and sets marble slabs in floors and walls of buildings and renovates and polishes slab previously set in buildings. Trims, faces and cuts marble to specified size using power sawing, cutting and facing equipment and hand tools. Drills holes in slab and attaches bracket. Spreads mortar on bottom of slab and on sides of adjacent slabs. Sets block in position, tamps it into place, and anchors bracket attachment with wire. Fills joints with grout. Removes excess grout from marble with sponge. Cleans and bevels cracks or chips on slabs, using hand tools and power tools. Heats cracked or chipped area with blowtorch and fills defect with composition mastic that matches grain of marble. Polishes marble and other ornamental stone to high luster, using power tools or by hand.

21. **Plasterers and Stucco Masons**

Apply coats of plaster onto interior or exterior walls, ceilings, or partitions or buildings to produce finished surface according to blueprints, architect's drawings or oral instructions.

Nozzleman
Swinging Scaffold
All Other Work

22. **Plumbers and Steamfitters/Pipefitters**

Assemble, install, alter, and replace pipe systems (metal, plastic, ceramic, composition, etc.) that carry water, steam, air or other liquids or gases. Fabricates on site and installs piping and tubing systems, which are to conduct water, steam, air, and other fluids or gases in and around buildings. Also installs vacuum piping systems. Installs drainage and sewage lines (laterals) from buildings to the point of attachment to mains. Installs plumbing fixtures such as sinks, faucets, drinking fountains, commodes, etc. Installs refrigeration equipment. Performs cutting, welding and burning which is incidental to the work of plumbing or pipefitting, except as is described under lead burner. May do other work in connection with the installation and testing of heating and cooling apparatus and control devices. **(Note: See also #28 – Sprinkler Fitters.)**

23. **Power Equipment Operators (equipment used on construction site)**

Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)
Operate equipment used for applying asphalt or other material compositions to roadbeds, airport runways, taxiways and street paving. Includes asphalt paving machine operators, asphalt plant operators, screed operators and roller operator (any asphalt mix, breakdown or finish). Excludes any residential work.

Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator
Operate equipment used for the removal of excess surface material (concrete, asphalt) during paving, texturing or other work on road surfaces (either concrete or asphalt). Includes removal and recycling of asphalt road surface material.

Power Equipment Operators (Continued)

Auxiliary Equipment: Compressors, Generators, Pumps
Control, maintain or operate various auxiliary equipment, such as compressors, condensers, electricity generators, feedwater heaters, filters and pumps that transfer or supply water, fuel, lubricants, gasses, air, liquids, slurries and auxiliary power for turbines, generators, boilers, power equipment at the construction site. Other auxiliary equipment not otherwise classified (tool grinders, conveyor tender).

Blade: Blade/Grader Operator
Operator Blade/Grader machine or vehicle equipped with blades to remove, distribute, grade and level earth, aggregate or other material to a specific grade, slope or elevation.

Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator and Material Haulers (including "Cat Wagons", DJB's, Volvos and other similar models)
Operate machines or off road vehicles that push, remove, pick up, distribute or haul rock, earth debris and other material on construction sites.

Compactors/Roller Operator: (not asphalt)
Operate Compactor, Roller or similar equipment used for compacting crushed rock, dirt or other fill material on construction site. (Includes airport runways, taxiways and roadbeds.)

Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails and/or street paving), Concrete Curing Equipment, Concrete Saw.
Operate equipment used for: applying, curing, finishing, mixing, pumping, sawing or spreading of concrete; installing concrete curbs/gutters, sidewalks or guardrails; and concrete street or highway paving.

Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men
Operate boom and cable equipment to lift and move materials, machines or other items in a variety of directions on a construction site. Operations, remote or otherwise such as hoisting, piledriver, clamshell, dragline, skip box or bucket to place material.

Crushing: Crusher Plant Operator or Oiler
Operation of machinery used to crush rock or recycled materials into aggregates for use in asphalt, concrete, base and fill materials for use in highways, streets, airports and construction sites.

Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling
Operate equipment used to drill or bore for any construction purpose, including preparation for the installation of foundations, pipe, utilities and soil stabilization.

Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator (excluding Dredging Operations, which is a separate classification. **See #8).**

Power Equipment Operators (Continued)

Fork Lifts: Industrial Lift Truck Operator and Material Handler
Operate industrial lift trucks or loaders equipped with forks used to unload, load, place, stack and distribute materials on a construction site.

Front End Loaders, Hydraulic Hoes, Excavators
Operate machinery equipped with scoops, shovels or buckets to excavate, load or move dirt, aggregate and other materials.

Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines (Punch, Auger, etc.)
Operation of any power equipment used to install guardrails.

Repairmen, Heavy Duty (Mechanics, Welders) and Oilers
Duties include repairing heavy equipment at the construction site (such as cranes, bulldozers, loaders, excavators, etc.). This classification includes any mobile heavy equipment mechanics employed by the contractor who is filling out the survey form. This also includes maintenance workers who change parts, lubricate machinery, and perform other routine maintenance functions at the construction site.

Sweepers
Broom Operator, self-propelled; Sweeper Operator (Wayne type) self-propelled.

24. **Riggers**
Classify riggers in the craft performing the work for which rigging is incidental. For example, a carpenter doing rigging is classified as a carpenter; an ironworker doing rigging is classified as an ironworker.

25. **Roofers**

Roofers, general roofing materials and irritable bituminous materials (For sheet metal roofs – see Sheet Metal Workers # 26)
Cover roofs of commercial structures with slate, asphalt, wood and related materials using brushes, knives, punches, hammers and other tools. May spray roofs, sidings and walls with material to bind, seal, insulate or soundproof sections of structures.

26. **Sheet Metal Workers and Sheet Metal Duct Installers**

On a construction site, fabricate, assemble, install and replace sheet metal products and equipment, such as control boxes, drainpipes and furnace casings. Work may involve any of the following: set up and operate fabricating machines to cut, bend and straighten sheet metal; shape metal over anvils, blocks or forms using hammer; operate soldering and welding equipment to join sheet metal parts; inspect; assemble and smooth seams and joints of burred surfaces. Install prefabricated sheet metal ducts used for heating, air conditioning or other purposes in commercial buildings and similar structures. **(Includes metal roofs)**

27. **Soft Floor Layers**

Floor Covering Layers (soft tile, linoleum and carpet)
Apply blocks, strips or sheets of shock-absorbing, sound-deadening or decorative coverings to floors and cabinets. Includes laying soft tile and linoleum. Lay carpets or rugs in buildings.

28. **Sprinkler Fitters**

Installs all piping and auxiliary devices, which are necessary for the complete installation of sprinkling systems for fire protection in buildings. Excludes systems operated with steam. **(Note: See also #22 – Plumbers and Steamfitters/Pipefitters.)**

29. **Tenders to Mason Trades: Brick and Stonemasons, Mortar Mixers, Hod Carriers**

Directly assist brickmasons and stonemasons by performing duties of lesser skill. Duties include mixing, supplying and holding materials or tools, and cleaning work area and equipment. Performed on block walls and may include scaffolding work. Erect scaffolding for Masons, any height.

Note: Excludes cement and concrete flat work and cement pumping which is performed by concrete/cement laborers. (See #18 for Laborer classifications.)

30. **Tenders to Plasterers: Assistants to Plasterers and Stucco Masons**

Assist plasterers or stucco masons by performing duties of lesser skill. Duties include supplying or holding materials or tools and cleaning work area and equipment. Exclude construction or maintenance laborers who do not primarily assists plasterers or stucco masons. Erect scaffolding for Plasterers, any height.

31. **Tile Setter/Terrazzo Worker: Hard Tile Setters**

Apply tile to walls, floors, ceilings and promenade roof decks following design specifications. Applies glazed, unglazed, mosaic and other ceramic tiles, which are used as a surface on floors, walls, ceilings and other surfaces and which must be set to a specified grade. Applies and floats all settings beds into which these tiles are set. Levels and plumbs these tiles to the specified grade.

Note: Tenders for tile setters and terrazzo workers are classified in Tile, Terrazzo and Marble Finishers (#32)

32. **Tile, Terrazzo and Marble Finishers**

Supplies and mixes construction materials for Marble setter, Terrazzo Worker and Tile Setter. Applies grout and finishes surface of installed marble, terrazzo and tile. Mixes mortar and grout, moves mortar and grout manually or using wheelbarrow. Cleans installed marble, terrazzo and tile surfaces, work and storage areas. May renovate and fill chipped, cracked or broken pieces. May assist Marble Setter, Terrazzo Worker, and Tile Setter. Grinds and polishes surfaces.

33. **Truck Drivers, Heavy or Tractor-Trailer**

Drive a tractor-trailer combination or a truck with a capacity of at least 3 tons, to transport goods or materials.

Group 1

A-frame or Hydra-Lift Truck w/load bearing surface
Battery Rebuilder
Bus or Man-Haul Driver
Concrete Buggies (power operated)
Driver
Loader and/or Leverman on concrete dry batch plant manually operated
Lubrication Man
Dump Trucks, side, end and bottom dumps up to and including 10 cu. yards, including semi-trucks and trains or combinations thereof
Fork Lifts used in loading, unloading and transporting material on job site.
Fuel Truck Driver
Lift Jitneys

Truck Drivers, Heavy or Tractor-Trailer (Continued)

Group 1 (Continued)

Pilot Car
Slurry Truck Driver or Leverman
Solo Flat Bed and miscellaneous body trucks
Steam Cleaner or combination
Tireman
Transit Mix & wet or dry mix trucks, 5 cu. yds. and under
Truck and Truck Mechanic Assistant
Wash Rack
Water Wagon up to 3,000 gallons

Group 2

Dumpsters or similar equipment
Flaherty Spreader Driver or Leverman
Low Bed Equipment, Flat Bed Semi-Truck & Trailer or doubles transporting equipment or wet or dry materials
Lumber Carrier, Driver-Straddle Carrier used in loading, unloading and transportation of material on job site
Oil Distributor Driver or Leverman
Transit Mix and Wet or Dry Mix Trucks, over 5 cu. yds. and including 7 cu. yds.
Water Wagons, 3,000 to 5,000 gallons

Group 3

Body Repairman
Dump Trucks, side, end and bottom dumps over 10 cu. yds. and including 30 cu. yds., including semi-trucks and trains or combinations thereof.
Transit Mix and wet or dry Mix Trucks over 7 cu. yds. and inc. 11 cu. yds.
Truck Mechanic – Welder – Body Repairman
Water Wagons, 5,000 to 10,000 gallons

Group 4

Dump Trucks, side, end and bottom dumps over 30 cu. yds. and including 50 cu. yds., including semi- trucks and trains or combinations thereof.
Transit Mix and wet or dry Mix Trucks, over 11 cu. yds. and including 15 cu. yds.
Water Wagons, 10,000 to 15,000 gallons

Group 5

Dump Trucks, side, end and bottom dumps over 50 cu. yds. and including 60 cu. yds., including semi-trucks and trains or combinations thereof.

Group 6

Dump Trucks, side, end and bottom dumps over 60 cu. yds. and including 80 cu. yds., including semi- trucks and trains or combinations thereof.

Group 7

Dump Trucks, side, end and bottom dumps over 80 cu. yds. and including 100 cu. yds., including semi-trucks and trains or combinations thereof.

34. **Welders**

Classify welders in the craft performing the work for which welding is incidental. For example, a carpenter doing hand welding is classified as a carpenter; an ironworker doing welding is classified as an ironworker.

PREVAILING WAGE RATES

OCCUPATIONS
BY
REGIONS

REGION #1
Clatsop, Columbia and Tillamook Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	$20.82	$6.15
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters	See Appendix	See Appendix
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall Applicator (Drywall/Wetwall)	See Appendix	See Appendix
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	See Appendix	See Appendix
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$21.03	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledriver men, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders (Carpenters)	See Appendix	See Appendix
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$21.06	$5.36

REGION #1
Clatsop, Columbia and Tillamook Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$21.67	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc.)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$18.31	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$21.03	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #2
Clackamas, Multnomah and Washington Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters	See Appendix	See Appendix
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall Applicator (Drywall/Wetwall)	See Appendix	See Appendix
Drywall Taper (Painters and Drywall Tapers)	See Appendix	See Appendix
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal) (Laborers)	See Appendix	See Appendix
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	See Appendix	See Appendix
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	See Appendix	See Appendix
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$21.03	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledriver men, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders (Carpenters)	See Appendix	See Appendix
Painter: Brush, Roller, Machine (spray and sandblasting)	See Appendix	See Appendix
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	See Appendix	See Appendix
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$21.06	$5.36

REGION #2
Clackamas, Multnomah and Washington Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$20.94	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$21.67	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	See Appendix	See Appendix
Sheet Metal Duct Installers; Sheet Metal Workers	See Appendix	See Appendix
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$21.03	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	See Appendix	See Appendix

REGION #2
Clackamas, Multnomah and Washington Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Tile Setter/Terrazzo Worker: Hard Tile Setter	See Appendix	See Appendix
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #3
Polk, Marion and Yamhill Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	$20.82	$6.15
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters	See Appendix	See Appendix
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall Applicator (Drywall/Wetwall)	See Appendix	See Appendix
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	See Appendix	See Appendix
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Limited Energy Electrician	$16.39	$4.00
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledriver men, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders (Carpenters)	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$21.06	$5.36

REGION #3
Polk, Marion and Yamhill Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$20.94	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	See Appendix	See Appendix
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #4
Benton, Lincoln and Linn Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	$20.82	$6.15
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman) (Dredgers)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	See Appendix	See Appendix
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$16.39	$4.00
Line Construction (Excludes Tree Trimmer)	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting) Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	$15.51 See Appendix	$3.21 See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix

REGION #4
Benton, Lincoln and Linn Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$21.06	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00

REGION #4
Benton, Lincoln and Linn Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmer (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #5
Lane County

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	$20.82	$6.15
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	$22.91	$7.37
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	See Appendix	See Appendix
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix

REGION #5
Lane County

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	See Appendix	See Appendix
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	See Appendix	See Appendix
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling, (Exclude exploratory drilling for water, minerals, oil & gas)	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	See Appendix	See Appendix
Sprinkler Fitters	$21.58	$5.53

REGION #5
Lane County

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	$18.16	$5.78
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #6
Douglas County

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	$20.82	$6.15
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	$19.66	$7.37
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons Cement Masons, finishing, hand chipping, patching, grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Composition Workers, includes installation of epoxy and other resinous toppings, and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst Mate, Fireman, Oilers, Operators, Tenderman) (Dredgers)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix

REGION #6
Douglas County

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	See Appendix	See Appendix
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	See Appendix	See Appendix
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a Separate classification – see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix

REGION #6
Douglas County

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	See Appendix	See Appendix
Sheet Metal Duct Installers; Sheet Metal Workers	See Appendix	See Appendix
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	$17.05	$5.78
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #7
Coos and Curry Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	$19.66	$7.37
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17 (all)	$5.76 (all)
Cement Masons Cement Masons, finishing, hand chipping, patching, grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Grinding of concrete done as preparatory to patching or when done to produce a finished concrete product. Composition Workers, includes installation of epoxy and other resinous toppings, and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix

REGION #7
Coos and Curry Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	See Appendix	See Appendix
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	See Appendix	See Appendix
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31

REGION #7
Coos and Curry Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	See Appendix	See Appendix
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	$17.05	$5.78
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (See Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	See Appendix	See Appendix
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #8
Jackson and Josephine Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	$19.66	$7.37
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons Cement Masons, finishing, hand chipping, patching, grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Grinding of concrete done as preparatory to patching or when done to produce a finished concrete product. Composition Workers, includes installation of epoxy and other resinous toppings, and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal) (Ironworkers)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix

REGION #8
Jackson and Josephine Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	See Appendix	See Appendix
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	See Appendix	See Appendix
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31

REGION #8
Jackson and Josephine Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	$17.05	$5.78
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #9
Hood River, Sherman and Wasco Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters	See Appendix	See Appendix
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$21.03	$4.00
Line Construction (Excludes Tree Trimmers)	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix

REGION #9
Hood River, Sherman and Wasco Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	See Appendix	See Appendix
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$21.06	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53

REGION #9
Hood River, Sherman and Wasco Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Telephone and Data Cabling	$21.03	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #10
Crook, Deschutes and Jefferson Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	$19.66	$7.37
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons Cement Masons, finishing, hand chipping and patching grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Composition Workers (includes installation of epoxy and other resinous toppings), and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60

REGION #10
Crook, Deschutes and Jefferson Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$16.41	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34

REGION #10
Crook, Deschutes and Jefferson Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #11
Klamath and Lake Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	$19.66	$7.37
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons Cement Masons, finishing, hand chipping and patching grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Composition Worker, includes installation of epoxy and other resinous toppings, and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60

REGION #11
Klamath and Lake Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$16.41	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34

REGION #11
Klamath and Lake Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	$17.05	$5.78
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #12
Gilliam, Grant, Morrow, Umatilla and Wheeler Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters	See Appendix	See Appendix
Cement Masons	See Appendix	See Appendix
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$21.03	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	See Appendix	See Appendix
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix

REGION #12
Gilliam, Grant, Morrow, Umatilla and Wheeler Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$16.41	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	See Appendix	See Appendix
Sprinkler Fitters	$21.58	$5.53

REGION #12
Gilliam, Grant, Morrow, Umatilla and Wheeler Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Telephone and Data Cabling	$21.03	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #13
Baker, Union and Wallowa Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons Cement Masons, finishing, hand chipping and patching grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Composition Workers, includes installation of epoxy and other resinous toppings, and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60

REGION #13
Baker, Union and Wallowa Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Landscape Laborer/Technician	$12.85	$2.18
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$21.03	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$16.41	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34

REGION #13
Baker, Union and Wallowa Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	See Appendix	See Appendix
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$21.03	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

REGION #14
Harney and Malheur Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Asbestos Workers/Insulators	See Appendix	See Appendix
Boilermakers	See Appendix	See Appendix
Bricklayers/Stonemasons	See Appendix	See Appendix
Carpenters Carpenter 1: Auto Nailing Machine, Form Stripper, Floor Layers, Stationary Power Saw Operator, Framer. Carpenter 2: Cabinet and shelving installers, Floor Finishers, Wall and Ceiling Insulators, Irritating Insulation, Finisher.	$19.17	$5.76
Cement Masons Cement Masons, finishing, hand chipping and patching grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, plants, stakes, lines and grades. Composition Workers, includes installation of epoxy and other resinous toppings, and Power Machine Operators Cement Masons working on suspended, swinging and/or hanging scaffold	$20.44	$6.87
Diver / Divers' Tender	See Appendix	See Appendix
Dredging (Asst. Engineer, Asst. Mate, Fireman, Oilers, Operators, Tenderman)	See Appendix	See Appendix
Drywall/Acoustical Carpenters: Ceiling tile installers and acoustical carpenters (exclude carpet, wood or hard tile installers); Drywall installer (apply plasterboard or other wallboard to ceilings and interior walls)	$17.57	$8.05
Drywall Taper	$20.09	$7.16
Electrician	See Appendix	See Appendix
Elevator Constructors, Installers and Mechanics	See Appendix	See Appendix
Fence Constructor (not metal)	$17.41	$5.60
Fence Erector (metal)	$14.84	$2.97
Floor Covering Layers (Soft tile, linoleum and carpet)	$20.10	$4.73
Glaziers	$15.56	$6.41
Hazardous Materials Handler/Mechanic	$15.13	$4.80
Highway and Parking Stripers	See Appendix	See Appendix
Ironworkers (Structural & Reinforcing Metal Workers)	See Appendix	See Appendix
Laborers and Material Movers (Hand); Flaggers	$17.41	$5.60
Landscape Laborer/Technician	$12.85	$2.18

REGION #14
Harney and Malheur Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Lather (Drywall/Wetwall)	See Appendix	See Appendix
Limited Energy Electrician	$16.39	$4.00
Line Construction	See Appendix	See Appendix
Marble Setters	See Appendix	See Appendix
Marine Carpenters: Bridge, dock and wharf builders, piledrivermen, boom men, marine piledrivers	$23.91	$6.59
Millwrights; Machine Erectors; Machinists; Millwright/Welders	$17.52	$4.83
Painter: Brush, Roller, Machine (spray and sandblasting)	$15.51	$3.21
Plasterers and Stucco Masons, (Swinging Scaffold, Nozzlemen and All Other Work) (Plasterers)	See Appendix	See Appendix
Plumbers and Steamfitters/Pipefitters (Plumbers)	See Appendix	See Appendix
Power Equipment Operators		
Asphalt Paving Equipment: Asphalt Paver Operator, Asphalt Plant Operator, Roller Operator, Screed Operator (any asphalt mix)	$19.85	$5.97
Asphalt/Concrete Profilers: Roto-Mill, Pavement Profiler Operator, Concrete Planer, Grinder or Grooving Machine Operator	$20.92	$7.25
Auxiliary Equipment: Compressors, Generators, Pumps	$19.82	$5.11
Blade: Blade/Grader Operator	$16.41	$5.36
Bulldozers, Rubber-Tired Scrapers, Material Haulers: Bulldozer Operator, Rubber-Tired Scraper Operator, and Material Haulers (including "Cat wagons", DJB's, Volvos and other similar models)	$20.33	$5.65
Compactors/Roller Operator: (not asphalt)	$20.04	$6.59
Concrete: Batch Plant and or Wet Mix Operator, Concrete Finishing Machine, Brooming, Tining or Wire Mat Machine Operator, Concrete Spreader/Placer Operator, Pump Operators (concrete or grout), Concrete Slip Form Paving Machine (for installing curbs/gutters, guardrails, and/or street paving), Concrete Curing Equipment, Concrete Saw	$17.74	$3.47
Crane Operation: Hydraulic, Tower, Whirley, Lattice Boom, Dragline & Clamshell, Signal Men	See Appendix	See Appendix
Crushing: Crusher Plant Operator or Oiler	$15.06	$2.97
Drilling: Earth Boring Machine Operator (horizontal & vertical), Directional Drilling	$18.86	$3.50
Floating Construction Equipment: Floating Crane (or "Derrick Barge"), Clamshell or Pile Driver used in conjunction with a construction project, Underwater Equipment Operator. (Excluding Dredging Operations, which is a separate classification - see "Dredging")	$23.46	$7.34
Fork Lifts: Industrial Lift Truck Operator and Material Handler	See Appendix	See Appendix

REGION #14
Harney and Malheur Counties

OCCUPATION	PREVAILING WAGE RATE	FRINGE RATE
Power Equipment Operators (Continued)		
Front End Loaders, Hydraulic Hoes, Excavators	$18.68	$5.31
Guardrail Equipment: Guardrail Punch Operator (all types), Guardrail Punch Oiler, Combination Guardrail Machines, Punch, Auger, etc)	See Appendix	See Appendix
Repairmen, Heavy Duty (Mechanics, Welders) & Oilers	$17.79	$4.29
Sweepers	$24.09	$7.48
Riggers	Receive rate for craft performing operation to which rigging is incidental.	Receive rate for craft performing operation to which rigging is incidental.
Roofers: General Roofing Materials; Irritable Bituminous Materials	$14.96	$4.37
Sheet Metal Duct Installers; Sheet Metal Workers	$17.96	$5.94
Sprinkler Fitters	$21.58	$5.53
Telephone and Data Cabling	$16.39	$4.00
Tenders to Mason Trades: Brick and Stonemasons	See Appendix	See Appendix
Tenders to Plasterers and Stucco Masons	See Appendix	See Appendix
Tile, Terrazzo, Brick and Marble Finisher	$18.73	$5.60
Tile Setter/Terrazzo Worker: Hard Tile Setter	$21.34	$5.79
Tree Trimmers (Line Constructors)	See Appendix	See Appendix
Truck Drivers, Heavy or Tractor-Trailer	$15.24	$3.77
Welders (Incidental)	Receive rate for craft performing operation to which welding is incidental.	Receive rate for craft performing operation to which welding is incidental.

APPENDIX

JULY 1, 2000

THE APPENDIX SECTION IS TO BE USED ONLY FOR REGIONS/TRADES SPECIFIED IN PAGES 14 THROUGH 53. REFER TO PAGES 14 THROUGH 53 BEFORE USING RATES IN THIS SECTION

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TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

ASBESTOS WORKERS

Installation of insulation on mechanical systems for Thermal and Acoustical purposes, also the installation of fire stop penetrations on electrical and mechanical systems.

Journeyman Asbestos Worker	**28.11**	**7.46**

Removal of regulated material on mechanical systems * which are not going to be scrapped. **

Hazardous Materials Handler Mechanic	13.75	3.50

*Mechanical systems include pipes, boilers, ducts, flues, breaching, grease ducts and acid ducts. This also includes all labor connected with the handling and distribution of materials for these systems.

**The removal of all regulated materials from mechanical systems is exclusively the work of Hazardous Materials Handlers, unless the mechanical systems are going to be scrapped. Laborers do all removal of regulated materials on mechanical systems to be scrapped and any non-mechanical (walls, ceilings, floors, beams etc.) insulation. They also do loading of any regulated materials after it has been removed, bagged and tagged, as well as cleanup at the removal site and all work done at the disposal site. Persons performing the removal of regulated materials are classified as Group 3 Laborers.

NOTE: Regulated materials are those materials that are regulated for the purpose of protecting the environment or for personal protection by EPA, OSHA, DEQ or Federal OSHA.

BOILERMAKERS	24.82	9.80

BRICKLAYERS/STONEMASONS
(This trade is tended by "Tenders to Masons")

Area 1	**25.63**	**8.59**

(Add $.75 per hour to Fringe for Refractory repair work.)

Area 2	**24.41**	**8.24**

(Add $.75 per hour to Fringe for Refractory repair work.)

BRICKLAYERS/STONEMASONS (Continued)

Area 1

Baker	Linn (a)	Umatilla
Benton (a)	Malheur (a)	Union
Clackamas	Marion	Wallowa
Clatsop	Morrow	Wasco (a)
Columbia	Multnomah	Washington
Gilliam	Polk	Yamhill
Hood River	Sherman	
Lincoln (a)	Tillamook	

Area 2

Benton (b)	Linn (b)
Grant	Malheur (b)
Harney	Wasco (b)
Lincoln (b)	Wheeler

CARPENTERS

Zone 1 (Base Rate)

Group 1	23.94	7.92
Group 2	24.09	7.92
Group 3	24.44	7.92
Group 4	24.59	7.92
Group 5	24.44	7.92
Group 6	24.59	7.92
Group 7	24.94	7.92

Zone Differential for Carpenters
(Add to Zone 1 Rate)

Zone 2	.85
Zone 3	1.25
Zone 4	1.70
Zone 5	2.00
Zone 6	3.00
Zone 7	5.00

Zone 1: Projects within 30 miles of City Hall in the Cities listed below.
Zone 2: More than 30 miles but less than 40 miles.
Zone 3: More than 40 miles but less than 50 miles.
Zone 4: More than 50 miles but less than 60 miles.
Zone 5: More than 60 miles but less than 70 miles.
Zone 6: More than 70 miles but less than 100 miles.
Zone 7: More than 100 miles from the city hall of the employee's home local.

CARPENTERS (Continued)

Reference Cities for Group 1 and 2 Carpenters

Albany	Eugene	Longview	Portland
Astoria	Goldendale	Madras	Port Orford
Baker	Grants Pass	Medford	Reedsport
Bend	Hermiston	McMinnville	Roseburg
Brookings	Hood River	Newport	Salem
Burns	Klamath Falls	Oregon City	The Dalles
Coos Bay	LaGrande	Ontario	Tillamook
Corvallis	Lakeview	Pendleton	Vancouver

Zones for Groups 3 and 4 Carpenters are determined by the distance between the project site and **either**
1) the worker's residence; ***or***
2) City Hall of a reference city
for the appropriate group shown, whichever is closer.

Reference Cities for Group 3 and 4 Carpenters

Eugene	Medford	Portland	Vancouver
Longview	North bend	The Dalles	

Zones for Groups 5, 6 and 7 Carpenters are determined as follows:

1. For those workers who reside within zone 1 of a reference city below, their zone pay differential shall be computed based upon the distance from the City Hall of that city to the project site.

2. For those workers who reside nearer to the project than is the City Hall of any reference city below, the mileage from their residence to the project may be used in computing their zone pay differential.

3. The zone pay differential for all other projects shall be computed from the City Hall of Longview, North Bend, or Portland, whichever is closer to the project.

Reference Cities for Groups 5, 6 and 7

Astoria	Klamath Falls	Newport	Roseburg
Bend	Longview	North Bend	Salem
Eugene	Medford	Portland	The Dalles

CARPENTERS (Continued)

Group 1

Auto. Nailing Machine
Carpenters
Form Stripper
Manhole Builders
Non-irritating Insulation
Cabinet & Shelving
Installers (wood or steel)

Group 2

Floor Layers & Finishers
Stationary Power Saw Operators
Wall & Ceiling Insulators
Irritating Insulation

Group 3

Millwrights
Machine Erectors
Machinists

Group 4

Millwright/Welders
(Certified Welders receive $0.25/hour over Group 3)

Group 5

Bridge, Dock & Wharf Builders
Piledrivermen

Group 6

Boom Men

Group 7

Marine Piledriver

CEMENT MASONS
(This trade is tended by "Concrete Laborers")

Zone 1 (Base Rate)

Group 1	**23.66**	**8.45**
Group 2	**24.09**	**8.45**
Group 3	**24.09**	**8.45**
Group 4	**24.52**	**8.45**

Group 1 Cement Masons, finishing, hand chipping, patching, grouting, end pointing, screed setting, plugging, filling bolt holes, dry packing, setting curb forms, planks, stakes, lines and grades. Grinding of concrete done as preparatory to patching or when done to produce a finished concrete product.

Group 2 Composition Workers (includes installation of epoxy and other resinous toppings), and Power Machine Operators.

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

CEMENT MASONS (Continued)

Group 3 Cement Masons working on suspended, swinging and/or hanging scaffold.

Group 4 Cement Masons performing work of both Group 2 and Group 3 at the same time.

Zone Differential for Cement Masons
(Add to Zone 1 Rate)

Zone 2	.65
Zone 3	1.15
Zone 4	1.70
Zone 5	2.75

Zone 1 – Projects within 30 miles of City Hall in the cities listed below.
Zone 2 – More than 30 miles but less than 40 miles.
Zone 3 – More than 40 miles but less than 50 miles.
Zone 4 – More than 50 miles but less than 80 miles.
Zone 5 – More than 80 miles.

Reference Cities

Bend	Eugene	Medford	Salem
Corvallis	Longview	Portland	The Dalles
			Vancouver

DIVERS & DIVERS' TENDERS

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Divers	56.65	7.92
Divers' Tenders	26.32	7.92

1) For those workers who reside within a reference city below, their zone pay shall be computed from the City Hall of the city wherein they reside.

2) For those workers who reside nearer to a project than is the City Hall of any reference city below, the mileage from their residence may be used in computing their zone pay differential.

3) The zone pay for all other projects shall be computed from the City Hall of Portland.

DIVERS & DIVERS' TENDERS (Continued)

Zone Differential for Divers/Divers' Tenders

(Add to Zone 1 Rate)

Zone 2	.85
Zone 3	1.25
Zone 4	1.70
Zone 5	2.00
Zone 6	3.00
Zone 7	5.00

Zone 1: Projects within 30 miles of City Hall in the cities listed below.
Zone 2: More than 30 miles but less than 40 miles.
Zone 3: More than 40 miles but less than 50 miles.
Zone 4: More than 50 miles but less than 60 miles.
Zone 5: More than 60 miles but less than 70 miles.
Zone 6: More than 70 miles but less than 100 miles.
Zone 7: More than 100 miles from the City Hall of the employee's home local.

Reference Cities for Divers/Divers' Tenders

Astoria	Klamath Falls	Newport	Roseburg
Bend	Longview	North Bend	Salem
Eugene	Medford	Portland	The Dalles

Depth Pay and Enclosure Pay are added to the Divers' Basic Hourly Rate to obtain the Total Hourly Rate for the Diver.

Basic Hourly Rate	+	Hourly Depth Pay	+	Hourly Enclosure Pay	=	Divers' Total Hourly Pay

Divers' Depth Pay

Depth of Dive	Hourly Depth Pay
50 – 100 ft	([Total ft- 50] X $1.00)/hr.
100 – 150 ft $ 50 +	([Total ft-100] X $1.50)/hr.
150 – 200 ft $125 +	([Total ft-150] X $2.00)/hr.

DIVERS/DIVERS' TENDERS (Continued)

Divers' Enclosure Pay (working without vertical escape)

Distance Traveled In the Enclosure	Hourly Enclosure Pay
5 - 50 ft.	$ .50/hr.
50 – 100 ft.	$ .63/hr.
100 – 150 ft.	$ 2.13/hr.
150 – 200 ft.	$ 4.63/hr.
200 – 300 ft.	$ 4.63 + ([total ft-200] X $.05/hr.
300 - 450 ft.	$ 9.63 + ([total ft-300] X $.10/hr.
450 – 600 ft.	$24.63 + ([total ft-450] X $.20)/hr.

DREDGERS

Zone 1 (Base Rate)

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Leverman (Hydraulic, Dipper, Floating Clamshell)	**30.65**	**7.75**
Asst. Engineer (including Watch Engineer, Welder, Mechanic, Machinist)	**28.60**	**7.75**
Tenderman (Boatman, Attending Dredge Plant); Fireman	**27.66**	**7.75**
Fill Equipment Operator	**26.90**	**7.75**
Assistant Mate (Deckhand); Oiler	**25.16**	**7.75**

Zone Differential for Dredgers
(Add to Zone 1 Rate)

Zone 2	2.00
Zone 3	3.00

Zone 1 Center of job site not more than 30 miles from the City Hall of Portland
Zone 2 More than 30 miles but not more than 50
Zone 3 Over 50 miles

DRYWALL/WETWALL

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Drywall (Acoustical and Drywall Applicator)	22.76	8.84
Wetwall (Lather)	21.74	9.86

ELECTRICIANS

Area 1

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Electricians	**22.26**	**6.79**
Cable Splicers	**24.49**	**6.89**

ELECTRICIANS (Continued)

Area 2

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Electricians	**27.31**	**7.75**
Cable Splicers	**28.68**	**7.80**

Area 3

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Electricians	**26.00**	**9.13**

Area 4

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Electricians	28.00	8.79
Cable Splicers	30.80	8.87
Electrical Material Handler	11.80	3.85

Area 5

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Electricians	**28.70**	**10.86**
Cable Splicers	**28.95**	**10.87**
Electrical Material Handler	**16.22**	**6.84**

Zone pay for Area 5 Electricians
(Add to Basic Hourly Rate)

Zone 1	31-50 miles	$1.00
Zone 2	51-70 miles	$3.00
Zone 3	71-90 miles	$5.00
Zone 4	91 or more	$8.50

There shall be a 30-mile free zone from downtown Portland City Hall and a similar 15-mile free zone around the following cities:

Astoria	Seaside	Tillamook
Hood River	The Dalles	

Further, the free zone at the Oregon coast shall extend along Hwy 101 west to the ocean and Hwy 101 east 10 miles if not already covered by the above 15-mile free zone.

Area 6

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Electricians	25.53	8.02
Cable Splicers	25.53	8.02

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

ELECTRICIANS (Continued)

Area 1	Area 2	Area 3
Malheur	Baker	Coos
	Gilliam	Curry
	Grant	Lincoln
	Morrow	Douglas (a)
	Umatilla	Lane (a)
	Union	
	Wallowa	
	Wheeler	

Area 4	Area 5	Area 6
Benton	Clackamas	Harney
Crook	Clatsop	Jackson
Deschutes	Columbia	Josephine
Jefferson	Hood River	Klamath
Lane (b)	Multnomah	Lake
Linn	Sherman	Douglas (b)
Marion	Tillamook	
Polk	Wasco	
Yamhill (c)	Washington	
	Yamhill (d)	

a) Those portions lying **west** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County
b) Those portions lying **east** of a line running North and South from the NE corner of Coos County to the SE Corner of Lincoln County.

c) South half
d) North half

ELEVATOR CONSTRUCTORS

Area 1

Mechanic	**30.79**	**7.77 + a**
Helper	**21.55**	**7.52 + a**
Probationary	**15.40**	**.41**

Area 2

Mechanic	30.96	7.80 + a
Helper	21.67	7.55 + a
Probationary	15.48	.42

a) Plus 8% of basic hourly rate for employees with more than 5 years of service; 6% of basic hourly rate for 6 months to 5 years of service.

ELEVATOR CONSTRUCTORS (Continued)

Area 1	Area 2
Umatilla	All
Wallowa	Remaining
Union	Counties
Baker	

GLAZIERS	25.19	5.95

(Add $1.00 to base rate if safety belt is required by State safety regulations)

(Add $4.00 to base rate for work done from a non-motorized single-man bosun chair)

Benton	Lane	Multnomah
Clackamas	Lincoln	Polk
Clatsop	Linn	Tillamook
Columbia	Marion	Washington
		Yamhill

HIGHWAY / PARKING STRIPERS	**21.38**	**5.26**
IRONWORKERS	**25.22**	**10.65**

Structural, Reinforcing, Ornamental, Riggers, Signal Men

LABORERS

Group 1	**20.44**	**7.85**
Group 2	**20.93**	**7.85**
Group 3	**21.30**	**7.85**
Group 4	**21.61**	**7.85**
Group 5	**17.98**	**7.85**

Note: A Hazardous Waste Removal Differential must be added to the base rate if work is performed inside the boundary of a Federally Designated Hazardous Waste Site. A Group 1 base rate is used for General Laborer on such a site. For further information on this, call the Prevailing Wage Rate Coordinator at (503) 731-4709.

Zone Differential for Laborers
(Add to Zone 1 Rate)

Zone 2	.65
Zone 3	1.15
Zone 4	1.70
Zone 5	2.75

LABORERS (Continued)

Zone 1 – Projects within 30 miles of City Hall in the cities listed below.
Zone 2 – More than 30 miles but less than 40 miles
Zone 3 – More than 40 miles but less than 50 miles
Zone 4 – More than 50 miles but less than 80 miles.
Zone 5 – More than 80 miles

Reference Cities

Albany	Eugene	Portland
Astoria	Grants Pass	Roseburg
Baker City	Hermiston	Salem
Bend	Klamath Falls	The Dalles
Burns	Medford	
Coos Bay	Pendleton	

Group 1

Asphalt Spreaders	Leverman or Aggregate Spreader (d)
Batch Weighman	Loading Spotter
Broomers	Material Yard Man (e)
Brush Burners/Cutters	Powderman Assistant
Carpenter Tender	Railroad Track Laborers
Car & Truck Loaders	Ribbon Setters (f)
Change-House Man	Rip Rap Man (Hand Placed)
Chipper Operator (a)	Road Pump Tender/Mover
Choker Setter	**Scaffold Tender**
Clean up Laborers ***	Sewer Laborer
Curing, concrete	Signalman
Demolition, wrecking moving (industrial)***	Skipman
Driller Assistant	Slopers
Dry-shack Man	Sprayman
Dumpers, road oiling crew	Stake Chaser
Dumpmen for grading crew	Stockpiler
Elevator Feeders	Tie Back Shoring
Erosion Control Spec (Cert)	Timber Faller/Bucker (Hand Labor)
Fine Graders	Toolroom Man (Job Site)
Fire Watch	**Traffic Control Supervisor (Certified)**
Form Strippers (b)	Weight-Man-Crusher (g)
General Laborer ***	Wood Fence Builder
Guardrail, Median Rail (c)	

a) Pittsburg or similar types
b) Not swinging stages
c) Reference Post, Guide Post, or Right-of Way Marker
d) Flaherty, and similar types
e) Including electrical
f) Including steel forms
g) Aggregate when used

LABORERS (Continued)

a) Air Tracks, Cat Drills, Wagon Drills, Rubber-mounted Drills, and other similar types.
b) Pipe laying, applicable when employee assigned to move, set up, align Laser Beam

*** Laborers can tear off roofs, clean up or handle roofing materials only when at least one new story is added or in demolition work, where no re-roofing will occur.

Group 2

Applicators (a)	Gunite Nozzleman Tender
Brush Cutters (b)	Gunite or Sandblasting Pot Tender
Burners	Handlers/Mixers (f)
Choker Splicer	Pipe Doping & Wrapping
Clary Power Spreader (c)	Post Hole Digger, Air, Gas or Electric
Clean up Nozzleman - Green Cutter (d)	Power Tool Operators (g)
Concrete Laborers	Sand Blasting (wet)
Concrete Power Buggyman	Stake Setter
Crusher Feeder	Tampers
Demolition/Wrecking (e)	
Vibrating Screed	

a) Including Pot Tender for same, applying protective material by hand or nozzle on utility lines or storage tanks on project.
b) Power saw
c) And similar types of spreaders
d) Concrete, rock, etc.
e) Charred Materials
f) Of all materials of an irritating nature including cement and lime
g) Includes, but not limited to: Dry Pack Machine, Jackhammer, Chipping Guns, Paving Breakers

Group 3

Asbestos Removal	Power Saw Operators (c)
Bit Grinder	Sand Blasting (dry)
Concrete Saw Operator	Sewer Timberman
Drill Doctor	Track Liners (d)
Drill Operators (a)	Tugger Operator
Laser Beam (b)	Vibrators (all)
Manhole Builder	Water Blaster
Nippers & Timbermen	Welder
Nuclear Plant Worker- Lead Shield	

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

LABORERS (Continued)

c) Bucking and falling
d) Anchor Machines, Ballast Regulators, Multiple Tampers, Power Jacks

Group 4

Asphalt Rakers	Motorman-Dinky Locomotive
Gunite Nozzleman	Pipe Layers (all)
Grade Checker	Powdermen
High Scalers, Strippers, Drillers (a)	Pumpcrete Nozzleman
	Shield Operator
Laser Beam (Tunnel), applicable when employee assigned to move, set up, align laser beam	Tunnel Bull Gang (above ground)
	Tunnel Chuck Tenders
	Tunnel Miners
	Tunnel Muckers/Brakeman/
Tunnel Powderman	Concrete Crew/Bull Gang
Loop Installation	(underground)

a) Covers work in swinging stages, chairs or belts, under extreme conditions unusual to normal drilling, blasting, barring-down, or sloping and stripping.

Group 5

Clean-up Laborers (building only)***
Demolition, Wrecking & Moving (building only)***
Flagger

***Laborers can tear off roofs, clean up or handle roofing material only when at least one new story is added or in demolition work, where no re-roofing will occur.

LINE CONSTRUCTION

Area 1

Group 1	29.41	7.99
Group 2	26.52	7.88
Group 3	20.57	5.90
Group 4	22.86	5.99
Group 5	19.95	5.87
Group 6	18.74	5.82

LINE CONSTRUCTION (Continued)

Area 2

Cable Splicers	28.42	7.00
Journeyman Lineman	25.75	6.82
Line Equip. Oper.	21.81	6.48
Groundman	15.91	5.03

Area 1 All counties except Malheur County
Area 2 Malheur County

Group 1

Cable Splicers
Leadman Pole Sprayer
Lineman
Pole Sprayer

Group 2

Certified Lineman Welder
Heavy Line Equipment Man

Group 3

Tree Trimmer

Group 4

Line Equipment Man

Group 5

Head Groundman
Jackhammer Man
Powderman

Group 6

Groundman

MARBLE SETTERS (Includes Granite)
(This trade is tended by "Tile, Terrazzo, Brick & Marble Finishers")

Area 1	26.63	8.59
Area 2	25.41	8.24

Area 1

Baker	Malheur (a)	Wallowa
Benton (a)	Marion	Wasco (a)
Clackamas	Morrow	Washington
Clatsop	Multnomah	Yamhill
Columbia	Polk	
Gilliam	Sherman	
Hood River	Tillamook	
Lincoln (a)	Umatilla	
Linn (a)	Union	

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

MARBLE SETTERS (Continued

Area 2

Benton (b)	Harney	Lincoln (b)
Crook	Jackson	Linn (b)
Coos	Jefferson	Malheur (b)
Curry	Josephine	Wasco (b)
Deschutes	Klamath	Wheeler
Douglas	Lake	
Grant	Lane	

a) North Half
b) South Half

PAINTERS & DRYWALL TAPERS

Brush Painting	20.15	3.48

(Add $0.60 to base rate for spray, sandblasting, other pressure blasting over 3000 PSI, and steam cleaning.)

(Add $0.50 to base rate for work over 60 ft. high on swing stage, mechanical climber, spider or bucket truck.)

Drywall Tapers	**25.00**	**7.85**

PLASTERERS

Nozzleman	**26.66**	6.36
Swinging Scaffold	**25.66**	6.36
All Other Work	**24.66**	6.36

PLUMBERS & STEAMFITTERS/PIPEFITTERS

Area 1 (Both)	**22.74**	**7.07**

(Add $2.21 per hour to basic hourly rate if it is possible for worker to fall 30 ft or more, or is required to wear a fresh-air mask or similar equip.)

Zone Differential for Area 1 Plumbers & Steamfitters/Pipefitters
(Add to Zone 1 Rate)

Zone 2	$ 1.20 per hour
Zone 3	$ 1.70 per hour
Zone 4	$ 2.50 per hour
Zone 5	$ 3.55 per hour
Zone 6	$30.32 per day

PLUMBERS & STEAMFITTERS/PIPEFITTERS (Cont'd)

Zone 1: Projects within 15 miles of City Hall in the cities listed below.
Zone 2: More than 15 but less than 30.
Zone 3: More than 30 but less than 40.
Zone 4: More than 40 but less than 50.
Zone 5: More than 50 but less than 100.
Zone 6: More than 100 miles.

Reference Cities for Area 1 — Boise, Idaho; Twin Falls, Idaho

With distances in Zone 6, 100 miles and beyond, there shall be a minimum of one hundred fifty-one dollars and sixty cents ($151.60) per week or thirty dollars and thirty-two cents ($30.32) per day worked.

Area 2 (Both)	28.10	10.30
Area 3 (Both)	**29.54**	**9.80**

Area 1	Area 2	Area 3
Baker	Grant (b)	All
Harney (a)	Morrow	Remaining
Malheur	Umatilla	Counties
	Wallowa	
	Union	

a) Except Northwest Portion
b) Except Southwest Corner

POWER EQUIPMENT OPERATORS

	Zone 1 (Base Rate)	
Group 1	26.91	8.20
Group 2	26.00	8.20
Group 3	25.30	8.20
Group 4	24.83	8.20
Group 5	24.27	8.20
Group 6	22.10	8.20

Note: A Hazardous Waste Removal Differential must be added to the base rate if work is performed inside the boundary of a Federally Designated Waste Site. For information on this differential, call the Prevailing Wage Rate Coordinator at (503) 731-4709.

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT	TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

POWER EQUIPMENT OPERATORS

Zone Rates

Zone 2	$1.50
Zone 3	$3.00

FOR THE FOLLOWING METROPOLITAN COUNTIES:

Multnomah; Clackamas; Marion; Yamhill; Washington and Columbia:

- **Zone map for this classification on page 71**

(A) All jobs or projects located in Multnomah, Clackamas and Marion counties, west of the western boundary of Mt Hood National Forest and west of mile post 30 on Interstate 84 and west of mile post 30 on State Hwy 26 and west of mile post 30 on Hwy 22 and all jobs located in Yamhill County, Washington County and Columbia County shall receive Zone 1 pay for all classifications

(B) All jobs or projects located in the area outside the identified boundary above, but less than 50 miles from the Portland City Hall shall receive Zone 2 pay for all classifications.

(C) All jobs or projects located more than 50 miles from the Portland City Hall, but outside the identified border above, shall receive Zone 3 pay for all classifications.

FOR THE FOLLOWING CITIES:

Albany; Bend; Coos Bay; Eugene; Grants Pass; Klamath Falls, Medford and Roseburg

(A) All jobs or projects located within 30 miles of the respective City Hall of the above mentioned cities shall receive Zone 1 pay for all classifications.

(B) All jobs or projects located more than 30 miles and less than 50 miles from the respective City Hall of the above mentioned cities shall receive Zone 2 pay for all classifications.

(C) All jobs or projects located more than 50 miles from the respective City Hall of the above mentioned cities shall receive Zone 3 pay for all classifications.

POWER EQUIPMENT OPERATORS (Continued)

ASPHALT

Group	
6	Plant Oiler
6	Plant Fireman
6	Pugmill Operator (any type)
6	Truck mounted asphalt spreader, w/screed
4	Screed Operator
5	Extrusion Machine Operator
2	Asphalt Plant Operator (any type)
4	Asphalt Paver Operator
5	Roller Operator (any asphalt mix)
4	Diesel-Electric Engineer, Plant
5	Asphalt Burner and Reconditioner Operator (any type), 84
4	Roto-Mill, pavement profiler, under 6 ft lateral cut
5	Roto-Mill, pavement profiler, ground man
2	Roto-Mill, pavement profiler operator, 6 ft lateral cut and over

BLADE

Group	
6	Blade Operator, pulled type
4	Blade Operator
4	Blade Operator, Finish
4	Blade Operator, externally controlled by electronic, mechanical hydraulic means
4	Blade Operator, multi-engine
2	Auto Grader or "Trimmer" Operator

BULLDOZERS

Group	
4	Bulldozer Operator
4	Drill Cat Operator
4	Side-Boom Operator
2	Tandem bulldozer operator (quadnine & similar type, D-11)
4	Bulldozer Operator, twin engine (TC12 and similar type, D-10)
4	Cable-Plow Operator (any type)

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

POWER EQUIPMENT OPERATORS (Continued)

CLEARING

Group	
4	Log Skidder Operator
4	Chipper Operator
4	Incinerator Operator
4	Stump Splitter Operator
4	Faller/Buncher Operator

COMPRESSORS

Group	
6	Compressor Operator (any power), **under** 1,250 cu. ft. total capacity.
5	Compressor Operator (any power), **over** 1,250 cu. ft. total capacity.

COMPACTORS – **Self-Propelled**

Group	
5	Compactor Operator, including vibratory
5	Wagner Patco Operator or similar type (without blade)
4	Compactor Operator, with blade
4	Compactor Operator, multi-engine

CONCRETE

Group	
6	Plant Oiler
6	Assistant Conveyor Operator
6	Conveyor Operator
6	Mixer Box Operator (C.T.B., dry batch,
6	Cement Hog Operator
6	Concrete Saw Operator
6	Wire Mat or Brooming Machine Operator
5	Combination Mixer and Compressor Operator, Gunite work
5	Beltcrete Operator
5	Pumpcrete Operator (any type)
5	Pavement Grinder and/or Grooving Operator (riding type)
4	Mixer Mobile Operator
5	Cement Pump Operator, Fuller-Kenyon similar

POWER EQUIPMENT OPERATORS (Continued)

CONCRETE (Continued)

Group	
5	Concrete Pump Operator
5	Grouting Machine Operator
4	Screed Operator
4	Concrete Cooling Machine Operator
5	Concrete Mixer Operator, single drum, any capacity
2	Batch Plant and/or Wet Mix Operator 1 and 2 drum
1	Batch Plant and/or Wet Mix Operator, 3 units or more
5	Cast in place pipe laying machine
5	Maginnis Internal Full Slab Vibrator Operator
5	Concrete Finishing Machine Operator, Clary, Johnson, Bidwell, Burgess bridge deck or similar type
5	Curb Machine Operator, Mechanical Berm, Curb and/or Curb and Gutter
5	Concrete Joint Machine Operator
5	Concrete Planer Operator
5	Tower Mobile Operator
5	Power Jumbo Operator setting slip forms etc., in tunnels
5	Slip Form Pumps, power driven hydraulic lifting device for concrete forms
5	Concrete Paving Machine Operator
5	Concrete Finishing Machine Operator
5	Concrete Spreader Operator
4	Concrete Paving Road Mixer
4	Reinforced Tank Banding Machine (K-17 or SIMILAR TYPES)
2	Concrete Profiler, Diamond Head
2	Automatic Concrete Slip Form Paver Oper.
2	Concrete Canal Line Operator
4	Concrete Breaker

CRANE

Group	
6	Oiler
6	Truck Crane Oiler-Driver, 25 ton capacity or over
6	Fireman, all equipment
6	A-Frame Truck Operator, single drum
6	Tugger or Coffin Type Hoist Operator

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

POWER EQUIPMENT OPERATORS (Continued)

CRANE (Continued)

Group	
5	Helicopter Hoist Operator
5	Hoist Operator, single drum
5	Elevator Operator
5	A-Frame Truck Operator, double drum
5	Boom Truck Operator
4	Chicago Boom and similar types
4	Lift Slab Machine Operator
4	Boom Type lifting device, 5 ton capacity or less
4	Cherry Picker or similar type crane-hoist, 5 ton capacity or less
4	Hoist Operator, two drum
4	Hoist Operator, three or more drums
4	Derrick Operator, under 100 tons
4	Hoist Operator, stiff leg, guy derrick or similar type, 50 ton and over
4	Cableway Operator, up to 25 tons
4	Bridge Crane Operator, Locomotive, Gantry, Overhead
2	Cableway Operator, 25 tons and over
1	Helicopter Operators, when used in erecting work

HYDRAULIC CRANE OPERATOR

Group	
5	Hydraulic Boom Truck Operator, Pittman
4	Hydro Crane Operator, under 50 tons
3	Hydro Crane Operator, 50 tons – 89 tons
2	Hydro Crane Operator, 90 tons – 199 tons
1	Hydro Crane Operator, 200 tons and over

TOWER/WHIRLEY OPERATOR

Group	
2	Tower Crane Operator
2	Whirley Operator, under 90 tons
1	Whirley Operator, 90 tons and over

LATTICE BOOM CRANE OPERATOR

Group	
4	Lattice Boom Crane Operator, under 50

POWER EQUIPMENT OPERATORS (Continued)

LATTICE BOOM CRANE OPERATOR (Continued)

Group	
3	Lattice Boom Crane Operator, 50 tons through 89 tons, & less than 250 ft boom
2	Lattice Boom Crane Operator, 90 tons through 199 tons, and/or 150 ft-200 ft boom
1	Lattice Boom Crane (Operator, 200 tons and over, and/or over 200 ft boom

CRUSHER

Group	
6	Crusher Oiler
6	Crusher Feederman
4	Generator Operator
4	Diesel-Electric Engineer
4	Grizzley Operator
2	Crusher Plant Operator

DRILLING

Group	
6	Drill Assistant
6	Auger Oiler
5	Churn Drill and Earth Boring Machine Operator
4	Drill Doctor
4	Boring Machine Operator
4	Driller – Percussion, Diamond, Core, Cable, Rotary and similar type
4	Cat Drill (John Henry)

FLOATING EQUIPMENT

Group	
6	Deckhand
6	Boatman
5	Fireman
4	Diesel-Electric Engineer
4	Barge Operator, self-unloading
4	Piledriver Operator (not crane type)
4	Floating Clamshell, etc. Operator, under 3 cu. yd. (only for construction projects - otherwise see "Dredging")

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

POWER EQUIPMENT OPERATORS (Continued)

FLOATING EQUIPMENT (Continued)

Group	
4	Floating Crane (derrick barge) Operator, less than 30 tons
2	Floating Clamshell, etc. Operator, 3 cu. yd. and over (only for construction projects - otherwise see "Dredging")
2	Floating Crane (derrick barge) Operator, 30 tons but less than 150 tons
1	Floating Crane, 150 tons and over

FORK LIFT

Group	
6	Self-Propelled Scaffolding Operator (excluding working platform)
6	Fork Lift or Lumber Stacker Operator
6	Ross Carrier Operator
5	Lull Hi-Lift Operator or similar type
5	Fork Lift, over 5 tons
3	Rock Hound Operator

GENERATORS

Group	
4	Generator Operator
4	Diesel-Electric Engineer

GUARDRAIL EQUIPMENT

Group	
6	Oiler
6	Auger Oiler
6	Oiler, combination guardrail machines
4	Guardrail Punch Operator (all types)
6	Guardrail Punch Oiler
4	Guardrail Auger Operator (all types)
4	Combination Guardrail machines, i.e. Punch, Auger etc.

POWER EQUIPMENT OPERATORS (Continued)

HAZARDOUS WASTE REMOVAL

Group	
5	Assistant to the Engineer (Oiler)
4	Assistant Incinerator Control Board Oper.
3	Incinerator Control Board Operator

HEATING PLANT

Group	
6	Temporary Heating Plant Operator
4	Surface Heater and Planer Operator

HYDRAULIC HOES

Group	
5	Hydraulic Backhoe Operator, wheel type 3/8 cu. yd. And under with or without front end attachments 2 ½ cu. yd. and under (Ford, John Deere, Case type)
4	Hydraulic Backhoe Operator, Track Type 3/8 cu. yd. (Note: Over 3/8 cu. yd. takes shovel classification rate)

LOADERS

Group	
6	Bobcat, Skid Steer (under 1 cubic yard)
6	Bucket Elevator Loader Operator, Barber-Greene and similar types
5	Loaders, rubber-tired type, 2 ½ cu. yd. and under
5	Elevating Grader Operator, Tractor Towed requiring Operator or Grader
4	Belt Loader Operator, Kolman and Ko Cal types
4	Loader Operator, front end and overhead, 2 ½ cu. yd. and under 4 cu. yd.
4	Elevating Loader Operator, Athey and similar types
4	Elevating Grader Operator, Sierra, Euclid or similar types
3	Loader Operator, 4 cu. yd. but less than 6 cu. yd
2	Loader Operator, 6 cu. yd. and over

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

POWER EQUIPMENT OPERATORS (Continued)

OILERS

Group	
6	Oiler
6	Guardrail Punch Oiler
6	Truck Crane Oiler-Driver, 25 ton or over
6	Auger Oiler
6	Grade Oiler, required to check grade
5	Service Oiler (Greaser)
6	Grade Checker

PILEDRIVERS
(Use Crane rates when driving or pulling piling)

Group	
4	Hammer Operator
4	Piledriver Operator (not crane type)

PIPE LINE - Sewer Water

Group	
6	Tar Pot Fireman
6	Tar Pot Fireman (power agitated)
6	Hydraulic Pipe Press Operator
5	Hydra Hammer or similar types
5	Pavement Breaker Operator
4	Pipe Cleaning Machine Operator
4	Pipe Doping Machine Operator
4	Pipe Bending Machine Operator
4	Pipe Wrapping Machine Operator
4	Boring Machine Operator
4	Back Filling Machine Operator

PUMPS

Group	
6	Pump Operator, any power
6	Hydrostatic Pump Operator
5	Pump Operator, more than 5 (any size)
5	Pot Rammer Operator

POWER EQUIPMENT OPERATORS (Continued)

RAILROAD EQUIPMENT

Group	
6	Brakeman
6	Oiler
6	Switchman
6	Motorman
6	Ballast Jack Tamper Operator
5	Locomotive Operator
5	Ballast Regulator Operator
4	H.D. Mechanic
5	Ballast Tamper Multi-Purpose Operator
5	Track Liner Operator
5	Tie Spacer Operator

REMOTE CONTROL

Group	
2	Remote controlled earth-moving equipment

REPAIRMEN, Heavy Duty

Group	
6	Parts Man (Tool Room)
6	H.D. Repairman Assistant
6	Welder's Assistant
4	Diesel-Electric Engineer (Plant or Floating)
4	Bolt Threading Machine Operator
4	Drill Doctor (Bit Grinder)
4	H.D. Mechanic
4	H.D. Welder
4	Machine Tool Operator
4	Combination H.D. Mechanic-Welder, when dispatched and/or when required to do both
4	Welder - Certified, when dispatched and/or required

RUBBER-TIRED SCRAPERS

Group	
4	Rubber-tired Scraper Operator, single engine, single scraper
4	Self-loading, paddle wheel, auger type under 15 cu. yd.
4	Rubber-tired Scraper Operator, twin engine
4	Rubber-tired Scraper Operator, with push-pull attachments.

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT	TRADE	BASIC HOURLY RATE	FRINGE BENEFIT

POWER EQUIPMENT OPERATORS (Continued)

RUBBER-TIRED SCRAPERS (Continued)

Group

3 Rubber-tired Scraper Operator, with tandem scraper
2 Rubber-tired Scraper Operator, with tandem scrapers, multi-engine
4 Self-loading, paddle wheel, auger type 15 cu. yd. and over, single engine
3 Self-loading, paddle wheel, auger type, finish and/or 2 or more units

SHOVEL, DRAGLINE, CLAMSHELL, BACKHOE, SKOOPER, ETC., OPERATOR

Group

6 Oiler
6 Grade Oiler (required to check grade)
6 Grade Checker
6 Fireman
4 Diesel-Electric Engineer
4 Stationary Drag Scraper Operator
4 Shovel, Dragline, Clamshell, Hoe etc., Operator under 3 cu. yd.
4 Grade-all Operator
2 Shovel, Dragline, Clamshell, Hoe etc., Operator 3 cu. yd. and over

SIGNALMAN

Group

6 Bell Boy, phones, etc., Operator
6 Helicopter Radioman (ground)

SURFACING (BASE) MATERIAL

Group

6 Roller Operator, grading of base rock (not asphalt)
5 Roller Operator, Oiling, C.T.B.
6 Tamping Machine Operator, mechanical, self-propelled
6 Hydrographic Seeder Machine Operator, straw, pulp or seed
5 Rock Spreaders, self-propelled

POWER EQUIPMENT OPERATORS (Continued)

SURFACING (BASE) MATERIAL (Continued)

Group

5 Pulva-mixer or similar types
4 Blade Mounted Spreaders, Ulrich and similar types
5 Chip Spreading Machine Operator
5 Lime Spreading Operator

SWEEPERS

Group

6 Broom Operator, self-propelled
5 Sweeper Operator (Wayne type) self-propelled

TRACTOR – RUBBER TIRED

Group

5 Tractor Operator, rubber-tired, 50 H.P. Flywheel and under
4 Tractor Operator, rubber-tired, over 50 H.P. Flywheel
4 Tractor Operator, with boom attachment
4 Rubber-tired Dozers and Pushers (Michigan,Cat, Hough type)

TRENCHING MACHINE

Group

6 Oiler
6 Grade Oiler (required to check grade)
5 Trenching Machine Operator, maximum digging capacity 3 ft. depth
4 Trenching Machine Operator, maximum digging capacity over 3 ft. depth
4 Back Filling Machine Operator
2 Wheel Excavator
2 Canal Trimmer
2 Band Wagon (in conjunction with wheel excavator

POWER EQUIPMENT OPERATORS (Continued)

TUNNEL

Group	
4	Mucking Machine Operator
6	Conveyor Operator (any type)
4	Shield Operator
6	Air Filtration Equipment Operator
6	Dinkey Operator
6	Oiler
4	Tunnel Boring Machine Operator

UNDERWATER EQUIPMENT

Group	
2	Underwater Equipment Operator, remote or otherwise, when used in construction work

WELDING MACHINES

Group	
6	Welding Machine Operator

ROOFERS

	BASIC HOURLY RATE	FRINGE BENEFIT
Area 1		
Roofers	21.90	5.95
Handling coal tar pitch	24.09	5.95
Remove fiberglass insulation	24.09	5.95
Area 2	18.00	6.72

(Add $2.00 per hour to Fringe for work with irritable Bituminous material)

SHEET METAL WORKERS

	BASIC HOURLY RATE	FRINGE BENEFIT
Area 1	**25.28**	**10.23**

- (Add $1.00 to base rate for work performed on any swinging platform, swinging chair or swinging ladder)

SHEET METAL WORKERS (Continued)
Area 1 (Continued)

- (Add $1.00 to base rate for work with lead or installing material in a plant that uses lead in any form to manufacture a product. (excluding soldering)
- (Add $1.00 to base rate for work performed in a confined space as defined by OSHA.)

Area 2	21.28	7.46

- (Add $1.75 to base rate for work performed whenever it is possible for worker to fall 30' or more)
- (Add $1.75 to base rate for work performed in an area where epoxy resins or other injurious chemicals are being applied)

Area 3	**25.43**	**8.36**

- (Add $1.00 to base rate for work where it is necessary to wear a chemically activated face mask)
- (Add $1.00 to base rate for work where employees are required to wear a fresh air mask due to nuclear related work)
- (Add $.45 to base rate for work on a swinging stage, swinging scaffold or bosun chair in excess of 30 feet above the ground)

Area 4 & Area 5	**22.46**	**8.78**

Areas

1	2	3	4	5
Clackamas	Baker	Morrow	Douglas	Coos
Gilliam		Umatilla	Lane	Curry
Grant		Union		
Marion		Wallowa		
Multnomah				
Polk				
Wasco				
Washington				
Wheeler				
Yamhill				

SOFT FLOOR LAYERS	**21.96**	**5.88 + a**

a) Plus 4% of basic hourly rate for employees with less than one year of service, 6% for those with more than one year.

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
SPRINKLER FITTERS	24.40	7.90
TENDERS TO MASON TRADES	21.19	7.50

Tenders to Bricklayers and Stone Masons, Mortar Mixers

(Add $.50 to base rate for refractory work)

(Add to base rate an amount equal to that received for safety belt requirements or other unusual job conditions by the mechanic this worker is tending)

TENDERS TO PLASTERERS	20.14	7.50
TILE SETTER/ TERRAZZO WORKER	**23.50**	**6.98**

(This trade is tended by "Tile, Terrazzo, Brick & Marble Finishers")

(Add $.50 to base rate if safety belt required by State safety regulations.)

(Add $1.00 to base rate if work involves epoxy, furnane, alkor acetylene black grouting or waterproof membrane.)

TILE, TERRAZZO, BRICK & MARBLE FINISHERS	**17.65**	**5.37**

Assists Tile Setter, Bricklayers, Marble Masons and Terrazzo Workers by striking, sawing, cleaning, washing or grouting. Does not lay or set any material.

- (Add $.50 to base rate if safety belt required by State safety regulations)
- (Add $1.00 to base rate if work involves epoxy, furnane, alkor acetylene black grouting or waterproof membrane.)
- (Add $.75 to fringe for refractory repair work.)

TRUCK DRIVERS

Zone 1 (Base Rate)

TRADE	BASIC HOURLY RATE	FRINGE BENEFIT
Group 1	**22.08**	**8.85**
Group 2	**22.20**	**8.85**
Group 3	**22.33**	**8.85**
Group 4	**22.59**	**8.85**
Group 5	**22.81**	**8.85**
Group 6	**22.97**	**8.85**
Group 7	**23.17**	**8.85**

Note: A Hazardous Waste Removal Differential must be added to the base rate if work is performed inside the boundary of a Federally Designated Hazardous Waste Site. For further information on this, call the Prevailing Wage Rate Coord. at (503) 731-4709

Zone Differential for Truck Drivers
(Add to Zone 1 Rate)

Zone 2	.65
Zone 3	1.15
Zone 4	1.70
Zone 5	2.75

Zone 1 Projects within 30 miles of City Hall in the cities listed below.
Zone 2 More than 30 miles but less than 40 miles.
Zone 3 More than 40 miles but less than 50 miles.
Zone 4 More than 50 miles but less than 80 miles.
Zone 5 More than 80 miles.

Reference Cities

Astoria	Hood River	Oregon City	The Dalles
Goldendale	Longview	Portland	Tillamook

Work	Group
A-Frame or Hydra-lift Truck w/load bearing surface	1
Battery Rebuilder	1
Bus or Man-Haul Driver	1
Concrete Buggies (Power operated)	1

Drivers and Helpers handling sacked concrete - add 15¢ per hour.

TRUCK DRIVERS (Continued)

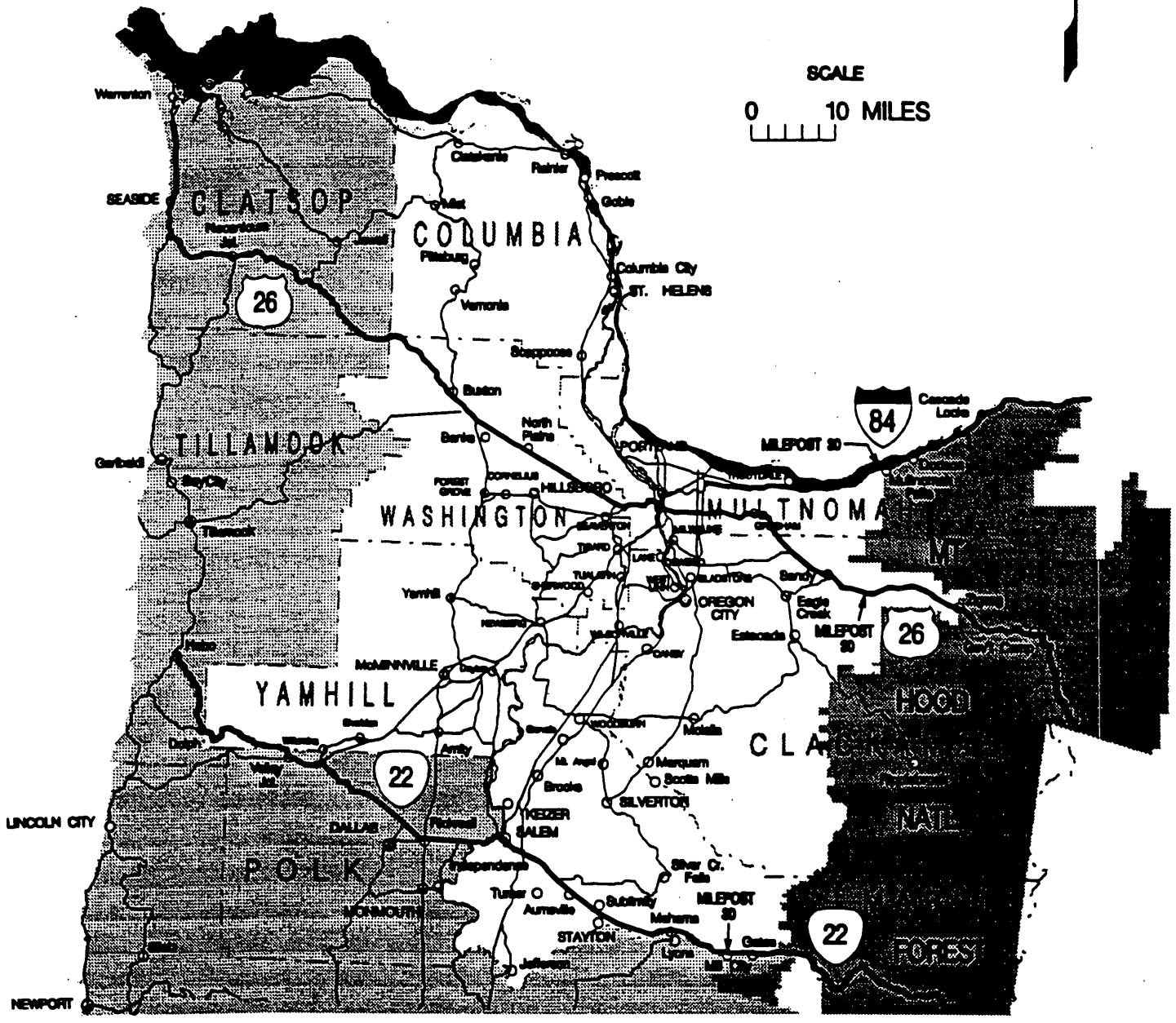
Work	Group
Dump Trucks, **Articulated Dump Trucks**, Side, End and Bottom Dumps, including Semi-Trucks and trains or combinations thereof:	
Up to and including 10 cu. yds	1
Over 10 cu. yds. and inc. 30 cu. yds.	3
Over 30 cu. yds. and inc. 50 cu. yds.	4
Over 50 cu. yds. and inc. 60 cu. yds.	5
Over 60 cu. yds. and inc. 80 cu. yds.	6
Over 80 cu. yds. and inc. 100 cu. yds.	7
Dumpsters or Similar Equipment – all sizes	2
Flaherty Spreader Driver or Leverman	2
Lift Jitneys, Fork List-all sizes-used in loading, unloading & transporting material on job site	1
Loader and/or Leverman on Concrete Dry Batch Plant, manually operated	1
Low Bed Equipment, Flat Bed Semi-Truck and Trailer or Doubles transporting equipment or wet or dry materials	2
Lubrication Man, Fuel Truck Driver, Driver, Tireman, Wash Rack, Steam Cleaner or combination	1
Lumber Carrier, Driver-Straddle Carrier-used in loading, unloading and transportation of material on job site	2
Oil Distributor Driver or Leverman	2
Pilot Car	1
Slurry Truck Driver or Leverman	1
Solo Flat Bed and Misc. Body Truck, 0-10 tons	1
Team Drivers	1
Tireman, full-time basis	1

TRUCK DRIVERS (Continued)

Work	Group
Transit Mix and Wet or Dry Mix Trucks:	
5 cu. yds. and under	1
Over 5 cu. yds. and inc. 7 cu. yds.	2
Over 7 cu. yds. and inc. 11 cu. yds.	3
Over 11 cu. yds. and inc. 15 cu. yds	4
Truck Assistant	1
Truck Mechanic-Welder-Body Repairman	3
Truck Mechanic Assistant	1
Water Wagons (Rated Capacity) up to:	
3000 gallons	1
3000 to 5000 gallons	2
5000 to 10,000 gallons	3
10,000 to 15,000 gallons	4
Winch Truck – takes classification of truck on which winch is mounted.	

BUREAU OF LABOR AND INDUSTRIES
Wage and Hour Division

ZONE 1



LIST OF CONTRACTORS INELIGIBLE TO RECEIVE PUBLIC WORKS CONTRACTS

Publication Date: June 6, 2000

To: All Oregon Contracting Agencies

Pursuant to ORS 279.361, contractors on this list are ineligible to receive public works contracts subject to the Prevailing Wage Rate Law. These contractors and subcontractors, as well as any firm, corporation, partnership or association in which the contractor or subcontractor has a financial interest are ineligible to receive public works contracts until removed from this list.

If you have questions regarding the list or for the most current information regarding persons ineligible to receive prevailing wage contracts, please contact the Prevailing Wage Rate Coordinator, (Portland) (503) 731-4709.

	CONTRACTOR NAME	DATE PLACED	REMOVAL DATE
1.	**Tracy Alexander** 16004 SW Tualatin-Sherwood, Suite 256 Sherwood, OR 97140	May 15, 2000	May 14, 2003
2.	**B.A.M. Electric Company, Inc.** 3718 Altamont Drive Klamath Falls, OR 97603	July 22, 1998	July 21, 2001
3.	**Kevin Brazell** **Debra Brazell** 155 Lyon Drive Fernley, NV 89408	October 6, 1999	October 5, 2002
4.	**Norman S. Brown** 4324 'B' Street Springfield, OR 97478	July 15, 1999	July 14, 2002
5.	**Cameron Creations** **Steven Cameron** **Nancy Cameron** PO Box 2 Lowell, OR 97452	May 25, 2000	Not to be Removed
6.	**E. Gene Kasey dba** **Empire Landscaping** 4714 SE 104th Portland, OR 97266	April 1, 1999	March 31, 2002
7.	**Del Gilman dba** **Del Gilman Painting** 1766 Henderson Eugene, OR 97403	April 1, 1999	March 31, 2002
8.	**HydroTech, Inc.** 155 Lyon Drive Fernley, NV 89408	October 6, 1999	October 5, 2002
9.	**Lisa A. Wiese dba** **L & G Interiors** P.O. Box 2218 Clackamas, OR 97015	April 20, 1998	April 19, 2001
10.	**Larson Construction Co., Inc. and** **David M. Larson** 485 SE 5th Warrenton, OR 97146	July 22, 1998	July 21, 2001

LIST OF CONTRACTORS INELIGIBLE TO RECEIVE PUBLIC WORKS CONTRACTS

Publication Date: June 6, 2000

11.	**Scott Little** **Rhonda Little** 9106-BN NE Highway 99 Vancouver, WA 98665	April 25, 2000	April 24, 2003
12.	**Anthony Lockett, Sr.** 16004 SW Tualatin-Sherwood, Suite 256 Sherwood, OR 97140	May 15, 2000	May 14, 2003
13.	**Magic Numbers Estimating, Inc.** c/o Russell D. Bevans, Registered Agent 895 Country Club Rd., Suite C-175 Eugene, OR 97401-6006	December 6, 1999	December 5, 2002
14.	**Pro Fit Development, Inc.** **Karl O. Johnson** **Devin Luzier** 1501 Green Siding Rd. Roseburg, OR 97470	April 20, 1998	April 19, 2001
15.	**Quality Homes N.W., Inc.** 9106-BN NE Highway 99 Vancouver, WA 98665	April 25, 2000	April 24, 2003
16.	**Russell L. Rich** 84901 Battle Creek Road Eugene, OR 97402	July 15, 1999	July 14, 2002
17.	**Single-Ply Roofing Systems, Inc.** c/o Russell L. Rich, Registered Agent 84901 Battle Creek Road Eugene, OR 97402	July 15, 1999	July 14, 2002
18.	**Keith Testerman dba** **Testerman Masonry** 1940 NE Sams Loop, #4 Bend, OR 97701	June 6, 2000	June 5, 2003
19.	**Veneta Roofing Company** c/o Douglas Minger, Registered Agent 541 Willamette St., Suite 110 Eugene, OR 97401	July 15, 1999	July 14, 2002
20.	**Western Integrity Drywall** 16004 SW Tualatin-Sherwood, Suite 256 Sherwood, OR 97140	May 15, 2000	May 14, 2003
21.	**Westside Landscape, Inc.** **Tim Barnes** 590 Greenwood Rd. Independence, OR 97351	May 4, 1998	May 3, 2001
22.	**Bernard J. Woodard dba** **Woodard Enterprises** 33939 Row River Rd. Cottage Grove, OR 97424	December 6, 1999	December 5, 2002

BUREAU OF LABOR AND INDUSTRIES
PREVAILING WAGE RATE UNIT

INSTRUCTIONS FOR COMPLETING THE PREVAILING WAGE RATE PAYROLL/CERTIFIED STATEMENT FORM

This form may be used by contractors for reporting their payroll as required by ORS 279.354 on public works projects subject to the Prevailing Wage Rate Law. The form contains a certified statement that is required to be signed by the contractor, certifying the accuracy of the information reported on the payroll, including representations pertaining to the provision of fringe benefits to employees by third parties. Contractors are not required to use this form in reporting their payroll, however, the contractor must provide all of the information contained in the form, and the certified statement must be signed and submitted with the contractor's payroll. Detailed instructions concerning the preparation of the form follow:

Complete the box at the top of the form. Check either the prime contractor or subcontractor box, and indicate whether the payroll report is the first, a 90-day, or last submission. Be sure to enter the date the contract was first advertised for bid. If you are not sure of this date, contact the Public Contracting Agency.

Column 1 - NAME AND ADDRESS OF EMPLOYEE: The employee's full name must be shown on each payroll submitted. The employee's address must also be shown on the first payroll submitted. (The address need not be shown on subsequent payrolls submitted unless the address changes.)

Column 2 - TRADE CLASSIFICATIONS: List the classification found in the Bureau of Labor and Industries' publication "Prevailing Wage Rates for Public Works Contracts in Oregon," that is most descriptive of the work actually performed by the employee. Give the group number for those worker classifications that include such information. Consult the worker classifications and minimum prevailing wage rate schedule set forth in the contract specifications. Use the appropriate prevailing wage rates in effect at the time the contract was first advertised for bid for information regarding trade classifications, basic hourly rates, and hourly fringe benefits. Indicate which workers are apprentices, if any, and give their current percentage, trade classification, and group number when applicable. If an employee works in more than one worker classification, use the highest rate for all hours worked, or use separate line entries to show hours worked, rate of pay, and fringe benefit for each classification.

Column 3 - DAY AND DATE: Enter the day of the week (M, T, W, Th, F, S, Sn) in the top row of boxes, and the corresponding date below.

HOURS WORKED EACH DAY: Enter the total number of "straight time" hours worked in the row marked "S." Hours worked over 8 in a day or work performed on Saturdays, Sundays, and legal holidays should be entered as overtime ("OT") hours worked. Contractors who have adopted a written work schedule of four consecutive ten-hour days, Monday through Thursday or Tuesday through Friday may enter hours worked over 10 in a day as overtime hours.

Column 4 - TOTAL HOURS: Enter separately the total number of straight time and overtime hours worked by each listed employee and classification during this pay period. The total number of straight time hours worked should be entered in the lower box ("S"); the total number of overtime hours worked should be entered in the top box ("OT").

Column 5 - BASIC HOURLY RATE OF PAY: Enter the basic hourly rate and the overtime hourly rate (if any) paid the employee in the appropriate straight time and overtime boxes. (Payment of not less than one and one half times the basic or regular rate of pay, not including fringe benefits, is required to be paid in overtime pursuant to ORS 279.334.)

Column 6 - HOURLY FRINGE BENEFIT AMOUNT PAID AS WAGES TO THE EMPLOYEE: Enter any additional cash paid directly to the employee in lieu of fringe benefits. (It is not necessary to pay time and a half for overtime work on those wages that are paid in lieu of fringe benefits.)

Column 7 - GROSS AMOUNT EARNED: Enter the gross amount of wages earned by and paid to the worker in each classification for all listed straight time and overtime hours, and including any additional amounts paid directly to the employee.

Column 8 - TOTAL DEDUCTIONS, FICA, FED, STATE, ETC.: Enter the total amount of deductions withheld from the wages of each employee for only those hours reported on this payroll/certified statement for this project. (All deductions must be in accordance with the provisions of ORS 652.610.)

Column 9 - NET WAGES PAID FOR WEEK: Enter the total amount of net wages actually paid to the employee after subtracting the total deductions reported in Column 8 from the gross amount earned shown in Column 7.

Column 10 - HOURLY FRINGE BENEFITS PAID TO BENEFIT PARTY PLAN, FUND OR PROGRAM: Enter the hourly amount of fringe benefits paid to each individually approved party, plan, fund or program for each employee. List these amounts separately on the lines provided. Any contractor who is making payments to approved parties, plans, funds or programs in amounts less than the required hourly fringe benefit is obligated to pay the difference directly to the employee as wages in lieu of fringe benefits, and to show that amount in Column 6 of this form.

Column 11 - NAME OF BENEFIT PARTY, PLAN, FUND OR PROGRAM: Enter the name of the party, plan, fund or program that corresponds to the amount paid as an hourly fringe benefit in Column 10.

CALCULATION CHECK

In order to determine whether the wages and fringe benefits paid are sufficient to meet prevailing wage rate requirements, the following check may be performed:

1. For each trade classification listed in Column 2, compute the sum of:
   a) the Basic Hourly Rate of Pay (Column 5),
   b) the Hourly Fringe Benefit Amount Paid as Wages to Employee (Column 6),
   c) and the Hourly Fringe Benefits Paid To Benefit Party, Plan, Fund or Program (Column 10).

2. This sum must equal or exceed the total of the Basic Hourly Rate (including zone pay and special wage differentials, if any) and the Fringe Benefit Amount as they are listed for the corresponding trade classifications in the appropriate issue of the Bureau of Labor and Industries publication Prevailing Wage Rates for Public Works Contracts in Oregon.

IF YOU HAVE QUESTIONS REGARDING COMPLETION OF THIS FORM, CONTACT THE PREVAILING WAGE RATE UNIT OF THE BUREAU OF LABOR AND INDUSTRIES AT (503) 731-4709.

NOTE: PAYROLL/CERTIFIED STATEMENTS ARE REQUIRED TO BE SUBMITTED TO THE CONTRACTING AGENCY ONLY.

BUREAU OF LABOR AND INDUSTRIES
WAGE AND HOUR DIVISION

PAYROLL/CERTIFIED STATEMENT FORM WH-38
FOR USE IN COMPLYING WITH ORS 279.354

PRIME CONTRACTOR ☐ Check one: **FIRST** ☐ **90 DAY** ☐ **LAST** ☐
SUBCONTRACTOR ☐

Business Name (DBA): | CCB Registration Number: | Project Name: | Project Number:

Phone: ( )

Type of Work:

Street Address:

Mailing Address:

Project Location:

Project County:

Date Pay Period Began: | Date Pay Period Ended:

THIS SECTION FOR PRIME CONTRACTORS ONLY
Public Contracting Agency Name:
Phone: ( ) CCB Registration Number:
Date Contract Specifications First Advertised For Bid:
Contract Amount:

THIS SECTION FOR SUBCONTRACTORS ONLY
Subcontract Amount:
Prime Contractor Business Name (DBA):
Phone: ( ) CCB Registration Number:
Date You Began Work On The Project:

(1) NAME AND ADDRESS OF EMPLOYEE	(2) TRADE, CLASSIFICATION (INCLUDE GROUP # IF APPLICABLE)		(3) DAY AND DATE — HOURS WORKED EACH DAY							(4) TOTAL HOURS	(5) BASIC HOURLY RATE OF PAY	(6) HOURLY FRINGE BENEFIT AMOUNT PAID AS WAGES TO EMPLOYEE	(7) GROSS AMOUNT EARNED	(8) TOTAL DEDUCTIONS FICA, FED, STATE, ETC.	(9) NET WAGES PAID FOR WEEK	(10) HOURLY FRINGE BENEFITS PAID TO BENEFIT PARTY, PLAN, FUND OR PROGRAM	(11) NAME OF BENEFIT PARTY, PLAN, FUND, OR PROGRAM
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THIS FORM CONTINUED ON REVERSE

(1) NAME AND ADDRESS OF EMPLOYEE	(2) TRADE, CLASSIFICATION (INCLUDE GROUP # IF APPLICABLE)		(3) DAY AND DATE — HOURS WORKED EACH DAY							(4) TOTAL HOURS	(5) BASIC HOURLY RATE OF PAY	(6) HOURLY FRINGE BENEFIT AMOUNT PAID AS WAGES TO EMPLOYEE	(7) GROSS AMOUNT EARNED	(8) TOTAL DEDUCTIONS FICA, FED, STATE, ETC.	(9) NET WAGES PAID FOR WEEK	(10) HOURLY FRINGE BENEFITS PAID TO BENEFIT PARTY, PLAN, FUND OR PROGRAM	(11) NAME OF BENEFIT PARTY, PLAN, FUND, OR PROGRAM
		OT															
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CERTIFIED STATEMENT

I, _____ DO HEREBY STATE:
(NAME OF SIGNATORY PARTY) (TITLE)

(1) THAT I PAY OR SUPERVISE THE PAYMENT OF THE PERSONS EMPLOYED BY: _____ ON THE _____
(CONTRACTOR, SUBCONTRACTOR OR SURETY) (BUILDING OR WORK)

THAT DURING THE PAYROLL PERIOD COMMENCING ON THE _____ DAY OF _____, _____ AND ENDING THE _____ DAY OF _____, _____,
(MONTH) (YEAR) (MONTH) (YEAR)

ALL PERSONS EMPLOYED ON SAID PROJECT HAVE BEEN PAID THE FULL WEEKLY WAGES EARNED, THAT NO REBATES HAVE BEEN OR WILL BE MADE EITHER DIRECTLY OR INDIRECTLY TO OR ON BEHALF OF SAID _____ FROM THE FULL WEEKLY WAGES EARNED BY ANY PERSON, AND THAT NO DEDUCTIONS HAVE BEEN MADE EITHER DIRECTLY OR INDIRECTLY FROM THE FULL WAGES EARNED BY ANY PERSON, OTHER THAN PERMISSIBLE DEDUCTIONS AS SPECIFIED IN ORS 652.610, AND DESCRIBED AS FOLLOWS:

_____

(2) THAT ANY PAYROLLS OTHERWISE UNDER THIS CONTRACT REQUIRED TO BE SUBMITTED FOR THE ABOVE PERIOD ARE CORRECT AND COMPLETE; THAT THE WAGE RATES FOR WORKERS CONTAINED THEREIN ARE NOT LESS THAN THE APPLICABLE WAGE RATES CONTAINED IN ANY WAGE DETERMINATION INCORPORATED IN THE CONTRACT; THAT THE CLASSIFICATION SET FORTH THEREIN FOR EACH WORKER CONFORMS WITH WORK PERFORMED.
(3) THAT ANY APPRENTICES EMPLOYED IN THE ABOVE PERIOD ARE DULY REGISTERED IN A BONA FIDE APPRENTICESHIP PROGRAM REGISTERED WITH A STATE APPRENTICESHIP AGENCY RECOGNIZED BY THE BUREAU OF APPRENTICESHIP AND TRAINING, UNITED STATES DEPARTMENT OF LABOR, OR IF NO SUCH RECOGNIZED AGENCY EXISTS IN A STATE, ARE REGISTERED WITH THE BUREAU OF APPRENTICESHIP AND TRAINING, UNITED STATES DEPARTMENT OF LABOR.

I HAVE READ THIS CERTIFIED STATEMENT, KNOW THE CONTENTS THEREOF AND IT IS TRUE TO MY KNOWLEDGE.

_____ _____
NAME AND TITLE SIGNATURE

NOTE TO CONTRACTORS: YOU MUST ATTACH COPIES OF THIS FORM TO EACH OF YOUR PAYROLL SUBMISSIONS ON THIS PROJECT. SEE THE BOLI PUBLICATION PREVAILING WAGE RATES FOR PUBLIC WORKS CONTRACTS IN OREGON FOR INSTRUCTIONS ON COMPLETING THIS FORM.

FILE THIS FORM WITH THE CONTRACTING AGENCY

FORM WH-38 (REV. 8/99)

BUREAU OF LABOR AND INDUSTRIES
PREVAILING WAGE RATE UNIT
800 N.E. OREGON ST., #32
PORTLAND, OR 97232
PHONE: (503) 731-4709
FAX: (503) 731-4606

PUBLIC WORK CONTRACT FEE INFORMATION FORM

(For use by contractors in complying with ORS 279.375)

CONTRACTORS: Please complete and mail this form to BOLI at the above address, along with the appropriate fee (1/10th of 1% of the contract price*) payable to BOLI. **The minimum fee is $100; the maximum fee is $5,000.00.** Without the following completed information, the bureau may be unable to properly credit you for payment received.

BUSINESS NAME (DBA): _____ **CCB#:** _____

MAILING ADDRESS: _____ **PHONE:** (___) _____

PROJECT NAME: _____

PROJECT NUMBER: _____ **PROJECT LOCATION:** _____

AGENCY AWARDING CONTRACT: _____

AGENCY CONTACT PERSON: _____ **PHONE:** (___) _____

CONTRACT AMOUNT: _____ **DATE AWARDED:** _____

DATE WORK BEGAN: _____

***Contract amount X .001**

(Please duplicate this form for future use)

WH-39 (Rev. 10/99)

BUREAU OF LABOR AND INDUSTRIES
PREVAILING WAGE RATE UNIT
800 N.E. OREGON ST., #32
PORTLAND, OR 97232
PHONE: (503) 731-4709
FAX: (503) 731-4606

PUBLIC WORK CONTRACT FEE ADJUSTMENT FORM

THIS FORM TO BE USED FOR RECONCILIATION OF FEES UPON COMPLETION OF PUBLIC WORKS PROJECTS
(As required by ORS 279.375 and OAR 839-016-0210)

CONTRACTORS: Complete and mail this form to BOLI at the above address after completion of the public work project and not less than 30 days after the final payment by the contracting agency. Contractors are required to determine the final contract price, including all change orders or other adjustments to the original contract price, and to calculate the adjusted prevailing wage rate fee based on the revised contract price. Documentation must be included to support the final contract price. Documentation of the final contract price may consist of change orders or other contract documents substantiating the amount of the contract. The prevailing wage rate fee of .001 (1/10th of 1%) shall be applied to the final contract price, with credit taken for fees already submitted. The contractor must submit any additional fee payable to BOLI with the adjustment form or requests for refund if applicable. **NO ADDITIONAL FEE IS REQUIRED TO BE PAID, AND REFUNDS WILL NOT BE MADE, FOR RECONCILED AMOUNTS OF LESS THAN $100.00.**

BUSINESS NAME (DBA):_____ **CCB#:**_____

MAILING ADDRESS:_____ **PHONE:(____)**_____
(STREET OR PO BOX #, CITY, STATE, ZIP)

PROJECT NAME:_____

PROJECT NUMBER:_____ **PROJECT LOCATION:**_____

AGENCY AWARDING CONTRACT:_____

DATE AWARDED:_____

FINAL CONTRACT AMOUNT:_____
(Include all change orders and adjustments to the contract price)

FINAL FEE DUE:_____
(Final Contract amount X .001)

ORIGINAL CONTRACT AMOUNT:_____

INITIAL FEE PAID:_____
(Contract amount X .001)

BALANCE DUE*:_____

REFUND DUE*:_____

***Final contract fee less initial fee paid**

Sample Calculation:			
Final Contract Amount:	**$ 400,000.00**	**Final Fee Due:**	**$ 400.00**
Original Contract Amount:	**- 300,000.00**	**Initial Fee Paid:**	**- 300.00**
Total Adjustment:	**$ 100,000.00**	**Additional Amount Due:**	**$ 100.00**

(Please duplicate this form for future use)

BUREAU OF LABOR AND INDUSTRIES
NOTICE OF AWARD OF PUBLIC WORKS CONTRACT

(For use by Public Agencies in Complying with ORS 279.363)

1. CONTRACTING AGENCY INFORMATION

Name _____ **Agency Number** _____

Address _____

City, State, Zip _____

Agency Representative _____ **Phone** _____

2. CONTRACT INFORMATION

Project Name _____ **Project Number** _____

Project Manager Name _____ **Fax Number** _____

Phone Number _____

Project Location (Street(s), City, State) _____

Project County _____ **Contract Amount** _____

Source of Funds (i.e. 100% Federal Funds, 50/50 Federal/State, 100% Local, etc.) _____

Note: If this project is federally funded and subject to the Davis-Bacon Act, do not submit this form to the Oregon Bureau of Labor and Industries. If federal funds are involved, but the project is subject to the Oregon Prevailing Wage Rate Law, please specify.

Date Contract Specifications First Advertised for Bid _____

Date Contract Awarded _____ **Date Work Expected to Begin** _____

Date First Progress Payment Due _____ **Expected Date of Completion** _____

3. PRIME CONTRACTOR INFORMATION

Name _____

Address _____

City, State, Zip _____ **Phone** _____

Construction Contractors Board Registration Number _____

Name of Bonding Company _____

Address _____

Agent Name/Phone _____

Bond Number _____

THIS FORM WILL BE RETURNED TO THE CONTRACTING AGENCY FOR CORRECTION AND RESUBMITTAL IF INCOMPLETE.

RETURN THIS COMPLETED FORM TO:

Prevailing Wage Rate Unit
Wage and Hour Division, Room 1160
Bureau of Labor and Industries
800 NE Oregon Street #32
Portland, OR 97232
Telephone: (503) 731-4723
Fax: (503) 731-4606

PLANNED PUBLIC IMPROVEMENT SUMMARY

FISCAL YEAR: _____-_____ _____ **PAGE** _____ **OF** _____

(Name of State or Local Government Agency)

Project Number	Project Name	Project Type	Project Location	Estimated Project Cost	Agency or Contract Work

ORS 279.023 requires that not less than 30 days prior to adoption of its budget for the subsequent budget period, each public agency shall prepare and file with the Commissioner of the Bureau of Labor and Industries a list of every public improvement known to the agency that the agency plans to fund in the budget period, identifying each improvement by name and estimating the total on-site constructions costs. The list shall also contain a statement as to whether the agency intends to perform the construction by a private contractor. If the agency intends to perform construction work using the agency's own equipment and personnel on a project estimated to cost more than $125,000, the agency must also show that its decision conforms to the state's policy that public agencies make every effort to construct public improvements at the least cost to the public agency. Public agencies are required to keep and preserve a full, true and accurate account of the costs of performing the work, including all engineering and administrative expenses, and the cost, including investment costs, of any equipment used.

This form (WH-118) may be used to list planned public improvements. Form WH-119 (Capital Improvement Project Cost Comparison Estimate) may be used to report the agency's least cost analysis.

Completed forms should be mailed to:

Prevailing Wage Rate Unit
Wage and Hour Division
Bureau of Labor and Industries
800 N.E. Oregon St., # 32
Portland, OR 97232

CAPITAL IMPROVEMENT PROJECT COST COMPARISON ESTIMATE

_____
(Name of State or Local Government Agency)

DEPARTMENT: _____ **PROJECT NAME:** _____

PROPOSED YEAR: _____ **FUND:** _____

PROJECT DESCRIPTION: _____ **PROJECT NUMBER:** _____

Rough Quantity Estimates	Units	Work Class Description	Agency Force Estimate		Agency Contract Estimate	
			Unit Cost	Total Cost	Unit Cost	Total Cost
				$		$

ESTIMATED CONSTRUCTION PERIOD: _____

The above-named agency has determined that this project can be performed at the least cost by: ☐ **the Agency** ☐ **Contractor** (check one)

_____
(Signature of Agency Official)

ORS 279.023 requires that not less than 30 days prior to adoption of its budget for the subsequent budget period, each public agency shall prepare and file with the Commissioner of the Bureau of Labor and Industries a list of every public improvement known to the agency that the agency plans to fund in the budget period, identifying each improvement by name and estimating the total on-site constructions costs. The list shall also contain a statement as to whether the agency intends to perform the construction by a private contractor. If the agency intends to perform construction work using the agency's own equipment and personnel on a project estimated to cost more than $125,000, the agency must also show that its decision conforms to the state's policy that public agencies make every effort to construct public improvements at the least cost to the public agency. Public agencies are required to keep and preserve a full, true and accurate account of the costs of performing the work, including all engineering and administrative expenses, and the cost, including investment costs, of any equipment used.

Form WH-118 (Planned Public Improvement Summary) may be used to list planned public improvements. This form (WH-119) may be used to report the agency's least cost analysis.

Completed forms should be mailed to:

Prevailing Wage Rate Unit
Wage and Hour Division
Bureau of Labor and Industries
800 N.E. Oregon St., # 32
Portland, OR 97232

PROJECT SPECIFICATIONS

FERNWOOD ROAD UTILITIES & PUMP STATION PROJECT

SAFETY AND HEALTH

PART 1 - GENERAL

1.01 SUMMARY

This section outlines the minimum safety and health requirements applicable to this project. These requirements include, but are not limited to, Oregon Revised Statutes, Oregon Administrative Rules, Oregon Occupational Safety and Health Regulations, Department of Labor and Industries, Oregon Department of Transportation, and other applicable federal, state, and local regulations.

1.02 SAFETY AND HEALTH REGULATIONS

Comply with all federal, state, and local safety and health regulations and laws including, but not limited to, the following:

A. Oregon Revised Statutes - ORS 654

B. Oregon Administrative Rules - OAR 437

1. The Contractor shall comply with all of OAR 437; however, specific reference is made to OAR 437-03, Subsection S, for underground construction and tunneling safety, and to OAR 437-83, Subsection P, for excavation and trenching safety.

C. Oregon Safe Employment Act (OSEA)

D. Oregon Occupational Safety & Health Administration (OR-OSHA)

1. Division 1-General Administrative Rules

2. Division 2-General Occupational Safety & Health Rules
   a. Subdivision A-General
   b. Subdivision B-Adoption & Extension of Established Federal Standards
   c. Subdivision C-Access to Employee Exposure and Medical Records
   d. Subdivision D,E,F- Walking-Working Surfaces, Means of Egress, Powered Platforms.
   e. Subdivision G- Occupational Health & Environmental Controls.
   f. Subdivision H- Hazardous Materials.
   g. Subdivision I-Personal Protective Equipment.
   h. Subdivision J-General Environmental Controls.
   i. Subdivision K-Medical & First Aid
   j. Subdivision L- Fire Protection
   k. Subdivision M- Compressed Gas & Air Equipment.

l. Subdivision N- Material Handling & Storage.
m. Subdivision O- Machinery & Machine Guarding.
n. Subdivision P- Hand & Portable Powered Tools & other Hand-Held Equipment.
o. Subdivision Q- Welding, Cutting & Brazing.
p. Subdivision S- Electrical
q. Subdivision Z- Toxic & Hazardous Substances (air contaminants, asbestos, benzene, bloodborne pathogens, cadmium, ethylene oxide, formaldehyde, lead, MDA.

3. Division 3-Construction

1.05 SITE SECURITY

A. Contractor shall be responsible for all labor, materials and equipment needed to secure the construction site at all times. This may include labor, lighting, fencing, alarm systems and other miscellaneous materials to maintain security at all sites where the Contractor may be working, staging work and storing materials or equipment.

PART 2 - PRODUCTS

2.01 SITE SPECIFIC SAFETY PLAN

A. Develop and submit a Site Specifice Safety Plan, based upon the sequence of Work, anticipated hazards, and the means/methods to confine or eliminate the hazards.

2.02 CONTRACTOR-FURNISHED SAFETY EQUIPMENT AND TRAINING

A. The Contractor shall furnish all safety equipment and training as required by the approved Site Specific Safety Plan..

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SPECIAL PROVISIONS

The intent of the following special provisions is to supplement the Specifications incorporated herein.

1. USE OF EXPLOSIVES

1.1 MEASUREMENT AND PAYMENT

There shall be no measurement and payment for the use of explosives or blasting. This item shall be incidental to other pay items.

1.2 BLAST APPROVAL REQUIRED

The "Blast Data Record Form", included at the end of this Special Provisions, shall be completed prior to each blast for review by the Engineer.

The transportation, handling, storage, and use of explosives shall be subject to the provisions of Sub-part U-Blasting and the Use of Explosives - of the Department of labor "Safety and Health Regulations for Construction", the applicable provisions of the Bureau of Reclamation Supplement thereto, and the regulations of the Department of the Treasury contained in 26 CFR 181, Commerce in Explosives. The American Table of Distances for explosive Materials shall be used to determine distance to inhabited buildings.

The Contractor shall maintain an inventory record of storage and withdrawal of all explosives. This record shall be available to the Owner, and he shall be promptly notified of any loss or theft of explosives. Overnight storage of explosives and detonators outside of the magazines will not be permitted.

1.3 DRILLING DUST CONTROL

When drilling in rock or other dust producing material, the dust shall be controlled within safe hygienic limits, as specified in the "Threshold limit Values for Chemical Substances and Physical Agents in the Workroom Environment" Published by the American Conference of Governmental Industrial Hygienists.

1.4 PERCUSSION DRILLING

All percussion-type drilling shall be performed with drilling apparatus equipped with water or chemical dust-control systems or other equivalent means of controlling the dust. Pressure tanks used in the suppression equipment shall conform to ASME Boiler and Pressure Vessel Code, Section VIII, for Unfired Pressure Vessels. Equipment and solutions shall be suitable for operation in freezing weather. Except for underground excavation, dust-control devices are not required on jack hammers provided the operators wear approved-type dust respirators when dust concentrations exceed safe hygienic limits.

1.5 BLASTING

Blasting will be permitted only after adequate provisions have been made for the protection of persons, the work, and public or private property. Damage to the work or to

public or private property by blasting shall be repaired by and at the expense of the Contractor. All other liabilities due to the use of explosives shall be the sole responsibility of the Contractor.

1.6 BLASTING PLANS AND TEST BLASTS

A two-part conceptual plan shall be submitted to the Engineer two weeks prior to initiating any blasting. Part 1 of the conceptual plan shall include a complete summary of proposed transportation, handling, storage, and use of explosives. Part 2 shall include the proposed general concept for the blasting including controlled blasting techniques and controls of noise, dust, flyrock, air blast, and vibrations. Any test blasts planned by the Contractor should be included in Part 2.

City or Engineer approval of the plan shall be for conformance to the specifications, but City shall assume or liability associated with the use of explosives.

1.7 DAMAGE CONTROL LIMITATIONS

Blasting adjacent to underground utilities, pipelines, buildings, or other facilities susceptible to vibration or air blast damage, or both, shall be carefully controlled by the Contractor to eliminate any possibility of damage.

Monitoring of vibration by the Contractor and air blast effects of blasting will be performed by the Contractor. Monitoring will be performed for all blasts, including test blasts. Vibration and air blast effects of blasts shall not exceed the limits specified for designated locations. The maximum peak particle velocity as recorded by the seismographs at the designated locations or structures shall not exceed two inches per second. Air blast shall not exceed 128 dB linear-peak or 0.007 psi.

Calibrated seismographs, containing triaxial orthogonal transducers, will be used for vibration monitoring. The transducers shall have a flat frequency response from 2 to 200 hertz. The seismograph recording or seismogram shall be a real time direct readout permanent record of vibration measurements.

There shall be a minimum of one vibration monitoring location for an individual blast. Transducers will be located at the nearest or most sensitive improvement or structure to the blast.

Air blast transducers will be required at each vibration monitoring site. This equipment may be a separate monitoring device or a transducer which interconnects with the vibration seismograph. Vibration and air blast monitoring records shall be analyzed by a qualified representative of the Contractor and submitted to the Engineer's representative.

1.8 PRE-BLAST INSPECTION

Prior to any blast, the Contractor shall have a licensed and qualified representative perform and physical inspection of all improved structures located within 250 feet of the blast. The inspection shall include photographs and written diagrams of pre-existing cracks, faults, or other structural or cosmetic defects inside or outside the structure.

The Contractor is responsible to obtain permission for access to private property from

property owners. Copies of each shall be submitted to Engineer.

1.9 MISCELLANEOUS

No electrical-type blasting system shall be used within 500 feet of energized lines or equipment.

The Contractor shall take all necessary measures to prevent flyrock damage to structures, individuals, and property, and is responsible for any damage resulting from flyrock. Blasting mats shall be used to protect adjacent underground pipelines and installations.

1.10 BLASTING WARNING

The Contractor, at his own expense, shall erect proper warning signs of adequate number and size stating that blasting operations are taking place in the area and such signs shall be clearly visible to all traffic entering the area. The Contractor shall establish a reliable audible blast-warning system, and utilize watchmen to insure that all personnel and the general public in the area are properly warned and kept at a safe distance from the impending blast.

1.11 INSURANCE

Prior to performance of any blasting operation, the Contractor shall provide to the Engineer, a written Certificate of Insurance which specifically includes coverage for explosive handling and blasting operations, for the following limits as minimum:

> Bodily Injury Liability Coverage with limits of not less than $1,000,000.00 for bodily injury including accidental death to any one (1) person and subject to that limit for each person in an amount of not less than $1,000,000.00 for each occurrence and Property Damage Coverage in an amount of not less than $500,000.00 for each occurrence.

The City and Engineer shall be named on the Certificate of Insurance as additional insured.

Should the Contractor not carry the insurance coverage noted above as general Contractor, he may substitute the Certificate of Insurance from his blasting subcontractor for the above referenced limits, naming the City and Engineer as additional insured.

This does not relieve the Contractor from the responsibility of complying with the requirements herein.

1.12 COST

The cost of monitoring and recording blast vibrations and complying with this paragraph shall be incidental to other bid items.

BLAST DATA RECORD FORM

Record No. _____ Date _____ Time _____ Contract No. _____

Contractor _____

Blast Location: Sta. _____ Offset _____ Depth _____

No. of Holes _____ No. of Delays _____

Total Weight of Explosives _____

Maximum Charge per Delay _____ On Delay No. _____

Description of Material Being Blasted _____
_____

Recording Unit No. _____ Recorded by _____

Paper speed _____ Interpretation by _____

Seismometer No. _____ Location: Sta._____ Off. _____

Depth of Overburden _____ Sensitivity _____ in/in/s

$V_T$max. _____ in/s, Vvmax. _____ in/s, V_L max. _____ in/s

Occurred at _____s*, Occurred at _____s, Occurred at _____s

Peak particle velocity _____ in/s

Description of material at seismometer _____
_____

Seismometer No. _____ Location: Sta._____ Off. _____

Depth of Overburden _____ Sensitivity _____ in/in/s

$V_T$max. _____ in/s, Vvmax. _____ in/s, V_L max. _____ in/s

Occurred at _____s*, Occurred at _____s, Occurred at _____s

Peak particle velocity _____ in/s

Description of material at seismometer _____
_____

Max. allowable peak particle velocity of specifications _____ in/s.

*Times indicated measured from arrival of initial wave of seismometer.

BLAST DATA RECORD FORM (cont. Page 2 of 2)

Remarks: _____

2. LIQUIDATED DAMAGES

Liquidated damages will be in the amount of $1,000.00 per calendar day. All other provisions shall apply

3. DEWATERING

Trenches shall be kept free of water during the period that the trench is being dressed to grade, the pipe is being laid and jointed, unless otherwise acceptable to the Engineer. Such acceptance will not relieve the Contractor of the responsibility of the completed pipeline meeting specification requirements for its entirety.

The method of Dewatering is left to the Contractor's discretion; in cases of extreme groundwater conditions, a manifold well point system may be necessary to keep the water table below the bottom of the trench.

During excavation, construction of structures, installing of pipelines and sewers, placing of structures and trench backfield and te placing and setting of concrete, excavations shall be kept free of water except as specified. The Contractor shall control surface run-off so as to prevent entry or collection of water in excavations. The static water level shall be drawn down a minimum of one foot below the bottom of the excavation so as to maintain the undisturbed state of the foundation soils and allow the placement of any fill or backfield to the required density. The Dewatering system shall be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

Before Dewatering is started, the Contractor shall submit to the Engineer a statement of the method, installation and details of the Dewatering system he proposes to use. Open and cased sumps shall not be used as primary Dewatering for excavations deeper than 3 feet below the static water table.

The release of ground water to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfield and prevent flotation or movement of structures, pipelines and sewers.

Dewatering of the trenches shall be considered as incidental to the construction and all costs thereof shall be included in various unit contract prices in the proposal, unless otherwise provided in the special provisions.

Water from Dewatering operations shall be desalted before discharging to surface waters. The Contractor shall obtain permits and required approvals from State and Federal agencies before discharging to existing drainages. Points of discharge shall be subject to the approval of, and monitored by, the Owner.

4. AS-BUILT DRAWINGS

The contractor shall be responsible for maintaining one complete and up to date set of record Contract Plans at the job site providing complete and accurate information on the location of the work, particularly where approved changes are made to accommodate unanticipated conditions.

This set of record drawings becomes the property of the Owner when all construction is completed. The Contractor's set of record drawings will be subject to review daily and prior to

each periodic pay estimate. No payment will be made until record drawings are up to date.

5. EXISTING UTILITIES AND IMPROVEMENTS

The Contractor is responsible to verify the location of all existing utilities prior to construction. All excavators performing work on this project must comply with all the provisions of O.R.S. 757.541 to 757.571, including notification of all owners of underground facilities at least 48 business day hours, but not more than 10 business days before commencing on excavation.

In the event of damage to water, gas, telephone or any other underground utility system, the contractor shall immediately notify the effected utility of the damage and coordinate the repair work. The Contractor shall make available to the utility company any manpower or equipment that will facilitate the repair and the continuation of the scheduled work. All cost of repairs shall be the responsibility of the Contractor.

The Contractor shall immediately repair any damages or breaks to unmarked existing sewer service pipes, or sewer mains or storm drainage pipes by connecting a section of pipe across the break. Permanent repair of the damaged lines shall be with approved materials and inspected by the Engineer prior to backfilling.

6. CITY PURCHASED PUMPING EQUIPMENT

The Contractor shall be responsible for providing all equipment, labor and materials necessary for construction of the project. However, the City will directly purchase the following equipment, which shall not be included in the Contractor's bid:

2 Flygt Model 3170, 30 Hp pumps affixed with modified sliding bracket.
2 Flygt Model 4190 Mix-Flush Valves with discharge elbows for pump housing 535 30 22, Model No. P/N 556 51 01.
2 Flygt FLS Leak Sensors
2 - 40' lengths submersible electrical cable (SUBCAB).
2 - 30' lengths 7/16", grade 30 galvanized lifting chain and shackles,
Flygt Model 14 58 75 50 and 14 58 91 11, or approved equal

The equipment described above shall be available for the Contractor to install approximately 8 weeks following the bid opening from ITT Flyght Corporation in Portland, Oregon. Contact Roy Voskuil, (503) 240-1980.

The contractor shall install all equipment necessary for a complete installation, including the equipment list above. All other equipment and materials for the pump station shall be furnished and installed by the Contractor. The Contractor shall be responsible for coordination of the installation so all equipment is compatible.

7. PUMP STATION WET WELL EQUIPMENT

The Contractor shall provide all equipment, materials, and labor necessary for a complete installation of the pumping equipment. The following is intended to be only a partial list of the items needed for installation that shall be furnished and installed by Contractor, and supplied from the pump supplier to match pumps:

3 - 30" x 48" (nom.) Access Covers - Flygt Model FAHS - 33 x 49, or approved equal, with integral locking devices and spring mechanisms
3 - 8" discharge connections, Flygt Part No. 444 71 06, or approved equal

3 - SS Safety Hook Assembly, Flygt Model 14 58 91 11, or approved equal
3 - Sets of Dual 304 SS, Schedule 40 Guide Rails
3 - SS Discharge Connection Hardware and Anchor Bolts, Flygt Model 14 48 82 00, or approved equal
3 - SS Upper Guide Bar Bracket - Flygt Kit No. 14 58 93 08, or approved equal
3 - SS Intermediate Guide Bar Bracket - Flygt Kit No. 14 58 44 53, or approved equal
1 - Pump Cable Holder, Flygt Kit No. 14 58 94 05, or approved equal
3 - Flygt Mini-CAS (to be installed in control panels)
1 - Multitrode 2.0/10-10m, 80" long, 10 Sensor Level Probe (see Electrical Specifications)
2 - Mercury Float Switches (see Electrical Specifications)

Any substitutions must be approved by the Engineer. It shall be the responsibility of the Contractor to coordinate any substituted equipment with the City provided pumping equipment to ensure proper fit and function.

*SS denotes Stainless Steel Equipment - no material substitutions acceptable.

8. PUMP STATION START-UP AND TESTING

8.1 Operational testing of the pumps, controls and equipment will be performed after the Contractor has completed the installation of all necessary equipment for the proper operation of the pump station. The Contractor shall perform his/her own preliminary tests to ensure proper operation, prior to requesting a formal test to the Engineer. The tests will duplicate all normal operating modes and all failure modes. The Contractor shall be responsible for conducting all tests, and shall operate all equipment as required during the test period. The Contractor shall also provide the necessary water and other materials required for performance of the pump tests.

8.2 A factory representative from the pump and wet well equipment manufacturer shall be present at the acceptance tests. All costs for this representative shall be borne by the Contractor. In the event of failed tests due to the actions of the Contractor, the representative shall be recalled to the project for additional testing as required by the Owner.

9. PUMP STATION WET WELL

The precast sections of the wetwell shall comply with the requirements of ASTM C478 for large diameter manholes. Pipe and foundation connections shall be made in accordance with the specifications included herein.

10. DISCHARGE MANHOLE PROTECTIVE COATING

The full interior of the downstream receiving manhole located at the intersection of Fernwood Road and Springbrook Road shall receive a protective interior coal tar epoxy coating, designed for resistance to hydrogen sulfide gases, and full immersion. Contractor shall submit proposed coating system to Engineer for approval.

11. ASPHALT CONCRETE PAVEMENT TRENCH REPAIR

The measurement and payment for asphalt concrete pavement trench restoration shall be as follows:

a. Pay width shall be trench width as defined on the drawings plus 6 inches on each side.

b. Length shall be as measured long centerline of pipeline(s).

12. AIR COMPRESSORS

Two air compressors shall be supplied and installed in the pump control building. Air injection piping and valving shall be provided for connection to each of the force mains in the valve vault. Each compressor shall provide 37.2 SCFM at 175 psig. Compressors shall be Quincy Northwest Model QT-10-120H, duplex two-state, heavy-duty, cast iron, air-cooled, splash lubricated units, or approved equal. Each shall be mounted atop a 120 gallon horizontal aire receiver ASME Coded for 200 psig. V-belt drive shall be provided, driven by 10 Hp, 3 phase, 230/460 volt, open dripproof motors mounted on adjustable slide rails. Include 10-micron air intake filter, pressure guage, pressure relief valve mounted on discharge piping, and enclosed V-belt guard (OSHA approved), on each unit.

Unit shall provide full automatic duplexing capability, and loadless starting for start/stop operation. Contoroller shall provide lead/lag capability with automatic alternation on timer control.

Air control panel shall be a Wallace and Tiernan 5510 series flowmeter (or approved equal), with cast aluminum frame borosilicate glass tube with fused on units of cfm, buna-n o-rings, polycarbonate tube shield, stainless steel female thread end fittings and self guided flow. the flowmeter shall be rated for a maximum working pressure of 150 psig. A needle throttling valve shall regulate aire flow out of the compressor tank.

END OF SECTION

DIVISION ONE
GENERAL REQUIREMENTS

****

101 DEFINITIONS AND ABBREVIATIONS

****

Unless otherwise defined in the Contract Documents the following definitions and abbreviations shall apply wherever used.

The words directed, required, permitted, ordered, requested, instructed, designated, considered necessary, prescribed, approved, acceptable, satisfactory, or words of like import, refer to actions, expressions, and prerogatives of the Engineer.

Command type sentences are used but are not exclusive of other directives, throughout these Standard Specifications. In all cases the command expressed or implied is directed to the Contractor.

The specifications contained herein are divided into categories: (1) Division; (2) Section; and (3) Subsection, and are designated as in the following example:

(1) Division:		**DIVISION TWO – GENERAL TECHNICAL REQUIREMENTS**
(2) Section:	**204**	**EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL**
(3) Subsection:	**204.02.06**	**Select Backfill Material**
	or	
	204.02.06A	**Bank-Run and River-Run Gravel**

In Division I - General Requirements paragraphs under subsections are alphabetical with subparagraphs numbered (1), (2), etc.

101.01 DEFINITIONS

Acceptance of Work

All work required by the Contract Documents will be considered accepted upon approval of the Certificate of Completion by Owner.

Acts of God

An act of God is to be construed to mean an earthquake, flood, cloudburst, tornado, hurricane or other phenomenon of nature of catastrophic proportions or intensity.

Advertisement

The public announcement inviting bids for work to be performed or materials to be furnished.

Attorney

The City Attorney of the City of Newberg, Oregon.

Bid

The offer of a Bidder, titled Proposal, which is the basis of the Contract, submitted on Owner's official Bid form, to perform stated work at a price or prices quoted.

Bid Bond

The bond required to be submitted with each Bid as described in Subsection 102.06 as a Bid Guaranty, which assures that the bidder will enter into a contract if his bid is accepted, synonymous with bid security.

Bidder

Any individual, firm, co-partnership, corporation, or combination thereof, submitting a Bid in response to the advertisement calling for bids on the work contemplated in the Contract.

Certificate of Completion

Standard Owner's form which must be signed by the Contractor.

Certificate of Compliance

Standard Owner's form which must be signed by the Contractor stating compliance with the Contract Documents.

Change Order

A written order issued by the Engineer to the Contractor directing changes in the work, subject to approval of Owner.

Contract Cost

The aggregate amount of price promised to be paid by Owner to Contractor upon fulfillment of the Contract.

Contract

The document entitled contract or agreement which is executed by the Contractor and the Owner, authorizing ordinance, the advertisement calling for bids, the bid, instructions to bidder, plans, all specifications, addenda, permits, performance bond, insurance certificates, and change order for any approved revisions made during the performance of the work to any of the above listed documents, collectively referenced as the contract documents.

Contract Item

A specific unit of work for which a price or basis of payment is provided in the Contract.

Contractor

Any individual, firm, co-partnership, corporation or any combination thereof who has or have entered into a Contract with the Owner for a particular project. In the case of work being done under permit issued by the Owner, the permittee shall be construed to be the Contractor.

Day

Calendar day, any and every day shown on the calendar, Sundays and Holidays included.

Easement

The right to use a defined area of property for specific purpose or purposes as set forth in the specifications.

Engineer

The City Engineer of the City of Newberg acting either directly or through authorized representatives.

Foreign Contractor

Contractor who is not domiciled in or registered to do business in the State of Oregon.

Improvement

General term encompassing all phases of work to be performed under a Contract for a Local Improvement District and is synonymous with the term Project or work.

Inspector

The authorized representative of the Engineer whose authority, instructions, and decisions shall be limited to the particular duties and responsibilities entrusted to him in making detailed inspections of any or all portions of the work or materials therefor.

Lump Sum

A method of payment providing for one all-inclusive payment for the work described to be done, complete and accepted without further measurement, as such work is covered under the applicable lump sum pay item.

Manager

The City Manager of the City of Newberg acting either directly or through authorized representatives.

Notice

A written communication delivered by hand or by mail to the authorized individual, member of the firm or officer of the corporation for which it is intended. If delivered or sent by mail it shall be addressed to the last known business address of the individual, firm or corporation. In the case of a Contract with two (2) or more persons, firms or corporations, notice to one shall be deemed notice to all.

OSHD Standard Specification

The latest edition of the Specification Document published by the State of Oregon entitled Standard Specifications for Highway Construction, Oregon State Highway Division. This document is available from the Oregon State Highway Division, Salem, Oregon.

Owner

The City of Newberg, acting through its legally constituted City Council.

Performance and Payment Bond

The bond submitted by the Contractor and his surety as specified in the Contract and as more fully described in Subsection 103.06.

Plans

The official Plans, profiles, cross sections, elevations, details and other working, supplementary and detail drawings, or reproductions thereof, signed by the Engineer, which show the location, character, dimensions and details of the work to be performed. Plans may either be bound in the same book as the balance of the Contract Documents or bound in separate sets, and are a part of the Contract Documents, regardless of the method of binding.

Prequalification

Process for pre-screening contractors.

Project

General term encompassing all phases of the work to be performed under the Contract and is synonymous with the term Improvement or Work.

Proposal

See Bid.

Provide

When related to an item of work, the word provide shall be understood to mean furnish and install the work complete in place.

Reference Specifications

Bulletins, standards, rules, methods of analysis or test, codes and specifications of other agencies, engineering societies, or industrial associations referred to in the Contract Documents. All such references specified herein refer to the latest edition thereof, including any amendments thereto which are in effect and published at the time of advertising for bids or of issuing the permit for the project.

Responsible and Responsive Bidder

This term denotes a bidder who has the capability in all respects to perform fully the contract, and the integrity and reliability which will assure good faith performance and who has submitted a bid under a competitive sealed bid which conforms in all respects to the invitation for bids so that all bidders may stand on equal footing with respect to method and timeliness of submission and as to the substance of any resulting contract.

Right-of-Way

A general term denoting public land, property, or interest therein, acquired for or devoted to a public street, public access or public use.

Roadway

That portion of a street and its appurtenances between curbs, gutters, or ditches, primarily used for vehicular traffic.

Shop Drawings and Submittals

Supplementary plans or data or other information which the Contract requires the Contractor to submit to the Engineer.

Shown

As used herein, the word shown, or as shown, shall be understood to refer to work shown on the Plans in the Contract.

Special Specifications

Requirements peculiar to the project and changes and modifications of the Standard Specifications.

Specified

As used herein, the word specified, or as specified, means as required by the Contract.

Standard Plans or Drawings

Details of structures, devices, or instructions adopted by Owner as a standard and referred to in the Contract.

Standard Specifications

The terms, directions, provisions and requirements set forth herein.

Station

A distance of 100 feet measured horizontally along the established centerline of a street, sewer, or other work, unless specified otherwise.

Street

Any street, avenue, boulevard, alley, lane, bridge, bicycle path, road, public thoroughfare or public way and any land over which a right-of-way has been obtained or granted for any purpose of public travel.

Subcontractor

An individual, partnership, firm, corporation, or any combination thereof, to whom the Contractor sublets part of the Contract.

Substantial Completion

The work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, it is sufficiently complete in accordance with the Contract Documents, so that the work (or specified part) can be utilized for the purposes for which it is intended.

Surety

The corporate body which is bound with and for the Contractor, for the acceptable performance of the Contract, and for his payment of all obligations arising out of the Contract.

Unit Price

A Contract item of work providing for payment based on specific unit of measurement; e.g., linear foot or cubic yard.

Use of Pronoun

As used herein, the singular shall include the plural, and the plural the singular; any masculine pronoun shall include the feminine or neuter gender; and the term "person" includes natural person or persons, firm, co-partnership, corporation or association, or combination thereof.

Utility

Tracks, overhead or underground wires, pipelines, conduits, ducts, or structures, owned, operated or maintained in or across a public right-of-way or easement.

Work

All material, labor, tools, equipment, 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.

Working Day

Calendar day, any and every day shown on the calendar, excluding Saturdays, Sundays and Legal Holidays.

101.02 ABBREVIATIONS

AAN	**American Association of Nurserymen**
AASHTO	**American Association of State Highway and Transportation Officials**
ACI	**American Concrete Institute**
AGA	**American Gas Association**
AGC	**Associated General Contractors of America**
AIA	**American Institute of Architects**
AISC	**American Institute of Steel Construction**
AISI	**American Iron and Steel Institute**
ANSI	**American National Standards Institute**
APWA	**American Public Works Association**
ASCE	**American Society of Civil Engineers**
ASME	**American Society of Mechanical Engineers**
ASTM	**American Society for Testing and Materials**
AWPA	**American Wood Preservers Association**
AWS	**American Welding Society**
AWWA	**American Water Works Association**
CRSI	**Concrete Reinforced Steel Institute**
DEQ	**Department of Environmental Quality**
EPA	**Environmental Protection Agency**
FHWA	**Federal Highway Administration**
ITE	**Institute of Traffic Engineers**
NEC	**National Electrical Code**
NEMA	**National Electrical Manufacturer's Association**
NLMA	**National Lumber Manufacturer's Association**
ORS	**Oregon Revised Statutes**
OSHA	**Occupational Safety and Health Administration**
OSHD	**Oregon State Highway Division**
PCA	**Portland Cement Association**
UBC	**Uniform Building Code**
UL	**Underwriters' Laboratories, Inc.**
USASI	**United States of America Standards Institute**
WWPA	**Western Wood Products Association**

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102 INSTRUCTIONS TO BIDDERS

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102.01 EEO AFFIRMATIVE ACTION

Bidders must comply with the City of Newberg's Equal Opportunity Policy for Contractors. The policy is included in and made a part of these Contract Documents.

102.0 PREQUALIFICATION OF BIDDERS

Prequalification application forms may be obtained from the City Engineer's Office, Newberg, Oregon. All bidders must be prequalified. Prequalification applications submitted without being designated for a project advertised for bid by the City will be considered as a general prequalification application and processed pursuant to ORS 279.039, and notice of prequalification status will be given within thirty (30) days of the receipt of the application. A notice of disqualification can be given orally. An oral disqualification notice will be followed by written notice and bear the date of the oral notice.

102.03 FORM OF BID

A. Bidders shall enclose the bid, bid bond, certified check or cashier's check in a sealed, labeled, and addressed envelope and file as required in the Notice to Contractors. The outside of the envelope should plainly identify: the Project name and the Bid Opening date.

B. All bids must be clearly and distinctly typed or written with ink or indelible pencil and be on the form furnished by Owner, and in addition to necessary unit price items and total prices in the column of totals to make a complete bid, all applicable blanks giving general information must be filled in and the bid signed by the Contractor or a duly authorized agent. Any statement accompanying and tending to qualify a bid may cause rejection of such bid, unless such statement is required in a bid embracing alternative bids.

C. Unless otherwise specified, bidders shall bid on all bid items included in the bid and the low bidder shall be determined as noted in Subsection 103.01, AWARD OF CONTRACT. Except as provided herein, bids which are incomplete, or fail to reply to all items required in the bid may be rejected.

D. State whether business is being done as an individual, a co-partnership, a corporation, or a combination thereof, and if incorporated, in what state, and if a co-partnership, state names of all partners. The person signing on behalf of a corporation, a co-partnership or combination thereof shall state his position with the firm or corporation, and state whether the corporation is licensed to do business in the State of Oregon.

102.04 WITHDRAWAL, MODIFICATION OR ALTERATION OF BID

A. A bid may only be withdrawn on written or telegraphic request of the bidder and received by the owner prior to the scheduled closing time for filing bids.

B. Prior to Bid Opening, changes may be made provided the change is initialed by the bidder or his agent. If the intent of the bidder is not clearly identifiable, the interpretation most advantageous to Owner will prevail.

102.05 LATE BIDS

Bids received after the scheduled closing time for filing bids, as set forth in the invitation for bids will be rejected and returned unopened to the bidder unless such closing time is extended by Owner.

102.06 BID GUARANTY AND ORGANIZATION

Unless covered by an annual bid bond, filed with the Owner, in an unencumbered amount sufficient to

cover all pending bids, all bids must be accompanied by a Bid guaranty guaranteeing that the bid will be irrevocable for 30 days, unless specified otherwise, in the form of a certified check or cashier's check payable to the order of the Owner, or a bidder's bond in such form as is approved by the City Attorney in an amount of at least ten percent (10%) of the amount of the bid. Such bid guaranty shall be forfeited as liquidated damages if the bidder shall fail or neglect to furnish a performance bond and insurance, if required, and to execute and return the contract within fifteen (15) days after issuance of the Contract.

102.07 INTERPRETATION OF CONTRACT AND ADDENDA

A. If it should appear to a Bidder that the work to be done or matters relative thereto are not sufficiently described or explained in the Contract Documents or that Contract Documents are not definite and clear, or the Bidder requests additional information or an interpretation of the contract, the Bidder may make written inquiry regarding same to the Engineer at least five (5) days before the scheduled closing time for filing bids.

B. If, in the opinion of the Engineer, additional information or interpretation is required, an addendum will be issued to all known specification holders.

C. Any addendum or addenda issued by the Owner which may include changes, corrections, additions, interpretations or information, and issued forty-eight (48) hours or more before the scheduled closing time for filing bids, Saturday, Sunday and legal holidays not included, shall be binding upon the Bidder. Owner shall supply copies of such addenda to all contractors who have obtained copies of the Contract for the purpose of bidding thereon, but failure of the Contractor to receive or obtain such addenda shall not excuse him from compliance therewith if he is awarded the contract.

ORAL INSTRUCTIONS OR INFORMATION CONCERNING THE CONTRACT OR THE PROJECT GIVEN OUT BY OFFICERS, EMPLOYEES OR AGENTS OF THE OWNER TO PROSPECTIVE BIDDERS SHALL NOT BIND THE OWNER.

102.08 EXAMINATION OF CONTRACT, SITE OF WORK AND SUBSURFACE DATA

A. Bidders shall determine for themselves all the conditions and circumstances affecting the project or the cost of the proposed work, including without limitation utility interferences, by personal examination of the site, careful review of the Contract and by such other means as the Bidder feels may be necessary. It is understood and agreed that information regarding subsurface or other conditions, or obstructions indicated in the Contract Documents, is provided by Owner only for the convenience of Bidders and such information is not expressly or tacitly warranted to accurately represent actual conditions. Bidder's use of such information shall be at Bidder's sole risk, and Bidder is responsible to confirm any information provided from such independent sources as Bidder feels may be necessary.

B. Logs of test holes, test pits, soils reports, ground-water levels and other supplementary subsurface information are offered as information of underlying materials and conditions at the locations actually tested. Owner will not be liable for any loss sustained by the Contractor as a result of any variance between conditions contained in or interpretations of test reports and the actual conditions encountered during progress of the work.

C. The submission of a Bid shall be conclusive evidence that the Bidder has investigated and is satisfied as to the site subsurface 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.

D. A geotechnical investigation has been explicitly prepared for this project and is available for examination at the City of Newberg City Engineer's office, 719 E. First St., Newberg, OR 97132. The geotechnical investigation, is identified as:

GEOTECHNICAL INVESTIGATION AND REPORT
FERNWOOD ROAD UTILITY IMPROVEMENTS
NEWBERG, OREGON
Prepared by: AGI Technologies, Project No. 30,251.021
Dated: November 12, 1998

This Report shall be considered a part of the contract documents, incorporated by reference.

102.09 FAMILIARITY WITH LAWS AND ORDINANCES

102.10 UNIT BIDS

A. The estimate of quantities of work to be done under unit price bids is approximate and is given only as a basis of calculation for comparison of bids and award of the Contract. The Owner does not warrant that the actual amount of work will correspond to the amount as shown or estimated. Payment will be made at unit prices under a contract, only for work actually performed or materials actually furnished according to actual measurement.

B. Bidders must include in their bid prices the entire cost of each item of work set forth in the bid, and when, in the opinion of the Owner, the prices in any bid are obviously unbalanced, such bid may be rejected.

C. The unit contract prices for the various bid items of the contract shall be full compensation for all labor, materials, supplies, equipment, tools and all things of whatsoever nature required for the complete incorporation of the item into the work the same as though the item were to read "In Place."

102.11 REJECTION OF BIDS

A. Owner reserves the right to reject any or all bids in whole or in part or waive irregularities.

B. This invitation to bid does not commit the City to pay any costs incurred by any Bidder in the submission of a proposal, or in making necessary studies or designs for the preparation thereof, or for procuring or contracting for the items to be furnished under the invitation to bid.

102.12 CONFLICT OF INTEREST

A bidder filing a bid thereby certifies that no officer, agent, or employee of the City who has a pecuniary interest in this bid has participated in the contract negotiations on the part of the City, that the proposal is made in good faith without fraud, collusion, or connection of any kind with any other Bidder for the same call for bids, and that the Bidder is competing solely on its own behalf without connection with, or obligation to, any undisclosed person or firm.

102.13 INELIGIBILITY FOR PUBLIC CONTRACTS FOR FAILURE TO PAY PREVAILING RATE OF WAGE

The bidder, in submitting the bid, does thereby certify that the bidder is not ineligible to receive a contract for a public work, as set forth in ORS 279.361 and agrees, if awarded a contract, that every subcontractor will be required to certify compliance thereto, said certification to be filed with the Engineer prior to such subcontractor commencing any work under the contract.

102.14 ORS 654.150 SANITARY FACILITIES AT CONSTRUCTION PROJECTS STANDARDS, EXEMPTIONS

If the contract price is estimated (itemized bid) or bid (lump sum) by Contractor at $500,000 or more, Contractor shall be responsible for all costs (which costs shall be included in the bid whether or not a specific bid item is provided therefore) that may be incurred in complying with or in securing exemption or partial exemption from the requirements of ORS 654.150, (Sanitary facilities at construction projects; standards, exemptions) and the rules adopted pursuant thereto. Whether or not ORS 654.150 is applicable to the project is the sole responsibility of the Contractor.

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103 AWARD AND EXECUTION OF CONTRACT

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103.01 AWARD OF CONTRACT

A. The award will be made by Owner to the Bidder submitting the lowest, responsible and responsive bid. In determining the lowest acceptable bid, Owner may take into account, among other factors, the prices bid, discounts, if any, time of completion or delivery proposed, as between equal bids, the relative merits and performance of any item specifically proposed by the Bidder, any variation in maintenance and guaranty period specially proposed by the Bidder in excess of any minimums specified, the realistic balance of prices in the bids for various parts or units of work and the experience and ability of Bidder to perform the work.

B. While price extensions are required as a matter of convenience, in the event of error in extensions, the unit prices bid shall govern. In the event of discrepancy between the written and numerical amounts, the written prices will govern.

C. Determination of the lowest Bidder and award are subject to review and determination by the Attorney as to legal sufficiency of any bid submitted.

D. Award and tender of contract, if it be awarded, shall be made within forty-five (45) calendar days, unless otherwise specified, after the date of opening of bids.

103.02 EXECUTION OF CONTRACT

The Bidder to whom award is made shall execute and return the Contract in the required number of copies, and shall furnish a performance bond and other required bonds and insurances satisfactory to

Owner within fifteen (15) days after issuance of the Contract.

103.03 FAILURE TO EXECUTE CONTRACT

Failure on the part of the Bidder to whom the Contract is awarded to execute the Contract and to deliver the Contract and required performance bond and insurance as provided for in Subsection 103.02 shall be just cause for cancellation of the award, withdrawing tender of the Contract and forfeiture of the Bid Guaranty to Owner. The forfeited Bid Guaranty shall become property of the Owner, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible and responsive Bidder, or the work may be re-advertised, or otherwise, as the Owner may decide.

103.04 RETURN OF BID GUARANTY

Upon the execution of the contract and bond by the successful bidder, the bid guaranty shall be returned. The bidder who is awarded a contract and who fails promptly and properly to execute the contract or bond shall forfeit the bid guaranty that accompanied the bid. The bid guaranty of unsuccessful bidders will be returned after the bids have been opened and the contract has been awarded, and shall not be retained after the contract has been duly signed. The owner reserves the right to retain the bid security of the three (3) lowest bidders until the award contract has been signed and returned.

103.05 TRANSFER OF CONTRACT AND INTERESTS THEREIN

A. Excepting Surety assignment under the performance and payment bond, the Contract is not assignable to any other party or parties without the prior written consent of Owner. In case of such attempted transfer without permission, Owner may refuse to carry out the Contract either with the transfer or the transferee, but all rights of action for any breach of the Contract by said Contractor are reserved to the Owner. No officer of Owner, nor any person employed in its service is or shall be permitted any share or part of the Contract or is or shall be entitled to any benefit which may arise from the contract.

B. Any assignment of money shall be subject to all proper setoffs and withholdings in favor of Owner and to all deductions provided for in the Contract, and particularly all money withheld, whether assigned or not, shall be subject to being used by Owner for completion of the work in the event Contractor should be in default therein.

103.06 PERFORMANCE AND PAYMENT BOND

At the time of execution of the Contract, the Contractor shall furnish Performance and Payment Bond or Bonds approved by the Owner and Attorney in an amount equal to the amount of the Contract based upon the estimate of quantities or lump sum as set forth in the Proposal, conditioned upon a compliance with and fulfillment of all terms and provisions of the Contract, including maintenance, repair and replacement, and all applicable laws and prompt payment, as due, to all persons supplying labor and/or material for prosecution of the work.

103.07 PROOF OF CARRIAGE OF INSURANCE

Work shall not commence until all insurance required in the Contract has been obtained and a certificate thereof has been approved by the Attorney. Contract shall maintain insurance throughout the life of the Contract which will hold Owner harmless and shall indemnify Owner for any and all losses to third persons or to Owner arising out of the operations, including any contingent liability arising therefrom.

103.08 FOREIGN CONTRACTOR

A foreign Contractor awarded a contract with a price exceeding $10,000, under provisions of ORS Chapter 279, shall promptly report to the Department of Revenue on forms to be provided by the Oregon Department of Revenue the total contract price, terms of payment, length of contract and such other information as may be required before final payment can be received on the public contract. Final payment shall not be made until this provision has been accomplished.

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104 SCOPE OF WORK

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104.01 PLANS AND SPECIFICATIONS

The Contract Documents will govern the work to be done. Anything mentioned in the Specifications and not shown on the Plans and detailed drawings, or shown on the Plans and detailed drawings and not mentioned in the Specifications, shall be of like effect as though shown or mentioned in both. Specifications and Plans referred to in any of the Contract Documents shall be considered as being included in the document in which such reference is made. When a particular Standard Plan or Specification is referred to, such reference shall be to the Standard Plan or Specification which is in force at the time of advertising for bids. The phrases, "Contractor shall", "Contractor will", etc. may not always be specifically stated in all paragraphs but is considered understood where not specifically stated otherwise.

104.02 PRECEDENCE OF CONTRACT DOCUMENTS

In case of conflict, the order of precedence of the following documents in controlling the work shall be:

1. **Contract**
2. **Addenda**
3. **Bid**
4. **Permits from outside agencies required by law**
5. **Special Specifications (Provisions)**
6. **Plans**
7. **Standard Plans and Standard Details**
8. **Standard/Technical Specifications**

Change orders, supplemental agreements and approved revisions to Plans and Specifications will take precedence over Contract Documents listed above.

104.03 SHOP DRAWINGS AND OTHER SUBMITTALS

A. Plans furnished and included with Specifications indicate the work proposed and the results that are intended to be accomplished.

B. Unless otherwise specified, furnish six (6) copies of all layout, detail, shop and working drawings requested by the Engineer. Shop drawings shall be of sufficient size and scale

to clearly show details. After review and approval by the Engineer, two copies will be returned to the Contractor.

C. By approving and submitting shop drawings, product data and samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, and that he has checked and coordinated the information contained within such submittals with the requirements of the work and of the Contract Documents and that he has checked and coordinated the information contained within such submittals with the requirements of the work and of the contract documents and that he is satisfied they conform to the contract documents.

D. All required shop drawings, product data and samples shall be furnished to the Engineer for his review and any required testing before any of the work or related work is performed or products or material ordered prior to the Engineer's review and completion of any testing will be at Contractor's risk.

E. The Engineer will review all shop drawings, product data and samples and conduct such tests as are required by the contract documents within a reasonable time but in no event will Engineer be required to complete such review or conduct such tests in less than fourteen (14) days after submission. the engineer will return marked-up submittal copies indicating one of the following actions:

1. If review and checking indicate no exceptions, copies will be returned marked "NO EXCEPTIONS TAKEN" and work may begin immediately on incorporating the material or equipment covered by the submittal into the work.

2. If review and checking indicate limited corrections are required, copies will be returned marked "Make Corrections noted," and upon making the corrections noted, work may begin immediately to incorporate the material or equipment covered by the submittal into the work.

3. If review and checking indicate insufficient or incorrect data have been submitted, copies will be returned marked "REVISE AND RESUBMIT." No work may begin on incorporating the material or equipment covered by this submittal into the work until the submittal is revised, resubmitted, and returned marked either "NO EXCEPTIONS TAKEN" OR "MAKE CORRECTIONS NOTED."

4. If review and checking indicate the material or equipment submittal is unacceptable, copies will be returned marked "REJECTED." No work may begin on incorporating the material or equipment covered by this submittal into the work until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" OR "MAKE CORRECTIONS NOTED."

5. If review and checking indicate additional information is required, copies will be returned marked "SUBMIT SPECIFIED ITEM." Work may begin immediately on incorporating the material or equipment covered by the submittal into the work, only if it is not affected by the item to be submitted. If any material or equipment is affected, no work may begin on incorporating that material or equipment into the work until it and the submittal are submitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

F. The review by the Engineer of any shop drawings, product data, samples, construction methods and equipment or other submittals is only for conformance with the general design concept of the project and does not extend to consideration of structural integrity, safety, detailed compliance with contract requirements, or any other obligation of the Contractor. Any action shown is subject to the requirements of the plans and specifications. The contractor is responsible for confirming and correlating all dimensions; fabricating and construction techniques; coordinating his entire work in strict accordance with the contract documents. The review does not relieve Contractor from his obligation fully to perform all contract requirements, nor shall such review give rise to any right of action or suit in favor of Contractor or third persons, against Engineer or Owner.

104.04 CHANGES IN THE WORK

A. Without invalidating the Agreement and without notice to a surety by the Owner, Owner may, at any time, order additions, deletions or revisions in the Work: these will be authorized by a written amendment, a Change Order, or a work directive change.

B. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

104.05 FORCE ACCOUNT WORK

A. The Contractor shall perform work on a force account basis upon written notice by the Engineer. If the Engineer determines the work increases the amount due under the Contract, payment will be made pursuant to Subsection 109.04 A 3 Method 3 Force Account Work.

B. The Contractor must maintain records in such a manner as to provide a clear distinction between direct cost of work performed on force account basis and costs of all other operations performed in connection with the Contract.

C. Daily, furnish to Engineer signed reports itemizing materials used and setting forth the cost of labor and charges for equipment rental, delineating whether said equipment is Contractor or Subcontractor owned. Provide names, identifications, and classifications of workmen, the hourly rate of pay and hours worked, and the size, type, and identification number of equipment and hours of equipment operation.

D. Substantiate material charges by vendor's invoices, submit such invoices with the reports; or, if not available, submit with subsequent reports. In the event said vendor's invoices are not submitted within 30 days after completion of the force account work owner reserves the right to establish the cost of such materials.

E. The Engineer will compare his records with the reports furnished by the Contractor, make any necessary adjustments, compile the costs of work paid for on a force account basis and issue a change order covering the work.

104.06 SALVAGE

A. When shown or specified, carefully salvage and stockpile within the construction area all castings, pipe and any discarded facilities, to be disposed of by owner.

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105 CONTROL OF WORK

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105.01 AUTHORITY OF THE ENGINEER

A. The Engineer will decide all questions which may arise as to quantity, quality, and acceptability of materials furnished and work performed, the rate of progress of the work; interpretation of the Plans and Specifications; the measurement of all quantities; and the acceptable fulfillment of the Contract on the part of the Contractor. The Engineer's estimates, decisions and approval signify favorable opinion and qualified consent; it does not carry with it certification or assurance of completeness, quality or accuracy concerning details. Such approval does not relieve Contractor from responsibility for errors, improper fabrication, improper construction methods, non-conformance to requirements or for deficiencies within his control.

B. It is further understood that all work to be done under the Contract will not be considered completed until it has passed final inspection by the Engineer and is accepted by the Owner. It is further understood that the authority of the Engineer is such that the contractor shall at all times carry out and fulfill the instructions and directions of the Engineer insofar as they concern the work to be done under the Contract.

C. The Engineer shall have the authority to order unacceptable work to be corrected, removed or replaced, and unauthorized work to be removed and, pending completion of such order, to deduct the estimated cost thereof from any monies due, including retainage, or to become due the Contractor. This authority shall take precedence over any and all requirements of the specifications for payment set forth elsewhere in the specifications.

D. In the Engineer's sole discretion, minor defects in the work may be accepted subject to a reasonable deduction from the Contract price or other credits to the owner. Such determination by Engineer shall be final.

E. The Engineer is not authorized to waive any written notice required of the Contractor by the Contract.

105.02 AUTHORITY AND DUTIES OF INSPECTORS

A. Engineer may appoint assistants to inspect all materials used and all work done. Such inspection may extend to any or all parts of the work and to the preparation or manufacture of materials to be used. Inspectors will not be authorized to revoke, alter, enlarge, or relax the provisions of the contract. An Inspector is placed on the work to keep the Engineer informed of progress of the work and the manner in which it is being done. In

addition, the Inspector shall call to the attention of Contractor any deviation from the Plans, or Specifications.

B. An Inspector will not be authorized to approve or accept any portion of the work or to issue instructions contrary to the Plans and Specifications under this Contract. Furthermore, the Inspector is not authorized to waive any written notices required by the Contract. The Inspector will have authority to reject defective material and to suspend any work that is being improperly done, subject to final decision by the Engineer.

105.03 RESPONSIBILITY OF CONTRACTOR

A. Do all work and furnish all labor, materials, equipment, tools, and machines necessary for the performance and completion of the project in accordance with the Contract. Be obligated to determine and be responsible for the method of construction.

B. Contractor shall be solely liable for any accident, loss or damage happening to work referred to in the Contract prior to completion and acceptance thereof.

105.04 NOTIFICATION OF UTILITIES AND AGENCIES

A. Obtain prior approval from the Engineer for closing or partial closing of any street. Give at least two working days advance notice of such closure to all agencies providing emergency services, including without limitation police, fire and ambulance services. Notification shall include, but not be limited to the time of commencement and completion of work, names of streets or location of alleys to be closed, or partially closed, schedule of operations and routes of detours where applicable.

B. When performing work in streets and easements, whether inside or outside Owner's legal boundaries, notify all of the affected utilities and local agencies about the operations so as to properly coordinate and expedite the work in such a manner as to cause the least amount of conflict and interference between the operations and those of other agencies.

C. The Contractor and its subcontractors must comply with all provisions of ORS 757.541 to 757.571 including notification of all owners of underground facilities at least forty-eight (48) business day hours but not more than ten (10) business days before beginning work. Notify the following utilities and agencies in writing at least two working days before commencing any work on the project:

City of Newberg, Public Works Division
Yamhill County Public Works
General Telephone Exchange
Newberg School District
TCI Cable Television
Northwest Natural Gas Co.
Portland General Electric Company

D. Owner shall relocate or cause to be relocated all privately or publicly owned utility conduits, lines, poles, mains, pipes and such other facilities within the jurisdiction and control of Owner where such relocation is necessary in order to conform said utility and other facilities with the plans and ultimate requirements of the project. If desirable for specific reasons, or for convenience of field operations, contact the above listed utilities.

105.05 UTILITIES AND EXISTING IMPROVEMENTS

A. Information shown as to location of existing water courses, drains, sewer lines or utility lines is provided for Contractor's information and convenience and is not, in any way, warranted to be accurate by Owner. Contractor shall verify all such information and shall deal with varying conditions at its own expense.

B. Operation of water valves and hydrants by unauthorized personnel is strictly prohibited. Obtain written permission from and pay any fee required from the City of Newberg prior to using hydrant water.

C. Provide for the flow of sewers, drains, or water courses interrupted during the progress of the work, and restore such drains or water courses as approved by the Engineer, at no additional cost to Owner.

D. Be responsible for all costs for the repair of any and all damage to any utility, whether previously known or disclosed during the work, as may be caused by the work. Maintain in place utilities not shown on the drawings to be relocated or altered by others. If Contractor requires temporary relocation, for his convenience or because of his method of construction or as a result of site conditions, Contractor shall bear all costs for said temporary relocation. Maintain utilities which have been relocated by others in their relocated positions in order to avoid interference with structures which cross the project work.

E. Make excavations and borings ahead of work, as necessary, to determine the exact location of interfering utilities or underground structures. When this is not feasible or practical or the need for such work was not foreseen, the utility owners or the Owner shall have the right to enter upon the right-of-way and upon any structure therein for the purpose of making new installations, changes or repairs. Conduct operations so as to provide the time needed for such work to be accomplished during the progress of the improvement, at no additional cost to the owner.

F. It is understood that there will be interfering utilities, service laterals, and other underground pipes, drains or structures encountered on underground projects that are not shown or are shown incorrectly on the plans and/or have not been previously discovered in the field. Contractor agrees this is a normal and usual occurrence in the construction of underground improvements. Furthermore, bidders understand and agree that work in some cases must be done in close proximity to said utilities and underground pipes, drains, and structures not shown or shown incorrectly on the plans which may require a change in operations and may cause sloughing of the trench, additional traffic control, additional pavement and backfill costs, and time; the Contractor agrees that a reasonable number of these occurrences are usual and ordinary on underground projects and are reflected in the bid and plan of operation.

G. The Engineer will require a reasonable amount of time to perform design changes necessitated by directly conflicting utilities and/or the utility owners will require a reasonable amount of time to make necessary utility relocations.

H. The Bidders agree to provide for these conflicts and interferences and agree to provide for a reasonable amount of time for design changes and/or utility relocations due to said interference in the bid and understand that no additional compensation for interruption of

schedule, extended overhead, delay or any other impact claim or ripple effect or any other costs whatsoever or additional time will be made for these conflicts or interferences.

105.06 SURVEY SERVICE

A. Give notice to Engineer not less than three working days in advance of when survey services will be required in connection with the laying out of any portion of the work.

B Engineer will furnish and set construction stakes establishing lines and grades as he determines necessary for all work under the Contract.

C. Engineer will furnish appropriate offset lines and grades as he deems necessary for all projects involving trenching operations. Contractor will be responsible for the transfer of the offset lines or grades into the ditch, to batterboards, or any other point within the work. Work done without lines and grades having been established by the Engineer or work done beyond the lines and grades will be considered as unauthorized and will not be paid for and may be ordered removed, replaced, or corrected at no expense to the Owner.

D. Staking to be provided above shall be provided one time only at cost to the Owner. Once the control staking and markings are provided, the Contractor shall be responsible for protection and maintenance of the work. Any loss of staking, monumentation or other project control shall be the responsibility of the Contractor to replace at no additional expense to the Owner. In such a case, Contractor shall make all necessary arrangements for replacement of lost staking.

105.07 PROTECTION OF SURVEY MARKERS

A. Permanent Survey Markers

Notify the Engineer not less than three working days prior to starting work in order that the Engineer may take necessary measures to ensure the preservation of survey monuments, stakes, lot stakes and bench marks. Do not disturb permanent survey monuments, stakes, lot stakes or bench marks without the consent of Engineer, and notify Engineer and bear the expense of replacing any that may be disturbed.

When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, preserve the monument and adjust the monument cover to the new grade at no expense to Owner.

B. Construction and Survey Markers

Preserve construction survey stakes and marks for the duration of their usefulness during construction. If any construction survey stakes are lost or disturbed through negligence of Contractor, and in the judgment of the Engineer need to be replaced, such replacement shall be by the Engineer at the expense of Contractor. The cost of replacement shall be charged against, and shall be deducted from payments for Contract work.

105.08 PROTECTION OF PROPERTY

A. Protect all public and private property, insofar as it may be endangered by operations and

take every reasonable precaution to avoid damage to such property.

B. Restore and bear the cost of any public or private improvement, facility, structure, or land and landscaping within the right-of-way or easement which is damaged or injured directly or indirectly by or on account of an act, omission, or neglect in the execution of the work. Restore to a condition substantially equivalent to that existing before such damage or injury occurred, by repairing, rebuilding, or otherwise effecting restoration thereof, or if this is not feasible, make a suitable settlement with the Owner of the damaged property.

C. Give reasonable notice to occupants of buildings on property adjacent to the work to permit the occupants to remove vehicles, trailers and other possessions as well as salvage or relocate plants, trees, fences, sprinkler systems, or other improvements in the right-of-way which are designated for removal or which might be destroyed or damaged by work operations.

D. Protect all designated trees, lawns and planted areas within the right-of-way or easements. Restore all on-surface disturbed areas, by methods as set forth in the technical specifications. If conditions are such that the method specified cannot be done, provide erosion control surface covering of such quality and quantity as will prevent erosion from occurring, without adverse impacts to the environment, if required by conditions existing at the site, at no additional cost to the Owner.

E. Review with Engineer the location, limits and methods to be used prior to clearing work. Clearing and grubbing shall be performed in strict compliance with all local, State and Federal laws and requirements pertaining to clearing and burning, and particularly in conformity with the provisions of ORS Chapter 477, and all subsequent amendments, which require, among other things, filing with the State Forester a general description of the right-of-way to be cleared before the start of clearing operations. Obtain the required permit from the State Forester and perform clearing work in conformance thereto.

105.09 USE OF WORK DURING CONSTRUCTION

A. Owner shall have the right to take possession of and use any completed or partially completed portions of the Work. Such use shall not be considered as final acceptance of the Work or portions thereof.

B. Such action by Owner will not relieve the Contractor of responsibility for injury or damage to said completed portions of the work resulting from use by public traffic, action of the elements, Contractor's operations, defective work, or negligence, or from any other cause, except for injury or damage resulting from Owner's negligence. Contractor will not be required to again clean up such portions of the Work prior to final acceptance, excepting for such clean up as results from Contractor's operations or defective work. Use of any completed or partially completed portions of the work does not relieve Contractor from the warranty responsibility nor shall the warranty period commence to run until final completion and acceptance of the work.

105.10 FURNISHING TEMPORARY SERVICES AND FACILITIES

Install, furnish and maintain temporary light, power, water and any temporary services or facilities complete with connecting piping, wiring, lamps, and similar equipment during construction of the work, including testing and start up. Remove temporary facilities upon completion of work. Obtain all permits

and bear all costs in connection with temporary services and facilities. Conform to applicable statues, rules, codes, and other requirements in the use of these facilities.

105.11 VERBAL AGREEMENTS OR REPRESENTATIONS

No verbal agreement or conversation by or with any officer, agent or employee of the Owner, either before or after execution of the Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract. Any such verbal agreement or conversation is in no way binding upon Owner.

105.12 WATER AND AIR POLLUTION CONTROL

A. During the term of the Contract, Contractor's operations shall conform to applicable laws and regulations of the Oregon Department of Environmental Quality, and other agencies of the State and Federal government, City of Newberg guidelines, as well as other local Ordinances and Resolutions designed to prevent, control, and abate water and air pollution.

B. During all phases of the work, or when directed, protect work sites, storage and disposal areas from washout and erosion, and take precautions to control or abate dust nuisance and air pollution by cleaning up, sweeping, sprinkling, covering, enclosing or sheltering work areas, and stockpiles, and by promptly removing from paved streets earth or other material which may become airborne or may be washed into waterways or drainage systems.

105.13 NOISE

A. Conform and comply with applicable noise regulations of the City of Newberg.

105.14 ACCESS TO THE WORK

A. Provide access to the work for representatives of the owner, the State of Oregon, the Federal Government, and other entities having jurisdiction in the area.

B. Allow access to Engineer or his representatives to all parts of the work and to plants of manufacturers at all times. Furnish them with every reasonable facility for ascertaining if the work meets requirements and intent of the Contract.

105.15 DEFECTIVE OR UNAUTHORIZED WORK

A. All work which does not conform to the requirements of the Contract shall be considered as unacceptable.

B. Upon discovery immediately remove unacceptable and defective work and replace by work and materials which conform to the Contract. This provision shall have full effect regardless of the fact that the unacceptable work may have been done or the defective materials used with the full knowledge of the Inspector.

105.16 RAILROAD CROSSINGS OR RIGHT-OF-WAY

Submit a schedule of proposed operations to the Engineer whenever the project or work thereunder

involves the crossing of any railroad line or the encroachment on any railroad right-of-way. This schedule shall be approved by the appropriate railroad officials and the Engineer before the work is started within such area. Pay for services of flag persons and/or watch persons furnished by the railroad company and provide and drive piling, set cribbing, build bridges or tunnels, install enclosing pipe and do all other work required by the railroad company or necessary for safety or maintenance of railroad traffic, including working on weekends, holidays and providing extra shifts. Furnish any bond or insurance required of the Owner by the railroad company as a result of such intended operations and indemnify Owner for any and all expenses incurred by Owner, and assume any and all liability or claims thereof imposed on Owner as a result of operations in railroad right-of-way area. Bear all costs resulting from interferences, obstructions or liabilities set forth in this Specification, whether or not herein specifically mentioned.

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106 CONTROL OF MATERIALS

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106.01 PREFERENCE FOR USE OF OREGON PRODUCTS

Preference may be given to services, articles or materials produced or manufactured in Oregon, if price, fitness, availability and quality are otherwise equal. These provisions do not apply to Contracts on projects financed wholly or in part by Federal funds.

106.02 QUALITY OF WORK

Materials, parts, products and equipment which are to be incorporated into the work shall be new and shall conform to the Contract Documents.

106.03 SAMPLING AND TESTING

A. Tests of the work may be made by Owner at any time during construction of the work or during the production, fabrication, or preparation and use of materials, parts, products and equipment.

B. Owner reserves the right to require samples and to test products for compliance with pertinent requirements irrespective of prior certification of the products by the manufacturer.

C. When such tests of the work are necessary, as determined by the Engineer, such tests will be made by and at the expense of Owner unless otherwise specified. Provide such facilities and cooperate as required for collecting and forwarding samples and do not incorporate into the work until tests have been made and found acceptable. In all cases furnish the required samples without charge and in ample time to permit testing prior to use. Provide safety measures and devices to protect those who take the samples.

D. In the absence of any reference Specification it shall be understood that materials shall meet the Specifications and requirements of the American Society for Testing and Materials (ASTM), or the American Association of State Highway and Transportation

Officials (AASHTO), as directed by the Engineer. When there is no pertinent coverage under ASTM or AASHTO, the material concerned shall meet Specifications and requirements of applicable Commercial Standards of the Commodity Standards Division of the U.S. Department of Commerce. Lacking such coverage, materials shall meet requirements established by reputable industry for a high-quality product of the kind involved.

E. All testing shall be performed by the testing laboratory or by the Engineer or as directed by the Engineer.

F. In the event Engineer requests tests, and the work fails, the contractor shall bear all costs for all subsequent testing necessary to meet specified requirements.

106.04 CERTIFICATION

The engineer in his sole discretion may in lieu of any other required sampling and testing accept from contractor two copies of the manufacturer's certification with respect to the product involved, under conditions set forth as follows:

1. Certification shall state that the named product conforms to Owner's requirements and that representative samples thereof have been sampled and tested as specified.

2. Certification shall either be accompanied with a certified copy of test results, or certify that such test results are on file with the manufacturer and will be furnished to Engineer upon request.

3. Certification shall give the name and address of the manufacturer and the testing agency and the date of tests; and shall set forth the means of identification which will permit field determination of the product delivered to the project as being the product covered by the certification.

4. Contractor shall not be responsible for any costs of certification or for any costs of the sampling and testing of products in connection therewith.

106.05 INSPECTION BY OTHERS

Inspection of work by persons other than representatives of the Owner will not constitute inspection by Owner.

106.06 STORAGE AND PROTECTION OF ITEMS OF WORK

Store items to be incorporated into the work to assure the preservation of their quality and fitness for the work. Stored items, even though approved before storage, may be reinspected and are subject to rejection prior to being incorporated into the work. Stored items shall be located so as to facilitate their prompt inspection.

106.07 TRADE NAMES, EQUALS OR SUBSTITUTIONS

A. In order to establish a basis of quality, certain processes, types of machinery or equipment or kinds of materials may be specified either by description of process or by designating a manufacturer by name and referring to his brand or product designation or by specifying a

kind of material. It is not the intent of these specifications to exclude other processes, equipment or materials of equal value, utility or merit.

B. Whenever a process is designated or a manufacturer's name, brand or item designation is given or whenever a process or material covered by patent is designated or described, it shall be understood that the words "or equal" follow such name, designation, or description, whether in fact they do so or not. This "or equal" clause is not a warrantee, either expressed or implied by Owner that an equal exists.

C. The Contractor may offer to furnish materials or equipment of equal or better quality and performance other than that specified as a substitute after the contract is executed. If the offer necessitates changes to or coordination with any other portion of the work, the data submitted shall include drawings and details showing all such changes. Contractor agrees to perform these changes as part of the substitution of material or equipment. Acceptance by the Engineer shall not relieve the Contractor from full responsibility for the efficiency, sufficiency, quality and performance of the substituted material or equipment in the same manner and degree as the material and equipment specified by name. Any cost differential associated with a substitution shall be reflected in the Contract price and the contract shall be appropriately modified by Change Order.

D. If the Bid includes a list of equipment, materials or articles for which Contractor must name the manufacturer at time of submission of the bid, no substitutions therefore will be permitted.

E. All materials or equipment of equal or better quality offered by the Contractor for substituting shall be approved by the Engineer prior to incorporation into the project.

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107 LEGAL RELATIONS AND RESPONSIBILITIES

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107.01 LAWS AND REGULATIONS

A. Comply with all Federal and State laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of work. Observe and comply with all such laws, ordinances, regulations, orders and decrees. Protect and indemnify Owner and his representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by Contractor, his subcontractors, suppliers of materials or services, or others engaged by the Contractor, or their employees.

B. In addition to those set forth herein, the Statutes of the State of Oregon for public works contracts, Chapter 279, are incorporated by reference into the Contract.

107.02 SUBCONTRACTORS

A. After contract award and notice of contractor subcontractor agreements have been submitted, work shall not be transferred or subcontracted without prior consent of Owner.

B. Use of subcontractors, material suppliers or equipment suppliers shall in no way release Contractor from any obligations of contract with Owner.

C. Contractor will provide in all subcontract agreements that the Subcontractor, material supplier and equipment supplier will be bound by the terms and conditions of this Contract to the extent that they relate to the Subcontractor's work, material or equipment. All Subcontractor's agreements will also provide that they are assignable to the Owner at Owner's option, in the event this agreement is terminated for default of Contractor.

107.03 NO WAIVER OF LEGAL RIGHTS

Owner shall not be precluded or stopped by any measurement, estimate or certificate made either before or after completion and acceptance of work or payment therefore, from showing the true amount and character of work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate or certificate is untrue or incorrectly made, or that work or materials do not conform in fact to the Contract. Owner shall not be precluded or stopped, notwithstanding any such measurement, estimate or certificate, or payment in accordance therewith, from recovering from the Contractor and his Sureties such damages as it may sustain by reason of his failure to comply with terms of the Contract, or from enforcing compliance with the Contract. Neither acceptance by Owner, or by any representative or agent of the Owner, of the whole or any part of the work, nor any extension of time, nor any possession taken by Owner, nor any payment for all or any part of the project, shall operate as a waiver of any portion of the Contract or of any power herein reserved, or any right to damages herein provided. A waiver of any breach of the Contract shall not be held to be a waiver of any other breach.

107.04 OTHER CONTRACTS

A. The Owner reserves the right to award other contracts or issue permits for work that may require coordination with the work to be performed under this contract.

B. When separate contracts or permits are awarded or issued for different portions of the Project, "the Contractor" in the contract documents in each case shall be the contractor who signs each separate contract.

C. Mutual Responsibility of Contractors - The contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate his Work with theirs.

D. If any part of the Contractor's Work depends for proper execution or results upon the work of any other separate Contractor, the Contractor shall inspect and promptly report to the Engineer any apparent discrepancies or defects in such work that render it unsuitable for such proper execution and results. Failure of the Contractor to inspect and report shall constitute an acceptance of the other Contractor's work as fit proper to receive the Work, except as to defects which may develop in the other separate contractor's work after the execution of the Contractor's Work.

E. Should the Contractor cause damage to the work or property of any separate contractor which results in a claim against the Owner, and if the claim is not satisfied by contractor and the separate contractor sues the Owner or initiates an arbitration proceeding on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor who shall defend if requested such proceedings at the contractor's expense, and if any judgment or award against the Owner arises therefrom the contractor shall pay or satisfy it and shall reimburse the Owner for all attorney's fees and court or arbitration costs which the Owner has incurred.

F. The Contractor shall be responsible for any cutting, fitting and patching that may be required to complete the Work except as otherwise specifically provided in the Contract. The Contractor shall not endanger any work of any other contractors by cutting, excavating or otherwise altering any work and shall not cut or alter the work of any other contractor. Any costs caused by defective or ill-timed work shall be borne by the party responsible therefore.

G. If a dispute arises between the separate contractors as to their responsibility for cleaning up, the Owner may clean up and charge the cost thereof to the several contractors as the Engineer shall determine to be just.

107.05 LIABILITY AND INDEMNIFICATION

The Contractor shall assume all responsibility for the work and shall bear all losses and damages directly or indirectly resulting to the Contractor, to the Owner, to the Engineer, and to their officers, agents, and employees on account of (a) the character or performance of the work, (b) unforeseen difficulties, (c) accidents, or (d) any other cause whatsoever.

The Contractor shall defend, indemnify, and hold harmless the Owner, the Design Engineer, and their officers, agents and employees from all claims, loss, damage, and injury of every kind directly or indirectly arising out of this Contract. The Contractor shall assume this responsibility even if (a) fault is the basis of the claim, and (b) any act, omission or conduct of the Owner connected with the Contract is a condition or contributory cause of the claim, loss, damage or injury.

The Contractor shall not be liable for, nor be required to defend, or indemnify the Owner or the Design Engineer relative to any claim, loss, damage, or injury resulting solely from acts or omissions by the Owner, the Design Engineer, or their officers, agents or employees. The Contractor shall not be liable for, not be required to defend, or indemnify the Owner or the Design Engineer relating to any claim loss, damage, or injury arising from the use of any maps, drawings, reports, surveys, designs, or specifications furnished by the Owner, Design Engineer, or their officers, agents, or employees.

Any specific duty or liability imposed or assumed by the Contractor, as may be otherwise set forth in the Contract documents, shall not be construed as a limitation or restriction of the general liability or duty imposed upon the Contractor by this section.

The Contractor shall assume all responsibility for the work.

107.06 INSURANCE

A. General

1. The Contractor shall provide and maintain during the life of this Contract the insurance

coverage designated hereafter. All costs for such insurance shall be born by the Contractor and shall be included in the contract price.

2. Prior to execution by the Owner and before commencing work under this Contract, Contractor shall furnish the Engineer with certificates of insurance specified herein showing the name of the insurance carrier, coverage, type, amount (or limits), policy numbers, effective and expiration dates, description of operations covered, and containing substantially the following cancellation provision:

   "The insurance covered by this certificate will not be canceled or materially reduced, except after 30 days written notice has been received by the Owner."

3. In case of the breach of any provision of this Article, the Owner, at its option, may take out and maintain, at the expense of the Contractor, such insurance as the Owner may deem proper. The Owner may deduct the cost of such insurance from any monies which may be due or become due the Contractor under this Contract.

B. Review and Approval of Insurance

The Contractor shall not commence work under this Contract nor allow any subcontractor to commence work on a subcontract until the Contractor has obtained all the insurance required hereunder and such insurance has been approved by the Attorney. All policies or insurance and certificates of insurance shall be satisfactory to the Owner. Approval of the insurance shall not relieve or decrease the liability of the Contractor hereunder.

C. Workers' Compensation, the Federal Longshoremens' and Harborworkers' Act and the Federal Jones Act

1. The Contractor shall provide and shall require all subcontractors to provide workers' compensation coverage for all persons employed under this Contract including the Contractors' partners and any individual regardless of relation to the Contractor's partners and any individual regardless of relation to the Contractor or to the partners who provide work under this Contract. The Contractor shall be required to assure that subject workers will receive the compensation for compensable injuries provided in ORS Chapter 656 either by:

   a. a carrier-insured employer; or

   b. a self-insured employer as provided by ORS 656.407.

   In addition to the statutory benefits outlined above, the Contractor and all subcontractors shall provide employers' liability insurance with limits of not less than:

   $100,000 each accident for bodily injury by accident
   $100,000 each employee for bodily injury for disease
   $500,000 policy limit for bodily injury by disease

2. Evidence of such coverage, including the guaranty or warrant period, shall be filed with the City and maintained for the duration of the Contract.

3. The Contractor shall defend, indemnify, and hold harmless, the City and the City's officers, agents, and employees against any liability that may be imposed upon them by reason of the Contractor's or subcontractor's failure to provide workers' compensation and employers liability coverage.

4. Where work under this Contract is subject to the Federal Longshoremens' and Harborworkers' Act or the Federal Jones Act, the Contractor shall provide coverage for such exposure.

D. General Liability and Automobile Liability

1. The Contractor shall provide a general liability policy that provides coverage for bodily injury including personal injury and property damage liability insurance and automobile liability insurance. Such insurance must protect the Contractor, the Owner, and their officers and employees from all things or damage which may arise out of this Contract or in connection therewith, including all operations of Subcontractors. Such insurance shall provide coverage for not less than the amounts for which public bodies are responsible as set forth in Oregon Revised Statutes Chapter 30, Tort Actions against Public Bodies, but in no event less than the following limits of liability:

   $1,000,000 each occurrence
   $1,000,000 general aggregate
   $1,000,000 product and completed operations aggregate
   $1,000,000 personal and advertising injury
   $1,000,000 combined single limit automobile liability for owned, non-owned, and hired automobiles.

   The policy shall contain an endorsement that the aggregate applies separately to this Contract.

   The insurance shall be written on a comprehensive form which includes broad form property damage on an occurrence basis. Unless excluded by Special Specification, the general liability policy shall include, without deductible, coverage for premises operations, explosion and collapse hazard, underground hazard, products, completed operations, contractual insurance, and independent contractors. Such insurance shall be maintained until the expiration of the guaranty period required by the Contract. Failure to maintain liability insurance as provided above shall, at Owner's option, be cause for immediate termination of the Contract.

2. The Contractor shall provide a letter from the insurance company which states that such insurance shall be without prejudice to coverage otherwise existing.

3. The City of Newberg, its officers, agents, and employees, shall be named additional insureds in the Contractor's General Liability Insurance policy by attaching ISO Endorsement number CG 20 09 11 85 ADDITIONAL INSURED - Owners, Lessees, or Contractors (Form A) or its equivalent.

   The policy shall also provide for a Cross Liability Endorsement or Separation of Insureds Endorsement.

   The policy shall be endorsed to provide an AMENDMENT - AGGREGATE LIMITS OF

INSURANCE (per project) specifying that a separate aggregate limit of liability applies to this Contract.

If there are insufficient insurance proceeds and assets of the Contractor to fully indemnify the City of Newberg, its officers, employees, agents, and the Engineer, then the City, its officers, employees, and agents would be indemnified first with any remaining insurance proceeds and assets to be used to indemnify the developer's or consulting Engineer.

1. If set forth in the Special Specifications, additional insureds may be the Owner's consultant, engineer, other governmental bodies with jurisdiction in the area involved in the project, and their officers and employees and such agents as may be specified.

E. Claims on Project

1. The Contractor, when notified of a claim by an affected party shall:

   a. Refer claim to the Contractor's insurance carrier or claims administrator.

   b. Contractor's insurer will copy Owner on acknowledgment of claim.

   c. Contractor's insurer will copy Owner on notice to claimant of disposition of claim.

F. Builders Risk Insurance

During construction, Contractor shall obtain and maintain for the benefit of the parties to the Contract as their interest may appear, all-risk Builder's Risk insurance to the extent of 100 percent of the value of the project. Coverage shall also include: (1) formwork in place; (2) form lumber on site; (3) temporary structures; (4) equipment; and (5) supplies related to the work while at the site. Such insurance shall be endorsed to require thirty days' written notice to the City prior to cancellation or change of the policy. One copy of the policy and two certificates of such insurance shall be delivered to the City before commencing work and shall be subject to review and approval by the City. The City may temporarily waive delivery of the copy of the policy. In the event Contractor fails to maintain such insurance, the City may arrange therefore; and any premium incurred shall be to the account of Contractor.

107.07 ROYALTIES AND PATENTS

Pay all royalties and license fees required to perform the Work. Defend and indemnify Owner, from all loss or damage that may result from the Contractor's wrongful or unauthorized use of any patented article or process.

107.08 PERMITS

Secure all Municipal, County, State, Federal or other permits or licenses, necessary or incident to performance of the work under this Contract. Comply with all permit requirements pertaining to the project.

107.09 COMPLIANCE WITH OREGON REVISED STATUTES CHAPTER 279 (Public Contracts)

A. Comply, and require all Subcontractors to comply with the cities public contracting requirements, the requirements of the applicable State statutes, and be subject to the applicable liabilities provided in Oregon Revised Statutes Chapter 279 (Public Contracts), such as, but not limited to, the statutes that are numbered and referenced, and incorporated herein by an abbreviated subject matter, and listed below and the statutes required to be set forth as conditions in public contracts, which follows:

LIST:

1. ORS 279.021 Award of contract; Bond; Waiver of bond in case of emergency

2. ORS 279.334 Maximum hours of labor on public contracts; holidays; exceptions.

3. ORS 279.338 Length of day's labor on public works.

4. ORS 279.350 Workers on public works to be paid not less than prevailing rate of wage.

5. ORS 279.354 Certification of rate of wage by Contractor or Subcontractor.

6. ORS 279.355 Inspection to determine whether prevailing rate of wage being paid; proceedings to require payment of prevailing rate of overtime.

7. ORS 279.356 Liability for violations.

8. ORS 279.400 Withholding of retainage.

B. The statutes required as conditions in public contracts are as follows:

1. 279.021 - Preferences; Foreign Contractor

   a. The public contracting agency shall prefer goods or services that have been manufactured or produced in their State if price, fitness, availability, and quality are otherwise equal.

   b. Where a public contract is awarded to a foreign contractor and the contract price exceeds $10,000, the Contractor shall promptly report to the Oregon Department of Revenue on forms to be provided by the Department of Revenue the total contract price, terms of payment, length of contract and such other information as the Department of Revenue may require before final payment can be received on the public contract. The public contracting agency shall satisfy itself that the requirement of this subsection has been complied with before it issues a final payment on a public contract.

      For purposes of this subsection, a foreign Contractor is one who is not domiciled in or registered to do business in the State of Oregon.

2. 279.029 - Conditions of award of contract regarding resident bidder.

   a. In determining the lowest responsible bidder, a public contracting agency shall, for the purpose of awarding the contract, add a percent increase on the bid of a nonresident bidder equal to the percent, if any, of the preference given to that bidder in the state in which the bidder resides.

   b. Resident bidder means a bidder that has paid unemployment taxes or income taxes in this state during the 12 calendar months immediately receding submission of the bid, has a business address in this state and has stated in the bid whether the bidder is a "resident bidder" pursuant to this subsection.

1. 279.312 - Conditions of public contracts concerning payment of laborers and material men, contributions to Industrial Accident Fund, liens and withholding taxes. The Contractor shall:

   a. Make payment promptly, as due, to all persons supplying to such contractor labor material for the prosecution of the work provided for in such contract.

   b. Pay all contributions or amounts due the Industrial Accident Fund from such contractor or subcontractor incurred in the performance of the contract.

   c. Not permit any lien or claim to be filed or prosecuted against the state, county, school district, municipality, municipal corporation or subdivision thereof, on account of any labor or material furnished.

   d. Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

4. 279.314 - Condition concerning payment of claims by public officers.

   a. If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the contractor or a subcontractor by any person in connection with the public contract as such claim becomes due, the proper officer or officers representing the state, county, school district, municipality, municipal corporation or subdivision thereof, as the case may be, may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due the contractor by reason of such contract.

   b. The payment of a claim in the manner authorized in this section shall not relieve the contractor or the contractor's surety from obligation with respect to any unpaid claims.

5. 279.316 - Condition concerning hours of labor. 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 279.334.

6. 279.318 - Provisions relating to environmental and natural resources laws and rules; change orders. A public contract for a public improvement shall make specific reference to federal, state and local agencies that have enacted ordinances or regulations dealing with the prevention of environmental pollution and the preservation of natural resources that affect the performance of the contract. If the successful bidder is delayed or must undertake additional work by reason of existing regulations or ordinances of agencies not cited in the public contract or due to the enactment of new or the amendment of existing statutes, ordinances or regulations relating to the prevention of environmental pollution and the preservation of natural resources occurring after the submission of the successful bid, the awarding agency shall grant a time extension and issue a change order setting forth the additional work that must be undertaken. The change order shall not invalidate the contract and there shall be, in addition to a reasonable extension of the contract time, a reasonable adjustment in the contract price to compensate the successful bidder for all costs and expenses incurred, including overhead and profits, as a result of such delay or additional work.

7. 279.320 - Condition concerning payment for medical care and attention to employees. The Contractor shall promptly, as due, make payment to any person, co-partnership, 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 Contractor, of all sums which the Contractor agrees to pay for such services and all moneys and sums which the Contractor collected or deducted from the wages of employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service.

8. 279.352 - Provision in Contract for minimum rate of wage. The existing prevailing rate of wage that may be paid to workers in each trade or occupation under this Contract is contained in the Special Specifications. Such workers shall be paid not less than such specified minimum hourly rate of wage.

107.10 LABOR

Upon notification in writing from the Engineer, remove immediately from the job for its duration any laborer, workman, mechanic, foreman, superintendent, or other person employed who is found to be incompetent, intemperate, troublesome, disorderly or otherwise objectionable, or who fails or refuses to perform his work properly or acceptably.

Comply with provisions of Owner's Equal Opportunity Policy and to Chapter 659, Oregon Revised Statutes relative to unlawful employment practices and discrimination by employers against any employee or applicant for employment because of race, religion, color, sex, or national origin. Particular reference is made to ORS 659.030, which states that it is unlawful employment practice for any employer, because of the race, religion, color, sex, or national origin of any individual, to refuse to hire or employ or to bar or discharge from employment such individual or to discriminate against such individual in compensation or in terms, conditions or privileges of employment.

107.11 OVERTIME

A. In addition to the requirement set forth in Specification 107.09 (ORS 279.316), Contractor shall notify the Engineer of any overtime operations as soon as possible. The Contractor must provide documentation to the Engineer's satisfaction justifying the overtime work.

B. In the event that the Contractor wishes to proceed with an overtime operation, the Contractor must first notify and obtain approval from the Engineer to do so, prior to commencing such work.

C. For overtime work requested by the Contractor, the Contractor shall pay the applicable wage rate for the Engineer's Inspector, engineering and operations personnel, and other staff required at the project during the overtime hours.

D. This section does not apply to labor performed in the manufacture or fabrication of any material ordered by the Contractor or manufactured or fabricated in any plant or place other than the place where the main Contract is to be performed.

107.12 SAFETY

A. Employee Safety:

The Contractor shall at all times be responsible for the safety of his employees and his subcontractor's employees. The Contractor shall maintain the job site and perform the work in a manner which meets the Owner's responsibility under statutory and common law for the provision of a safe place to work and which complies with the Owner's written safety regulations, if any.

Conduct the project with proper regard for the safety and convenience of the public. When the project involves use of public ways, provide necessary flag persons and install and maintain means of reasonable access to all fire hydrants, service stations, warehouses, stores, houses, garages and other property. Private residential driveways shall be closed only with approval of the Engineer or specific permission of the property owner. Do not interfere with normal operation of public transit vehicles unless otherwise authorized. Do not obstruct or interfere with travel over any public street or sidewalk without approval. At all times provide open trenches and excavations with secured and adequate barricades or fences of an approved type which can be seen from a reasonable distance. Close up or plate all open excavations at the end of each working day in all street areas unless approved otherwise by the Engineer and in all other areas when it is reasonably required for public safety or as directed by the Engineer. At night, mark all open work and obstructions by lights. Install and maintain all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges and facilities. Observe all safety instructions received from the Engineer or governmental authorities, but following of such instructions shall not relieve Contractor from its responsibility or liability for accidents to workmen or damage or injury to person or property.

B. Public Safety and Convenience:

The Contractor shall at all times conduct his work so as to insure the least possible obstruction to traffic and convenience to the general public and residents in the vicinity of the work and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Engineer and proper governmental authority. Fire hydrants on or adjacent to the work shall be kept accessible to fire fighting equipment at all times. Temporary provisions shall be made by the Contractor to insure the use of sidewalks, private and public driveways and proper functioning of all gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses. The Contractor will minimize inconvenience to others due to mud and dust.

C. Safety Program:

The Contractor shall adopt a written safety program complying with the requirements of employee and public safety set forth hereinabove and as described in the Special Conditions. The Safety Program shall also comply with O.A.R. Chapter 437, Division 3, Rules 1926.20 through 1926.32 regarding general safety and health provisions.

107.13 RIGHTS-OF-WAY, EASEMENTS, AND PREMISES

A. Confine construction activities within property lines, right-of-way, limits of easements and limits of construction permits as shown or specified in the Contract Documents unless arrangements are made with owner(s) of adjacent private property. If additional space or property is needed to accommodate Contractor's method for construction of the Work or for the convenience of the Contractor, Contractor shall bear all related costs and responsibilities. Prior to the use of any private property outside the specified boundaries, file with the Engineer written permission from the property owner(s).

B. Do not unreasonably encumber the specified work areas with materials and equipment. Obtain and bear the costs of permits for special occupancy and use of the specified work areas from the proper agencies. Comply with all requirements regarding signs, advertisements, fires and smoking.

107.14 TWO (2) YEAR MAINTENANCE AND WARRANTY

A. In addition to and not in lieu of any other warranties required under the Contract make all necessary repairs and replacements to remedy, in a manner satisfactory to the Engineer and at no cost to Owner, any and all defects, breaks, or failures of the Work occurring within two (2) years following the date of substantial completion due to faulty or inadequate materials or workmanship. Repair damage or disturbances to other improvements under, within, or adjacent to the Work, whether or not caused by settling, washing, or slipping, when such damage or disturbance is caused, in whole or in part, from activities of the Contractor in performing his duties and obligations under this Contract when such defects or damage occur within the warranty period. The two-year maintenance period required shall, with relation to such required repair, be extended two years from the date of completion of such repair.

B. If Contractor, after written notice, fails within ten (10) days to proceed to comply with the terms of this section, Owner may have the defects corrected, and Contractor and Contractor's Surety shall be liable for all expense incurred. In case of an emergency where, in the opinion of the Engineer, delay would cause serious loss or damage, repairs may be made without notice being given to Contractor and Contractor or Surety shall pay the cost of repairs. Failure of the Engineer to act in case of an emergency shall not relieve Contractor or Surety from liability and payment of all such costs.

C. In addition to provisions A and B above, City of Newberg waterline facilities installed by the contractor under this contract that require repair or replacement during the two-year maintenance period shall be repaired by the Owner or under the direction of the Owner and the contractor and contractor's surety shall be liable for all expenses incurred.

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108 PROSECUTION AND PROGRESS OF WORK

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108.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

Within thirty (30) days of Contract award or one (1) week in advance of starting work, whichever is earlier, SUBMIT FOR WRITTEN APPROVAL a proposed construction schedule to the Engineer. Contractor may not commence work until construction schedule is approved by the Engineer.

If it is desirable to carry on operations in more than one location simultaneously, submit a schedule for each location at least one (1) week in advance of beginning such operations. In the event that the Contractor's proposed construction schedule does not meet the necessary construction program schedule as determined by Owner, immediately resubmit a schedule that conforms as approved. Contractor shall not commence work until schedule is approved by the Engineer.

The schedule shall show the proposed order of work and indicate the time required for completion of the major items of work. This working schedule shall take into account the passage and handling of traffic with the least practicable interference therewith and the orderly, timely and efficient prosecution of work. It will also be used as an indication of the sequence of the major construction operations and as a check on the progress of work.

108.02 PRECONSTRUCTION CONFERENCE

Attend a preconstruction conference, if requested, at a time, prior to start of work, designated by the Engineer. Comply with information and instructions provided at the preconstruction conference as recorded in the minutes of the meeting.

108.03 NOTICE TO PROCEED

A. Unless stated otherwise in the Special Specifications, written Notice to Proceed will be given by the Engineer within thirty (30) days after the Performance and Payment Bond and all required insurances have been filed with and approved by the Owner and the Contract has been executed. Do not commence work under the Contract until such written notice has been given.

B. Notice to proceed may be delayed up to an additional thirty (30) days (for a total of sixty (60) days) from date of Contract by Engineer if, in the Engineer's opinion, necessary easements or permits have not been obtained, or required utility relocation, construction, or reconstruction has not been completed or has not progressed to a degree that will allow initial contract work to commence.

C. Commence work within ten (10) working days after the date of the Notice to Proceed, or such other date as may be fixed by the Notice to Proceed, which date shall establish the date for commencement of the Contract time. Notify Engineer forty-eight (48) hours in advance of the time and place work will be started.

108.04 CONTRACT TIME

A. Time shall be considered the essence of the Contract.

B. Upon commencement of work, Contractor shall provide adequate labor, materials, and equipment, and work shall be performed vigorously and continuously in accordance with a schedule which will ensure completion within the specified time limit. Failure to diligently pursue the work may jeopardize additional contract time.

108.05 SUSPENSION OF WORK

A. If the work is suspended for convenience: Temporarily suspend work on the Project wholly or in part for convenience of Owner as directed by the Engineer. In the event of such suspension, Engineer shall, except in emergency, and except as hereinafter provided, give Contractor three (3) days notice. Work shall be resumed within five (5) days after notice has been given by Engineer to Contractor to do so. Engineer shall allow Contractor an extension of time for completion corresponding to the total period of temporary suspension, and shall reimburse Contractor for necessary rental of unused equipment, services of watch persons, and other unavoidable expenses accruing by reason of the suspension, as stipulated in Section 108.05 (E), Delays and Extensions of Time.

B. If work is suspended by the Engineer: Immediately suspend work on the project, wholly or in part, as directed by the Engineer, for reasonable periods of time as the Engineer may deem necessary, when conditions are unsuitable for satisfactory performance of the work. The Owner shall allow the Contractor an extension of time for completion corresponding to the total period of suspension, but the Contractor shall not be entitled to reimbursement for any costs or damages arising under this clause.

C. If work is suspended for cause: Immediately suspend work on the Project wholly or in part as directed by the Engineer for such periods as the Engineer may deem necessary due to: (1) failure to correct unsafe conditions for working personnel, the general public, or Owner's employees, (2) failure to immediately correct defective and unacceptable work in accordance with Subsection 105.15, (3) failure to carry out provisions of the Contract Documents, and (4) failure to carry out orders or directives.

D. Voluntary suspension by Contractor: There shall be no voluntary suspension or slowing of operations without the prior written approval of the Engineer and such approval shall not relieve Contractor from the responsibility to complete the Contract work within the prescribed Contract time. Should operations be discontinued, Contractor shall notify, in writing, the Engineer at least twenty-four (24) hours in advance of resuming operations.

E. Responsibilities of Contractor:

1. At the commencement of and during any suspension of Work, protect all work performed to prevent any damage or deterioration of the Work. Provide temporary protection devices to warn, safeguard, protect, guide and inform traffic during suspension, the same as though the work had been continuous and without interferences.

2. Bear all costs for providing suitable provisions for traffic control and for maintenance

and protection of the work during suspension unless the suspension was for convenience.

F. In all cases of suspension, except voluntary suspension by Contractor, work will be resumed only upon written order of the Engineer or Owner.

108.06 DELAYS AND EXTENSIONS OF TIME

A. If the Contractor is significantly delayed due to court orders enjoining the prosecution of this Project, unavoidable strikes, Acts of God, unusual and extraordinary action of the elements that are of such severity to stop all progress of the work, or act or neglect of Owner not authorized by the Contract, the Contractor shall, within forty-eight (48) hours of the start of the occurrence, give notice to the Engineer of the cause of the potential delay and estimate the possible time extension involved. Within ten (10) days after the cause of the delay has been remedied the Contractor shall give notice to the Engineer of any actual time extension requested as a result of the aforementioned occurrence in accordance with Section 109.05 Claims and Notice.

B. No extension of time will be considered for weather conditions normal to the area and time of year in which the work is being performed. Delays in delivery of equipment or material purchased by the Contractor or his Subcontractors (including Owner-selected equipment) shall not be considered as a just cause for delay, when timely ordering would have made the equipment available. The Contractor shall be fully responsible for the timely ordering, scheduling, expediting, delivery, and installation of all equipment and materials. Extensions of time will be considered for delayed delivery of Owner specified equipment "without equal".

C. Within a reasonable period after the Contractor submits to the Engineer a written request for an extension of time the Engineer will make the decision on each request, for City Manager approval.

D. An adjustment of Contract time as herein provided shall be the Contractor's sole remedy for any delay in completion of the project arising from causes beyond the control of the Contractor, except for unreasonable delay caused by acts or omissions of the Owner or persons acting therefor. In no event shall the Contractor be entitled to collect or recover any damages, loss or expense incurred by reason of such delay, except for an unreasonable delay caused by acts or omissions of the owner or persons acting therefor. However, if Contractor is delayed due solely to a breach by Owner, Contractor will be entitled to recover damages limited to reimbursement for necessary rental of unused equipment, services of watch persons, documented direct overhead costs, documented direct unavoidable expenses accruing by reason of the suspension, plus fifteen percent (15%) of the foregoing damages to cover normal Contractor profit. Contractor shall not be entitled to indirect costs or any other damages arising out of the delay, including but not limited to, interruption of schedules, or any other impact claim or ripple effect. If a delay is caused by Owner and Contractor (joint delay), Contractor shall be entitled to a time extension only, by reason of such joint delay.

108.07 LIQUIDATED DAMAGES

A. Time shall be considered the essence of the Contract. If Contractor fails to complete the project or to deliver the supplies or perform the services within the time specified in the

Contract or any extension thereof by Owner, the actual damage to Owner for the delay will be substantial but will be difficult or impractical to determine.

B. It is therefore agreed that Contractor will pay to Owner, not as a penalty but as liquidated damages, the per diem amount, as set forth in the following given Schedule of Liquidated Damages or modification thereof as given in the Special Provisions for each and every calendar day elapsed in excess of the Contract time or the final adjusted Contract time applicable to the work required under the Contract.

SCHEDULE OF LIQUIDATED DAMAGES

Original Amount of Contract		Per Diem Amount of Liquidated Damages	
For More Than	To and Including	Calendar Day*	Working Day
$ 0	$ 25,000	$ 40	$ 55
25,000	50,000	65	85
50,000	100,000	110	150
100,000	500,000	150	210
500,000	1,000,000	225	315
1,000,000	2,000,000	300	420
2,000,000	5,000,000	450	630

* Calendar day amounts are applicable when the contract time is expressed on the calendar day, calendar workday or fixed date basis.

C. Permitting Contractor to continue and finish the work or any part thereof after the Contract time or adjusted Contract time, as pertinent, has expired shall in no way operate as a waiver on the part of Owner or any of its rights under the Contract.

D. Payment of liquidated damages shall not release Contractor from obligations in respect to the fulfillment of the entire Contract, nor shall the payment of such liquidated damages constitute a waiver of Owner's right to collect any additional damages which may be sustained by failure of Contractor to carry out the terms of the Contract, it being the intent of the parties that said liquidated damages be full and complete payment only for failure of Contractor to complete the work on time.

108.08 CONTRACTOR'S REPRESENTATIVE

Designate, in writing before starting work, an authorized representative who shall have complete authority to represent and to act for Contractor, in all directions given by the Engineer. Contractor, or its authorized representative shall supervise the work, and shall be present on site continually during its progress.

If Contractor or its authorized representative is not present, directions may be given by Engineer or his authorized representative to the workmen and such order shall be received and followed. Any direction will be confirmed in writing upon request from the Contractor.

Keep a complete copy of the Plans and Specifications on or near the site at all time.

108.09 CONFLICTS, ERRORS, OMISSIONS, AND ADDITIONAL DRAWINGS

Check and compare all Plans and Specifications prior to construction and notify Engineer of any discrepancies or omissions in order to permit correction by Engineer. Coordination of Plans and Specifications is intended. Furnish labor and materials as required for the work. Should any work or materials be reasonably required or intended for carrying the project to completion which are omitted on the Plans and Specifications, furnish same as fully as if particularly delineated or described. The intent of the Plans and Specifications is to show and describe a complete project within the limits stated. Dimensions shown on Plans shall be followed, rather than scale measurements. Whenever it appears that the Plans are not sufficiently detailed or explicit, the Engineer may furnish additional detail drawings or written instructions and Contractor shall perform the work in accordance with the additional details or instructions.

108.10 OWNER'S RIGHT TO DO WORK

Failure or refusal to comply with any of the terms or conditions of the Contract will permit Owner to supply or correct any deficiency or defect or take other appropriate action without prejudice to any other remedy. Such action by Owner shall be taken only after seven (7) days notice by Engineer to Contractor and his Surety, unless in the judgment of the Engineer an emergency or danger to the work or to the public exists, in which event action of Owner as set forth above may be taken without any notice whatsoever. The cost of such action by Owner shall be deducted from the payment then or thereafter due Contractor. Pay Owner any costs in excess of such payment due.

108.11 TERMINATION FOR DEFAULT

A. If the Contractor should be adjudged 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 insolvency, or if he should refuse to or fail to supply enough properly skilled workmen or proper materials for the efficient prosecution of the Project, disregard laws, ordinances or the instructions of the Engineer, or otherwise be in violation of any provision of the Contract, the Owner may, without prejudice to any other right or remedy and after giving the Contractor and its Surety seven (7) days written notice, terminate the services of the Contractor and take possession of the premises and of all materials, tools and appliances thereon as well as all other materials whether on the premises or not, on which the Contractor has received partial payment and finish the work by whatever method it may deem expedient.

B. In the event action as above indicated is taken by the Owner, the Contractor, or its Surety, shall provide the Engineer with immediate and peaceful possession of all of the materials, tools and appliances located on the premises as well as all other materials whether on the premises or not, on which the Contractor has received any progress payment. Upon termination, in the event that the Surety does not complete the Contract, at the election of the Owner, Contractor shall assign any and all subcontractors and material contracts to Owner or Owner's designee. Further, the Contractor shall not be entitled to receive any further payment until the work is completed. On completion of the work, determination shall be made by the Engineer of the total amount the Contractor would have been entitled to receive for the work, under the terms of the Contract, had Contractor completed the work. If the difference between said total amount and the sum of all amounts previously paid to the Contractor, which difference will hereinafter be called the "unpaid balance,"

exceeds the expense incurred by the Owner in completing the work, including expense for additional managerial and administrative services, such excess will be paid to the Contractor, with the consent of the Surety. If, instead, the expense incurred by the Owner exceeds the unpaid balance, the amount of the excess shall be paid to the Owner by the Contractor or his Surety. The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be as determined and certified by the Engineer.

C. In addition to and apart from the above-mentioned right of the Owner to terminate the employment of the Contractor, the Contract may be canceled at the election of the Owner for any willful failure or refusal on the part of the Contractor to faithfully perform the Contract according to all of its terms and conditions; provided, however, that in the event the Owner should cancel the Contract, neither the Contractor nor its Surety shall be relieved from damages or losses suffered by the Owner on account of the Contractor's breach of Contract.

D. The Owner may, at its discretion, avail itself of any or all of the above rights or remedies and that its invoking of any one of the above rights or remedies will not prejudice or preclude the Owner from subsequently invoking any other right or remedy set forth above or elsewhere in the Contract.

E. None of the foregoing provisions shall be construed to require Owner to complete the work, not to waive or in any way limit or modify the provisions of the Contract relating to the fixed and liquidated damages suffered by Owner on account of failure to complete the Project within the time prescribed.

108.12 TERMINATION IN THE PUBLIC INTEREST

F. It is hereby agreed that the Owner has the right to terminate the Contract in whole or in part when it is considered to be in the public interest.

G. In the event the Contract is terminated as being in the public interest the Contractor shall be entitled to a reasonable amount of compensation for preparatory work and for all costs and expenses arising out of the termination excluding lost profits.

The amount to be paid to the Contractor:

1. Shall be determined on the basis of the contract price in the case of any fully completed separate item or portion of the work for which there is a separate or unit contract price; and
2. In respect to any other work, the Contractor will be paid a percent of the Contract price equal to the percentage of the work completed.

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109 MEASUREMENT AND PAYMENT

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109.01 MEASUREMENT OF QUANTITIES

A. Payments shall be based on measurements of completed work in accordance with the United States Standard Measures, and as set fourth in the applicable divisions of these specifications.

B. Volume of materials measured in the vehicles by which they are transported will require computing of the volume of the vehicles to the nearest 0.1 cubic yard for its approved capacity, and identification of the vehicle and its capacity. Pay quantities will be determined by vehicle measurement at point of delivery with no allowance for settlement of material during transit.

Loads shall be level and uniform. Payment will not be made for material in excess of the approved capacity of the vehicle and deductions will be made for loads below approved capacity.

C. Volume of concrete and masonry in structures will bemeasured according to neat lines as shown on the Plans or as altered on order of the Engineer.

D. Volume of earthwork, particularly excavation and embankment, will be computed by the average and area method or by other methods of equivalent accuracy.

E. Weight - When payment for materials other than bituminous cements is on a weight basis and unless otherwise set forth in the specification under which material is to be furnished, pay quantities will be determined by weighting material on weigh scales provided by the Contractor as set forth hereinafter. Such weighing is to be of material in the hauling vehicle as loaded for delivery. Determination of tare weights and weight of loaded vehicles will be to the nearest ten (10) pounds. Tare weights will be determined by weighing empty vehicles at intervals of such frequency as the Engineer deems necessary to ensure accuracy of pay load weights.

F. Scales - When the Contract calls for materials which are to be measured by weighing on scales, provide suitable scales and transport materials to scales at no expense to the Owner. Before use of scales is commenced, and as frequently as the Engineer may deem necessary to ensure accuracy, having the scales examined by an official of the State's Sealer of Weights and Measures, and bear all resulting costs. Maintain the scales in accurate condition at all times.

G. Furnish and so locate scales that the amount of hauling involved in the delivering of materials is no greater than if no weighing were required; if not, bear expense of whatever extra hauling is required. If hauling of materials is to be paid for as a separate pay item, the distance shall be via the most direct practicable route and no allowance will be made for any extra hauling required to reach the scales.

H. If material is weighed on public scales, a representative of the Owner may be present at all times to witness the weighing and to check and compile records of scale weights.

109.02 SCOPE OF PAYMENT

A. Quantities listed in the Bid do not govern final payment. Payments to the Contractor will be made only for actual quantities of Contract items performed in accordance with terms of the Contract and for items of work actually performed under Change Orders.

B. The Contractor shall accept the compensation, as herein provided, in full payment for furnishing all materials, labor, tools and equipment necessary to the completed work and for performing all work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the Owner.

109.03 COMPENSATION FOR ALTERATION OF CONTRACT

A. Unless changes and alterations in the Plans, or quantities, or details of construction materially change the character of the work to be performed or the unit costs thereof, the Contractor shall accept as payment in full, so far as Contract items are concerned, payment at the same unit prices as are provided under the Contract for the accepted quantities of work done. If the Contract is done on a lump sum basis, the adjustment for increases or decreases may be based, at the sole discretion of the Engineer, on a theoretical unit price. This price will be determined by dividing the Contractor's applicable breakdown category price (as listed in the Special Specifications or as set forth in the Bid) by the estimated quantities of all units of work within the applicable breakdown category.

B. If either (1) the total project (total bid) cost of the work, using original bid quantities and unit prices, or (2) the total quantity of any major contract item, using original bid quantities changes more than 25 percent, then that part of the increase or decrease exceeding 25 percent shall be adjusted as the parties agree. A major bid item is any contract item, except lump sum items, having an original contract value greater than 10 percent of the total amount of the contract. If the parties cannot agree, the Engineer will determine the equitable adjustment of time, payment, or both. The basis of the equitable adjustment of time will be in accordance with Subsection 108.06. The basis of the equitable cost adjustment for decreases will take into account a redistribution of fixed costs. The basis of the equitable cost adjustment for increases will be by using one of the following methods:

1. Unit contract prices.
2. Other means of establishing costs.
3. Force account.

C. The Contractor shall obtain written consent of the surety or sureties if: (1) changed work increases the total cost by more than 25 percent of the original total contract, or (2) the Engineer requests such consent. The City will not adjust for increases or decreases if the City has entered the amount for the item in the proposal only to provide a common basis for bidders. The Contractor shall bear all costs that result from increased or decreased in such common-bid-basis amounts.

109.04 PAYMENT FOR CHANGE ORDERS

A. Payment or credit for any alterations covered by a Change Order shall be determined by one or a combination of the methods set forth in 1, 2, 3, or 4 below:

1. METHOD 1. UNIT PRICES. If applicable, those unit prices stipulated in the Proposal, or unit prices negotiated and mutually acceptable to the Contractor and Owner.

2. METHOD 2. LUMP SUM. A total sum for the work negotiated and mutually acceptable to the Contractor and Owner.

3. METHOD 3. FORCE ACCOUNT WORK

   a. The Contractor shall perform work on a force account basis upon written notice from the Engineer. Payment will be made as set forth herein.

   b. The Contractor must maintain records in such a manner as to provide a clear distinction between direct cost of work performed on force account basis and costs of all other operations performed in connection with the Contract.

   c. Daily, furnish to Engineer signed reports itemizing materials used and setting forth the cost of labor and charges for equipment rental, delineating whether said equipment is Contractor or Subcontractor owned. Provide names, identifications, and classifications of workmen, the hourly rate of pay and hours worked, and the size, type and identification number of equipment and hours of equipment operation.

   d. Substantiate material charges by vendor's invoices, submit such invoices with the reports; or, if not available, submit with subsequent reports. In the event said vendor's invoices are not submitted within forty-five (45) days after completion of the force account work Owner reserves the right to establish the cost of such materials.

   e. When work is ordered to be paid for on a force account basis, such work will be paid for on the basis of cost, plus a negotiated percentage allowance, not to exceed the maximum set forth herein.

   f. Items of cost for which payment will be made and to which payment will be restricted, together with the maximum percentage allowance applicable to the respective items, are as follows:

Items of Cost for Which Payments Will Be Made	Maximum Percentage Additional Allowance To Actual Costs
Labor, while engaged directly on force account work	20
Materials and supplies used on force account work	15
Rental on equipment having a value in excess of $300	*

* No additional percentage except as follows:

g. Payment for labor used in the work will be computed at the rates actually paid by Contractor, but not to exceed prevailing straight time rates established by the Oregon Department of Labor, plus allowable allowance set forth above. Time allowed shall be the number of hours worked directly on force account operations. The employers cost for accident and unemployment compensation premiums, labor insurance cost, public liability and property damage cost and fringe benefits will be included in the direct labor cost item before applying the additional allowance. Any overtime worked on force account operations will be compensated at the straight time rates unless previous approval was obtained from the Engineer.

h. Payment for materials and supplies used on force account work must be supported by paid invoices. Contractor and Subcontractors shall take advantage of all practicable discounts on bills for materials and supplies, and such discounts shall be reflected on all bills and invoices submitted to the Owner for payment. Freight will be considered to be part of the cost of materials and supplies and will be paid for as materials and supplies. Materials and supplies will be paid for as agreed in writing prior to their production or use. If there is no price agreement, the Engineer shall establish a reasonable price for such materials and supplies.

i. For the use of the Contractor's equipment, the Contractor will be paid at the monthly rental rates and the hourly operating costs set forth in the current edition of the "Rental Rate Blue Book for Construction Equipment" and the "Rental Rate Blue Book for Older Construction Equipment" which are published by the Equipment Guidebook Company, 2800 W. Bayshore Road, Palo Alto, California 94303. Reference copies of the above publications are on file at the Oregon State Highway Division Region Engineer, and the area offices of the Associated General Contractors of America. While using the Blue Book to determine allowable rental rates for equipment the hourly rate will be calculated by using the monthly rate as set forth in the book divided by one hundred seventy-six (176) hours. The rental rates will be the total compensation for all costs including fuel, supplies, repairs and renewals. No further allowance will be made for these items. For the use of equipment not listed in said documents, the rental rates shall be as agreed to in writing between the Contractor and the Engineer prior to use of said unlisted equipment. If there is no prior agreement, the Engineer shall establish a reasonable price for such equipment.

j. Time allowed for Contractor's equipment shall be only the number of hours that the equipment actually operated directly on force account work.

k. Compensation on equipment not owned by the Contractor will not exceed the rates actually paid by the Contractor and must be supported with an invoice that represents an arms length transaction. The Contractor and the Engineer will agree on the equipment to be used and the appropriate rental rates before using said equipment on force account work. If prior approval is not obtained, the Engineer will establish the rates by either comparing the available equipment and using the applicable rate for the least expensive equipment that will accomplish the work or utilizing the applicable Blue Book rates as established above. Rental cost for equipment not owned by the Contractor will be established so as to minimize the cost to the City. The Hourly rate will be used unless the accumulated cost using the hourly rate exceeds the accumulated cost using the daily rate. The

daily rate will be used unless the accumulated cost using the daily rate exceeds the accumulated cost using the weekly rate. This system will be expanded to utilize monthly or yearly rates as appropriate. These rental rates will be considered total compensation for all costs, including move-in, move-out, fuel, supplies, repairs, and renewals. No further allowance will be made for these items without specific approval of the Engineer before the work is commenced. Payment for rental on equipment not owned by the Contractor shall be at the rental costs so determined, plus a negotiated percentage not to exceed the allowance for materials and supplies.

l. Individual pieces of equipment, having a value of $350 or less, will be considered to be tools or small equipment, and no rental will be allowed on such, unless not normally on work site and must be rented from others. Then (k) will apply.

m. No standby charges will be considered as a compensable part of any force account work. When a piece of equipment and operators thereof are hired, rented, or furnished as a unit, (Owner/Operator), the additional percentage to be allowed shall be five (5) percent and Contractor shall not be entitled to twenty (20) percent on the time of operators of such equipment. Neither shall Contractor be entitled to payment for contributions made under terms of the Worker's Compensation Act, Unemployment Compensation Act, or Social Security Act or any other benefits to cover the time of these operators.

n. The percentage allowances made to Contractor in accordance with terms outlined herein will be full reimbursement and compensation for all superintendence, use of tools and small equipment, overhead expense, bond costs, record keeping expense, insurance premiums, profits, indirect costs, and all other items of cost not specifically designated herein as items for which payment is to be made, whether or not the services, costs and other items involved are furnished or incurred by Contractor or Subcontractor.

o. When work is performed on a force account basis by a Subcontractor, the Contractor will be allowed a supplemental markup of five percent (5%) on amount charged by Subcontractor, provided however, Owner will pay no more than a reasonable amount for work performed by a Subcontractor.

4. METHOD 4. PAYMENT DETERMINED BY ENGINEER

In case no other basis can be agreed upon, and the Engineer has not directed the work to be paid for on a force account basis, then an allowance may be made, either for or against the Contractor, in such amount as the Engineer may determine to be fair and equitable.

B. The Owner's request for quotations on alterations to the work shall not be considered authorization to proceed with the work prior to the issuance of a formal Change Order, nor shall such request justify any delay in existing work. Lump sum quotations for alterations to the work shall include substantiating documentation with an itemized breakdown of Contractor and Subcontractor costs, including labor, material, rentals and approved services, overhead, and profit calculated as specified under Method "3" above.

C. In Methods "1" and "2" above, Contractor's quotations for Change Orders shall be in writing and firm for a period of thirty (30) days. Any compensation paid in conjunction with the terms of a Change Order shall comprise total compensation due the Contractor for the work or alteration defined in the Change Order. By signing the Change Order, the Contractor acknowledges that the stipulated compensation includes payment for the work or alteration plus all payment for the interruption of schedules, extended overhead, delay or any other impact claim or ripple effect, and by such signing specifically waives any reservation or claim for additional compensation or time in respect to the subject of the Change Order.

109.05 CLAIMS AND NOTICE

A. No claim shall be made by the Contractor for any loss of anticipated profits because of any alterations or changes made pursuant to the provisions of Subsections 104.04 and 109.04, nor by reason of any variation between the approximate quantities and the quantities of work as done. No allowance except as provided in Subsection 104.04 will be made for any increased expense, loss of expected reimbursement or loss of anticipated profits suffered or claimed by the Contractor resulting directly from such alterations or changes or resulting indirectly from unbalanced allocation among the Contract items of overhead expense on the part of the Contractor as a Bidder and subsequent loss of expected reimbursements therefor or from any other cause.

B. In any case where the Contractor claims that it is entitled to or will be entitled to additional compensation and/or additional Contract time or if the Contractor considers any interpretation or order by the Engineer to be a breach of Contract, Contractor shall immediately notify the Engineer, in writing, of its intention to make claim before beginning the work or conforming to the interpretation on which the claim is based. Contractor's written notification shall be a written statement describing (1) the act of omission or commission by the Owner or its agent that allegedly caused damage to the Contractor, (2) the nature of the claimed damage, (3) the clauses of the Contract or general legal principles upon which the claim is based, (4) the factual occurrences upon which the Contractor bases the claim. Submission of notice of claim as specified shall be mandatory, and failure to comply shall be a conclusive waiver to such claim for damages by the Contractor. Oral notice or statement will not be sufficient nor will notice or statement after the event since it tends to hinder, if not prevent, the Owner's investigation of the pertinent facts. After said written notification (if the claim is not resolved or withdrawn in writing) and only upon written direction by the Engineer proceed without delay to perform the work pursuant to the decision of the Engineer. While the work on an unresolved claim is being performed Contractor shall keep track of costs and maintain records in the manner set forth in Section 109.04 A 3 FORCE ACCOUNT WORK, at no cost to Owner. Such notice by the Contractor and the fact that Contractor and Engineer are keeping track of costs and maintaining records as required by Section 109.04 A 3 FORCE ACCOUNT WORK shall not in any way be construed as proving the validity of the claim nor the costs thereof.

C. A fully documented claims package shall be submitted in writing to the Engineer within forty-five (45) days after completion of the work upon which the claim is based.

D. Each claim submitted shall include substantiating documentation with an itemized breakdown of Contractor and Subcontractor's costs on a daily basis which shall include, but not be limited to labor, material, equipment, supplies, services, overhead, and profit.

All documentation that Contractor believes is relevant to the claim shall be provided in said claim package including without limitation, payroll records, purchase orders, quotations, invoices, estimates, profit and loss statements, daily logs, ledgers, and journals. Failure to submit the claim package in full compliance with this requirement, and/or maintain cost records as herein required, will constitute a waiver of the claim.

E. The requirements of this Subsection 109.05 shall apply to claims for additional or extra compensation or time arising from any situation which may occur except for claims of error in the final estimate as provided in Subsection 109.08.

F. Provided the claim or claims have been submitted in accordance with the requirements of this Subsection 109.05, the Engineer will, as soon as possible, consider and investigate the claim or claims of the Contractor for additional compensation. The Engineer will promptly advise the Contractor of the decision to accept or reject the claim or claims, in full or in part.

G. The Contractor shall commence any suit or action to collect or enforce any claim filed in accordance with this Subsection 109.05 within a period of one year following the mailing of the Engineer's full or partial denial. If said suit is not commenced in said one year period, the Contractor expressly waives any and all claims for additional compensation and any and all causes of suit for the enforcement thereof that he might have had.

109.06 OWNER'S RIGHT TO ACCESS TO CONTRACTOR'S RECORDS

A. In the event that Contractor makes a claim under Subsection 109.05 or performs work under 109.04 A 3 the Owner or its designated representative shall have access and a right (at any time) to inspect, audit and copy Contractor's books, records, documents, diaries, and logs and other evidence (hereinafter referred to as records) pertinent to performance and payment of this Contract and amendments, change orders and any claims made in relation to the Contract. If an audit is conducted, it shall be in accordance with generally accepted auditing standards.

B. The Contractor will make its records available within the boundaries of the City of Newberg, Oregon, or pay all additional costs for travel and per diem or other additional expenses incurred by Owner in examining, auditing, inspecting and copying Contractor's records, by reason of said records not being available within said boundaries.

C. Contractor agrees to the disclosure of all records and to their admission as evidence in any proceeding, between the parties, involving a claim or force account work as set forth in Subsections 109.05 and 109.04(3).

D. In the event that Contractor's records establish a discrepancy, favorable to Owner, in the representations Contractor has made to Owner involving claims or force account work, Contractor shall bear all costs incurred by Owner in conducting the audit and inspection provided herein.

E. All costs referenced in subparagraphs B. and D. may be withheld and/or deducted from any sum due or that becomes due Contractor.

109.07 PROGRESS PAYMENTS AND RETAINAGE

A. Payment for all work under the Contract will be made at the price or prices bid, and those prices shall include full compensation for all incidental work.

B. If the Contract is for a public work and the Contract price is $10,000 or more, supply and file, and require every Subcontractor to supply and file, with the Owner and the with the Wage and Hour Division, Bureau of Labor and Industries (BOLI), 1400 S.W. Fifth Avenue, Portland, Oregon 97201 a statement in writing that conforms to the requirements of ORS 279.354. The schedule for submitting payroll information shall be as noted in the latest applicable edition of the Prevailing Wage Rates for Public Works Contracts in Oregon published by BOLI.

C. Make progress estimate of work performed in any calendar month and submit to the Engineer for approval, on or before the 24th day of the following month. These estimates shall include value of labor performed and materials incorporated in the work since commencing work under the Contract. Such estimates need not be made by strict measurements and may be approximate only, and shall be based upon the whole amount of money that will become due according to terms of the Contract when Project has been completed.

D. If the Contract price is determined, in whole or in part, on a Lump Sum basis, prepare an itemized cost breakdown relating thereto and have the Engineer approve same before commencing work; progress estimates based on said itemized cost breakdown may be the basis for progress payments. Upon direction by the Engineer provide for revision of the costs breakdown to reflect the true costs of the work as it progresses.

E. If the Contract price is determined wholly on a unit basis, Engineer may use unit prices bid in making progress estimates on the work. In case said unit prices do not, in the opinion of the Engineer, truly represent actual relative costs of different parts of work, a percentage of the Unit Price may be used in making progress estimate adjustments.

F. If the Engineer receives written notice of any unsettled claims for damage or other costs due to Contractor's operations including, without limitation, claims from any City Department or other governmental agency, an amount equal to the claim may be withheld from the progress, final payments or retainage until such claim has been resolved to the satisfaction of Engineer.

G. Progress payments will be made by Owner on a monthly basis within thirty (30) days from sign off by the Contractor of the progress payment or fifteen (15) days after the payment is approved by Engineer of work performed. Payment will be issued by Owner for the amount of the approved estimate, less five percent (5%) retainage. Such amount of retainage shall be withheld and retained by Owner until it is included in and paid to Contractor as part of the final payment of the Contract amount. Securities in lieu of retainage will be accepted, or if Contractor elects, retainage as accumulated will be deposited by Owner in an interest-bearing account pursuant to ORS Chapter 279 for progress payments. Upon substantial completion of the work under the Contract which shall be understood to be not less than ninety-five percent (95%) of the work, the Engineer may, at its discretion, reduce the retained amount equivalent to not less than two hundred percent (200%) of the contract value or estimated value or estimated cost, whichever is greater, of the work remaining to be done.

H. The Engineer may decline to approve an application for payment and may withhold such approval if, in the Engineer's opinion the work has not progressed to the point indicated by the Contractor's submittal. The Engineer may also decline to approve an application for payment or may reduce said payment or, because of subsequently discovered evidence or subsequent inspections, he may nullify the whole or any part of any payment previously made to such extents as may be necessary in his opinion to protect the Owner from loss because of: (1) defective work not remedied, (2) third party claims filed or failure of the Contractor to make payments properly to Subcontractors for labor, materials or equipment, unless Surety consents to such payment, (3) reasonable doubt that the work can be completed for the unpaid balance of the Contract sum, (4) damage to another contractor's work, (5) reasonable indication that the work will not be completed within the Contract time, (6) unsatisfactory prosecution of the work by the Contractor, (7) claims against the Contractor by the Owner, (8) failure to submit a construction schedule or failure to keep said construction schedule updated as set forth in Subsection 108.01, or (9) exceeding work limits as set forth in Subsection 204.03.

I. When the above grounds are removed, payment shall be made for amounts withheld because of them. Withholding of progress payments or partial payments under the criteria set forth above shall not entitle the Contractor to interest on such withheld payments or partial payments.

J. If Contractor fails to complete the Project within the time limit fixed in the Contract or any extension, no further estimate may be accepted or progress or other payments allowed until the Project is completed, unless approved otherwise by Owner.

K. Progress estimates are for the sole purpose of determining progress payments and are not to be relied on for any other purpose. The making of a progress payment shall not be construed as an acceptance of any of the work or materials under the Contract.

L. When the progress estimate indicates that the progress payment would be less than one thousand dollars ($1,000), no progress payment will be made for that estimate period, unless approved by the Engineer.

109.08 FINAL ESTIMATE AND FINAL PAYMENT

A. Pursuant to ORS Chapter 279, notify the Engineer in writing when work is considered complete and Engineer shall, within fifteen (15) days after receiving notice, make a final inspection and either accept the work or notify Contractor of work yet to be performed on the Contract. If accepted, Engineer shall so notify Contractor, and will make a final estimate and prepare a Certificate of Completion recommending acceptance of the Work as of a certain date.

B. If the Contractor believes the quantities and amounts specified in the final estimate and Certificate of Completion prepared by the Engineer to be incorrect, Contractor shall submit to the Engineer within fifteen (15) days of mailing of the Engineer's final estimate and Certificate of Completion to the Contractor's last known address as shown in the records of the Owner, an itemized statement of any and all claims for additional compensation under the Contract which are based on differences in measurements or errors of computation. Any such claim not so submitted and supported by an itemized statement within said fifteen (15) day period is expressly waived and the Owner shall not be obligated to pay the same. Nothing contained herein shall limit the requirements of

Subsection 109.05.

C. A project cannot be accepted until all provisions of the Contract Documents have been met including submission of the certificate of completion and compliance. Upon receipt of the executed Certificate of Completion from the Contractor, the final payment will be made within thirty (30) days in accordance with ORS 279.

D. Provided Contractor submits a claim in the manner and time as required in B) above, the Engineer, as soon as practicable, will consider and investigate the claim or claims of the Contractor for compensation earned under the Contract and not included in the Engineer's final estimate and Certificate of Completion. The Engineer will then promptly advise the Contractor of acceptance or rejection of the claim in full or part. If the Engineer allows the Contractor's claims in full or in part, Engineer will prepare a revised final estimate and Certificate of Completion, including all such items allowed and will submit the same to the Contractor.

E. The Contractor shall execute and return the revised Certificate of Completion within five (5) days of receipt of the final progress payment.

F. If the Engineer rejects the claim or claims, he will issue written notice of rejection mailed to the Contractor's last known address as shown in the records of the Owner.

G. The Contractor shall commence any suit or action to collect or enforce the claim or claims for any additional compensation arising from, or errors of computation in the final estimate within a period of one (1) year following the original mailing of the Engineer's final estimate and Certificate of Completion to the Contractor's last known address as shown in the records of Owner. The Engineer's issuance of a revised final estimate pursuant to this subsection does not alter the original final estimate date. If said suit, action or proceeding is not commenced in said one (1) year period, the final estimate and Certificate of Completion or revised final estimate and Certificate of Completion, if revisions are made, shall be conclusive with respect to the amount earned by the Contractor, and the Contractor expressly waives any and all claims for compensation and any and all causes of suit or action for the enforcement thereof that he might have had.

H. Upon return of the fully executed Certificate of Completion from the Contractor, the Engineer will submit the Certificate of Completion and final estimate to the Owner for approval. Upon approval and acceptance by the Owner, Contractor will be paid a total payment equal to the amount due under the Contract including retainage.

I. Monies earned by the Contractor are not due and payable until the procedures set forth in these Specifications for inspection, approval and acceptance of the Work, for determination of the work done and the amount due therefor, for the preparation of the final estimate and Certificate of Completion processing the same for payment, for consideration of the Contractor's claim, or claims, if any, and for the preparing of a revised final estimate and Certificate of Completion and processing same for payment have been carried out.

J. Foreign Contractor will provide Owner with evidence that provisions of ORS Chapter 279 have been satisfied; this is a prerequisite to final payment. See Subsection 103.08.

K. Execute and deliver to Owner, in form approved by the Attorney, a receipt for all amounts paid or payable to Contractor under the Contract, and a release and waiver of all claims against Owner arising out of or relating to the Contract and furnish satisfactory evidence that all amounts due for labor, materials and other obligations under the Contract have been fully and finally settled or are fully covered by the Performance and Payment Bond and/or insurance protecting Owner, its officers, agents and employees as well as Contractor. This is a condition of final payment and Contractor will not be entitled to final payment on release of retainage nor interest thereon until execution and delivery of said Receipt, Release & Waiver.

L. If Owner declares a default of the Contract, and Surety completes said Contract, all payments after declaration of default and retainages held by Owner shall be paid to Surety and not to Contractor in accordance with terms of the Contract.

M. Unless otherwise specifically noted and documented as required in Subsection 109.05 or this Subsection 109.08, acceptance by Contractor of final payment shall release Owner and Engineer from any and all claims by Contractor whether known or unknown, arising out of and relating to the work. No payment, however, final or otherwise, shall operate to release Contractor or its Sureties from warranties or other obligations required in the performance of the Contract.

END OF DIVISION

DIVISION TWO
GENERAL TECHNICAL REQUIREMENTS

****

201 MOBILIZATION

****

201.01 DESCRIPTION

This section covers, but is not limited to, work necessary to obtain all bonds, insurance, licenses, and permits; move in personnel and equipment; set up all offices, buildings, and facilities; provide all required light, power, and water; install project information signs if required; prepare for construction complete; demobilize, including removal of all facilities and clean up; and all other work to successfully complete the project which is not covered in other bid items.

201.02 MATERIALS

Provide all materials required to accomplish the work as specified.

201.03 CONSTRUCTION/GENERAL REQUIREMENT

Set up construction facilities in a neat and orderly manner within designated or approved work area. Provide for an acceptable material and equipment storage area. Supply all labor and equipment necessary to accomplish the work as specified. Conform to applicable requirements of Section 105 of GENERAL REQUIREMENTS, including, but not limited to, (1) required notifications, (2) protection of surveying monuments and other markers, (3) temporary traffic control, (4) temporary utility connections, (5) protection of property, (6) water and air pollution, and (7) noise.

201.04 MEASUREMENT AND PAYMENT

201.04.01 Lump Sum Basis

When mobilization is listed as a separate pay item on the Proposal, it will be paid for on a lump sum basis. Normal retainage will be deducted from partial payments.

Partial payments for Mobilization under the Contract will be made under the following schedule:

1. When 5 percent of the total original contract amount is earned from other bid items, 50 percent of the amount bid for Mobilization, or 5 percent of the total original contract amount, whichever is the least, less normal retainage, will be paid.

2. When 10 percent of the total original contract amount is earned from other bid items 100 percent of the amount bid for Mobilization, or 10 percent of the total original contract amount, whichever is the least, less normal retainage, will be paid.

3. Upon completion of all work on the project, payment of any amount bid for Mobilization in excess of 10 percent of the total original contract amount will be paid.

The above schedule of progress payments for Mobilization shall not be construed to limit or preclude partial payments otherwise provided by the Contract.

201.04.02 Incidental Basis

When not listed in the Proposal, all Mobilization costs will be considered incidental work for which no separate payment will be made.

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202 TEMPORARY TRAFFIC CONTROL

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202.01 DESCRIPTION

This section covers all work necessary to conduct construction operations so as to offer the least possible obstruction and inconvenience to the public and to protect pedestrian and vehicular traffic.

202.02 UNIFORM TRAFFIC CONTROL DEVICES

Provide barricades, signs, and traffic control devices built in conformance with the Manual on Uniform Traffic Control Devices (current edition), published by the U.S. Department of Transportation, and the Oregon supplements to the Manual published by the Oregon Department of Transportation.

202.03 CONSTRUCTION

202.03.01 General

Use flag persons and provide and maintain such signs, barricades, warning lights, and other traffic control devices in conformance with the manuals referenced in Subsection 202.02.01. Adequately warn the public at all times of existing conditions on all streets affected by work operation.

Patrol the construction area at least twice daily and reset all disturbed signs and traffic control devices immediately. Remove or cover non applicable signs when not needed. Prior to closing or partial closing of any street, conform to Subsection 105.04 NOTIFICATION OF UTILITIES AND AGENCIES.

202.03.02 Traffic Control Within the Project

Formulate and submit a traffic control plan and a work schedule to minimize the disruption of traffic. Plan shall be submitted at the pre-construction conference. If no conference is held, plan shall be submitted at least 10 days in advance of beginning work. Obtain approval of plan and schedule from Engineer before commencing work. Allow traffic to pass through the work with as little inconvenience and delay as possible.

The traffic control plan shall contain a complete signing plan for semi-permanent and portable signs, barricades, and other traffic controls, provisions to keep the signs or devices current with the construction activities and the illumination of all detours and obstructions during hours of darkness. Be responsible for furnishing, installing, and maintaining all traffic control devices.

Maintain these devices at all times including non-working hours.

Provide approved access to private properties at all times, except during stages of construction when it is impractical to perform construction and maintain access to private property simultaneously, as determined by the Engineer. When access is to be denied notify occupants of affected properties at least 24 hours in advance.

When, in the judgment of the Engineer, vehicular parking is a hazard to through traffic or to the work, furnish and place NO PARKING signs on any street which is directly involved in the construction work.

Only one intersection will be closed at a time without prior approval by the Engineer. The Contractor will notify Police and Fire departments in the jurisdiction of the closing and opening of streets. Pedestrian detours shall not exceed one block in length and all foot bridges will be provided with adequate handrails.

202.03.03 Construction and Maintenance of Detours

Construct and maintain temporary detours for protection of the work and the safe passage of traffic around work area.

Conform to requirements for detours in Subsection 107.12 of the Safety Requirements.

202.03.04 Flagging Requirements

The Contractor shall provide and maintain such signs, barricades and warning lights as are necessary to warn and protect the public at all times on highways, roads or streets affected by work operations. In addition, the Contractor shall also provide all necessary flag persons and guards necessary to warn and protect the public. Each flagger on duty shall wear an orange or yellow colored hard hat and an orange colored or fluorescent red-orange or fluorescent yellow-orange colored vest and shall be equipped with a highly visible, reflectorized "Stop-Slow" hand sign conforming to current standards for daylight use; and with illuminated stand area, of high visibility for night use.

202.03.05 Dust Control

Contractor shall be responsible for maintaining adequate dust control during and after construction and prior to acceptance by the Owner. The contractor shall apply a fine spray of water or other approved dust pallative to unpaved surfaces. Paved surfaces shall be broomed with power brooms (i.e., street sweepers) to control dust.

202.04 MEASUREMENT AND PAYMENT

202.04.01 Lump Sum Basis

When listed in the Proposal as a separate pay item, payment for Temporary Traffic Control will be made on a lump sum basis.

202.04.02 Incidental Basis

When not listed in the Proposal for separate payment, all Temporary Traffic Control will be considered incidental work for which no separate payment will be made.

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203 CLEARING AND GRUBBING

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203.01 DESCRIPTION

This section covers work necessary to clear, remove, and dispose of all debris and vegetation such as stumps, trees, logs, roots, shrubs, vines, grass, and weeds within the designated limits, to preserve from injury or defacement such objects and vegetation as are designated to remain in place, and to perform final clean-up of the designated area.

Clearing is defined as cutting of trees, bushes, vines, and other vegetative growth at or above ground surface and removal from the site of all such cut or down vegetation.

Grubbing shall consist of the elimination of wooden and vegetative matter occurring at or below ground surface including, but not limited to, stumps, trunks, roots, canes, stems, debris remaining from clearing work, and sticks having a diameter of one inch or more.

Review with the Engineer the location, limits, and methods to be used prior to commencing work under this section.

Removal of man-made structures, including, but not limited to, concrete slabs, walls, vaults, footings, asphaltic surfaced areas, and graveled areas, shall be included in payment for excavation or excavation and backfill as provided in Subsection 204.03.04, and will not be included in Clearing and Grubbing.

As indicated in Subsection 105.08 PROTECTION OF PROPERTY, occupants of buildings adjacent to the work shall have salvage rights to plants, trees, shrubs, fences, and other improvements in the right-of-way. Contractor shall notify adjacent property owners. Contractor does not assume ownership of clearing and grubbing items until after fulfilling the requirements of Subsection 105.08, and Subsection 203.03.02 TIMBER SALVAGE.

203.02 MATERIALS

Explosives used for clearing and/or grubbing shall be fresh, stable material manufactured to the standards of the "Institute of Makers of Explosives", and shall conform to the applicable requirements of ORS Chapter 476 and 480.

203.03 CONSTRUCTION

203.03.01 General

Obtain the required permits as specified in Subsection 105.08, PROTECTION OF PROPERTY, and perform clearing work in conformance thereto.

Remove trees and plants as designated within the area of work, and remove all sod, topsoil, and organic earth within designated areas.

Remove and stockpile as directed, all topsoil that is free of roots, rocks, and other objectionable material and is determined by the Engineer to be suitable for future use. Take reasonable care to prevent topsoil from becoming mixed with subsoil. Contractor shall provide imported topsoil

per Subsection 206.02.04 at its sole expense if existing topsoil is not adequately segregated as determined by the Engineer.

203.03.02 Timber Salvage

203.03.02A Trees in Street Right-of-Way

The adjacent property owner shall have the right to any trees felled in the right-of-way adjacent to owner's property. Contractor shall notify adjacent property owners by mail or doorhanger at least 48 hours prior to felling trees. Trees shall be stacked and decked on owner's property or removed from the construction site if the owner does not reserve the right of ownership.

203.03.02B Trees on City-Owned Property

Owner reserves the right to merchant timber as designated in the Contract Documents and as marked at the project site by the Engineer. Assume ownership, remove, and dispose of all other timber. Cut, trim, and handle marked merchantable timber in such a manner as to ensure the best sale value to Owner and dispose of resulting waste materials as hereinafter specified.

203.03.03 Protection of Existing Vegetation

Protect all trees, shrubbery, and other vegetation, not designated for removal, from damage caused by the work. Cut and remove trees and branches only where approved. When directed, remove branches other than those required to provide a balanced appearance of any tree. Contractor will provide adequate protection for trees, shrubbery, and other vegetation adjacent to the work area which are to remain, as indicated on the plans. No roots projecting into the excavation will be cut except in the presence of the Project inspector. All roots authorized to be cut will be cut neatly, with a sharp tool to avoid torn root endings. Remove branches only as directed by the Engineer and treat scars with approved tree sealant.

203.03.04 Clearing

Clear the area above the natural ground surface of all vegetation and objectionable materials. Cut timber and timber growth so that no stump extends above ground surface more than 6 inches. Prune all limbs over paved streets to an elevation fourteen feet above the pavement on arterial and collector streets, and eleven feet above the pavement on residential streets. Prune all limbs over sidewalks to an elevation seven feet, six inches above the sidewalk. All such pruning shall be done in accordance with accepted arboricultural standards, and shall be approved by the Engineer.

203.03.05 Clearing Borrow and Waste Disposal Areas

Clear areas designated as borrow and waste disposal areas to designated limits and dispose of all waste as herein specified.

203.03.06 Grubbing and Stripping

Completely remove all stumps and roots within the limits of required excavations and fill areas. No stumps or portion thereof shall come within three (3) feet of fill subgrades or slope surfaces. Use of explosives for stump removal shall conform to requirements of Subsection 203.02.

Obtain any and all permits required for use of explosives from controlling jurisdiction.

On areas to be occupied by fills, remove all grass, roots, and embedded wood to a depth not less than 3 feet below subgrade or slope surface on which the fill is to be constructed.

On excavation areas, remove all roots and embedded wood to a depth not less than 1 foot below subgrade or slope surface through which excavation is required.

203.03.07 Disposal of Waste Material

Remove and dispose of all waste material or debris from the site. Obtain all necessary permits for disposing of waste materials. Copies of such permits shall be provided the Engineer prior to disposal.

203.03.08 Backfilling and Clean-up

In areas not subject to future excavations or filling, fill all holes and depressions caused by clearing and grubbing with material acceptable to the Engineer and reshape area to drain properly and to conform to adjacent undisturbed topography.

Leave work area in a clean and sightly condition, free from litter and debris.

203.03.09 Removal and Replacement of Signs, Mailboxes, Posts, etc.

Contractor will be responsible for the removal and replacement of all signs, mailboxes, posts, etc. when not specifically designated otherwise by the Engineer. Contractor to contact property owner prior to removal and reinstallation of mailbox. Mail boxes in work area must be temporarily moved to allow clearing and excavation as well as easy access by mailman and residents. Upon completion of excavation, mail boxes shall be permanently replaced behind curb to postal service regulations.

203.04 MEASUREMENT AND PAYMENT

203.04.01 Lump Sum Basis

When shown in the Proposal, payment for clearing and grubbing will be made on a lump sum basis for all clearing and grubbing within the limits specified.

203.04.02 Incidental Basis

When not listed in the Proposal for separate payment, all clearing and grubbing will be considered incidental work for which no separate payment will be made.

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204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL

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204.01 DESCRIPTION

204.01.01 GENERAL

This section covers work necessary for excavation, construction of embankment, foundation stabilization, pipe bedding, pipe zone backfill, trench backfill, and disposal of material required in construction of streets, sewers, water mains, storm drains, structures, and appurtenances thereto.

204.01.02 Unclassified Excavation

Unclassified excavation is defined as all excavation, regardless of type, nature, or condition of materials encountered unless separately designated. The Contractor shall assume full responsibility to estimate the kind and extent of various materials to be encountered in order to accomplish the work.

204.01.03 Rock Excavation

Rock excavation is defined as the removal of all material which by actual demonstration cannot, in Engineer's judgment, be reasonably excavated with equipment comparable to types listed in TABLE 1 and equipped with rippers or similar approved equipment and which is, in fact, systematically drilled and blasted or broken by power-operated tools designed for rock excavation. Engineer may waive the demonstration if material encountered is well-defined rock. The term Rock Excavation shall be understood to indicate a method of removal and not a geological formation.

TABLE 1

Manufacturer	Model	Minimum Net Horse Power	Type of Excavation
Caterpillar	225	125	Trench
John Deere	690	125	Trench
Case	125B/980B	125	Trench
Caterpillar	D8	300	Grading and Structural

In trenches, boulders or pieces of concrete below grade larger than 1/2 cubic yard will be classified as rock if drilling and blasting or other approved methods are actually used for their removal from the trench. If material which would be classified as rock by the above definition is mechanically removed without blasting, breaking, or splitting, it will be considered unclassified excavation and will be paid for as such at the unit price bid, or if larger equipment is specifically brought in for the sole purpose of rock removal, as defined above, then such removal will be considered rock excavation and will be paid for as such at the unit price bid.

204.01.04 Trench Excavation

Trench Excavation is defined as removal of all material encountered in the trench to the depths and widths as shown and, unless otherwise classified by the Engineer, shall be considered unclassified or rock excavation.

204.01.05 Embankment

Embankment is defined as furnishing, placing, and compacting embankment materials to the depth and configuration as shown.

204.01.06 Foundation Stabilization

Foundation stabilization is defined as the removal of unsuitable material in the bottom of an excavation as directed by the Engineer and replacement with specified material for support of a roadbed, pipe, main, conduit, structure, or appurtenances thereto.

204.01.07 Vacant

204.01.08 Pipe Zone

Pipe zone is defined as the full width of the trench from 6-inches below outside of the pipe barrel to a point 12-inches above the top outside surface of the pipe barrel as shown on the appropriate Standard Drawing.

204.01.09 Trench Backfill

Trench backfill is defined as furnishing, placing, and compacting backfill material in the trench between the top of the pipe zone and the bottom of the pavement base or ground surface. Trench backfill will be classified as either native or select backfill.

204.02 MATERIALS

204.02.01 Embankment Materials

Provide embankment materials of approved earth, sand, bank-run or river-run gravel or combinations thereof, which can be compacted to the densities specified free of peat, humus, muck, frozen ground, organic matter, or other materials detrimental to construction of firm, dense, and sound embankments.

204.02.02 Foundation Stabilization

Use foundation stabilization consisting of gravel or crushed aggregate ranging in size from 6 inch-minus to 3/4 inch-minus as specified. Material shall be well graded from coarse to fine, and free from excessive clay or organic material.

204.02.03 Vacant

204.02.04 Pipe Zone Material

Use pipe zone material consisting of 3/4" - 0" crushed aggregate or sand, as noted on the

plans or in the special provisions.

Pipe zone material shall be as specified for crushed aggregate material in Section 204.02.06B CRUSHED AGGREGATE.

204.02.05 Native Backfill Material

Use native material excavated from within limits of the project that can be compacted to the density specified and free from vegetation and other deleterious material containing no frozen ground.

Maximum particle size shall be as shown, except for trench backfill, wherein the particle size shall not exceed 6 inches in diameter.

204.02.06 Select Backfill Material

Use imported granular material for backfill consisting of bank-run or river-run gravel from an approved source, sand, or crushed aggregate as specified.

204.02.06A Bank-Run and River-Run Gravel

Use imported bank-run or river-run gravel from an approved source. Approval of material from a location does not mean approval of the entire site, but only as material continues to meet specification. Material shall be well- graded sandy gravel free from roots, clay balls, organic material, and debris. Maximum size of material shall be six (6) inches. No more than five (5) percent by weight shall pass the No. 200 sieve. The material shall have a minimum uniformity coefficient of 8, and a minimum permeability coefficient of 10-3 cm/sec.

204.02.06B Crushed Aggregate

Coarse and fine aggregates shall conform to requirements of Section 205 MATERIALS and to additional requirements contained herein.

Base aggregates to be incorporated in the work shall have a sand equivalent of not less than 30 when tested in conformance with AASHTO T 176.

Base aggregate shall meet the requirements for Liquid Limit and Plasticity Index of Subsection 205.02.12C FINE AGGREGATE.

The base aggregates shall be uniformly graded from coarse to fine and shall conform to one or another of the following grading requirements as specified:

	Separated Sizes				
	2½" - 0	2" - 0	1½" - 0	1" - 0	¾" - 0
Sieve Size	Percentages (by weight)				
3"	100				
2½"	95 - 100	100			
2"		95 - 100	100		
1½"			95 - 100	100	
1¼"	55 - 75				
1"		55 - 75		90 - 100	100
¾"			55 - 75		90 - 100
½"				55 - 75	
3/8"					55 - 75
*¼"	30 - 45	30 - 45	35 - 50	40 - 55	40 - 60

*Of the fraction passing the 1/4-inch sieve, 40 percent to 60 percent shall pass the No. 10 sieve.

For determination of sizes and grading conform to AASHTO T 27.

Where 1"-0 base aggregate is approved for use, at least 70 percent (by weight) of the material passing through the 1/4" sieve but retained on the No. 10 sieve shall have at least one mechanically fractured face.

Materials will be subject to acceptance as follows:

Construction Method	Time of Acceptance
Stationary plant mixed	Immediately following mixing
Travel plant mixed	After mixing and before laying
Road mixed	After mixing and before compacting

Acceptance will be based on periodic samples taken following mixing.

For trench backfill, the maximum particle size shall not exceed 1-1/2" in pipe zone.

204.02.06C Sand

1. Use sand consisting of fine granular material, naturally produced by the disintegration of rock, or produced from crushed gravel, and reasonably free of organic material, mica, clay, and other deleterious substances.

2. Use dredge sand produced from river dredging and reasonably free of organic material, mica clay, and other deleterious substances.

The grading of sand used for backfill shall be as follows, or as approved by the Engineer:

	Percentage Passing by Weight	
Sieve Size	Coarse Sand	Fine Sand
1"	100	100
3/8"	95 - 100	...
#4	80 - 100	90 - 100
#30	10 - 30	...
#100	...	2 - 10
#200	0 - 8	0 - 4
Sand Equivalent	50 min.	50 min.

3. When using sand as imported granular trench backfill material, material must be able to stand on a minimum 60° angle from horizontal following compaction to specified density unless otherwise approved by the Engineer. For the purpose of this specification, specified density will be a minimum of 95% of relative density as determined by the appropriate City of Newberg standard test at optimum moisture.

204.02.07 Imported Topsoil

Unless specified otherwise, imported topsoil shall be used. Provide natural, fertile, friable topsoil, representative of local productive soil, and 90 percent free of clay lumps or other foreign matter larger than 2-inch diameter, not frozen or muddy, with pH 5.0 to 7.0, and not less than 3 percent humus as determined by loss on ignition of moisture-free samples dried at 100 degrees C. Gravel portion (particles larger than 2 mm) shall not exceed 15 percent of total volume. Imported topsoil shall be free of quack grass, horsetail, and other noxious vegetation and their seeds. Should such regenerative material be present in the soil all resultant growth, both surface and root, shall be removed and replaced to original specifications at the Contractor's expense within 2 years of acceptance of the work.

204.02.08 Native Topsoil

When specified, use topsoil from the site, properly stored and protected and free from grass, debris, overburden and roots, sticks, hard clay, and stones which will not pass a 1-inch square opening.

204.02.09 Water

Use water which conforms to requirements of Section 205 MATERIALS TYPES AND USE. Provide water at the Contractor's sole expense. Whenever City water is to be used, the Contractor shall obtain a meter issued by the City.

204.02.10 Explosives

Use explosives which are fresh, stable materials manufactured to the standards of the

"Institute of Makers of Explosives", and conforming to applicable requirements of ORS Chapters 476 and 480.

204.03 CONSTRUCTION

204.03.01 Excavation

Excavate, remove, and dispose of all formations and materials, natural or man-made, irrespective of nature or conditions, encountered within limits hereinafter defined or as specified, necessary for construction of the project. Method of excavation used is optional. Overbreak shall be removed at the Contractor's expense. Use hand methods for excavation that cannot be accomplished without endangering existing or new structures or other facilities.

Furnishing, installing, and removal of all shoring, sheeting, and bracing as required to support adjacent earth banks and structures, and for the safety of the public and of all personnel working in the excavation shall be the Contractor's responsibility and shall be considered incidental to the construction.

204.03.02 Rock Excavation and Explosives

204.03.02A Depth of Excavation

Excavate to the depths designated or as shown on the appropriate plan or standard drawing. Correct over-excavation with compacted material as directed at no additional expense to Owner. In trenches for sewers, and water mains or conduits, remove all material necessary to provide a minimum clearance of 6 inches under the pipe and replace with bedding material in conformance with Subsection 204.02.04 PIPE ZONE MATERIAL.

204.03.02B Methods and Records Required

Before rock removal by systematic drilling and blasting or other methods will be permitted, notify Engineer who, with Contractor or its representative, will determine the amount of material to be removed as rock excavation and will record the information. Then drill, blast, or break with power-operated tools specially designed for rock excavation, and excavate the material.

204.03.02C Use of Explosives

Obtain any and all permits required for use of explosives required by the City of Newberg, and other governing agencies.

Use of explosives shall be avoided as far as practicable, and in no case shall tunnel blasting methods be used. Such blasting as must be done shall be controlled in a manner which will avoid possible shattering or loosening of materials back of lines to which the excavations are to be made. All blasting shall be supervised and/or done by a state certified powder person. Be responsible for any and all damages to property or injury to persons resulting from blasting, or accidental or premature explosions that may occur in connection with the use of explosives. Give adequate warning to all affected persons and adjacent property owners prior to blasting.

Where excavations in hard, solid rock are to be made to depths of 10 feet or more, blasting thereof shall be done by the presplitting or preshearing method unless other methods are approved by Engineer.

204.03.02D Trench Blasting

When blasting rock in trenches, cover area to be shot with blasting mats or other approved type of protective material that will prevent scattering of rock fragments outside of the excavation.

204.03.03 Preservation of Existing Improvements

Conduct operations in such a manner that existing streets, utilities, railroad tracks, structures, and other facilities which are to remain in place will not be damaged, as specified in Section 105. Furnish and install cribbing and shoring, or whatever means are necessary to support material carrying existing facilities, or to support the facilities themselves, and maintain such supports until no longer needed.

Protect temporary facilities, until they are no longer required, and remove and dispose of temporary supports and other protective means when they are no longer required.

204.03.04 Excavation of Existing Improvements and Miscellaneous

Unless otherwise specifically provided for, excavation or excavation and backfill includes all excavating, removing, hauling, and depositing, including but not limited to, existing pavements, walks, driveways, surfaces, slabs, curbs, gutters, and similar cement concrete structures, bituminous materials, all rock or gravel road surfacing materials, abandoned sewers, pipes and conduits, logs, piling, footings, foundations, vaults, and chambers, when such materials are within the limits of excavation.

Remove remaining ends of abandoned pipes, or portions of other items partially removed under this work, which would be left exposed after final excavation, to a minimum of one (1) foot below the finished grade or elevation. Plug or seal ends of abandoned pipes in backfill or embankment areas. Storm drain pipe shall be reconnected as directed by the Engineer.

Payment for all work in this section and repair of any damage will be considered incidental to the work and included under bid items for Excavation, Excavation and Backfill, or other specified earthwork items.

204.03.05 Limits of Excavation

Excavate to the depths and widths designated, allowing for forms, shoring, working space, base material, and finish topsoil where required. Do not excavate deeper than elevation shown. Excavation carried below grade lines shown or established without approval shall be replaced with compacted foundation stabilization material at the Contractor's expense. Over-excavation under footings shall be filled with concrete of a strength equal to that of the footing, and cuts below grade shall be corrected by similarly cutting adjoining areas and creating a smooth transition, all at the Contractor's expense. When the precise location of subsurface structures is unknown, locate such structures by hand excavation prior to utilizing mechanical excavation equipment.

204.03.06 Slope Grading

Make slopes free of all exposed roots, unstable rock, and loose stones exceeding 3 inches in any dimension. Shape tops of banks to circular curves with, in general, not less than a 6-foot radius, unless rock makes such work impractical. All surfaces shall be neatly and smoothly trimmed.

204.03.07 Foundation Stabilization

If, in the judgment of the Engineer, material in the bottom of an excavation is unsuitable for supporting foundations, piers, retaining walls, cribbing, sewers, pipes, or similar facilities, over-excavate as directed and backfill to required grade with thoroughly compacted foundation stabilization material conforming to Subsection 204.02.02.

204.03.08 Disposal of Excess Material

Excavated materials not suitable or not required for backfill or embankment shall be deposited at predesignated sites specified or sites supplied by the Contractor. An embankment permit may be necessary within the City of Newberg for any embankment exceeding 50 yards before the Contractor places any excavated material from City projects on any property. The Contractor shall make all arrangements for disposal of excess material, obtain the necessary permits when not provided by the City at predesignated sites, and bear all cost or retain any profit incidental to such disposal.

204.03.09 Temporary Location of Excavated Materials

Place excavated material, specified for embankment or backfills and not excess material, only within the construction easement, right-of-way, or specified working area. Pile in such a manner that it will cause a minimum of inconvenience to the public. Furnish the Engineer a copy of written approval from each property owner prior to stockpiling material on private property outside of easements. Conform to all Federal, State, and local codes governing the safe loading of trenches with excavated material.

Provide free access to all fire hydrants, water valves, and meters, and leave clearance to enable free flow of storm water in all gutters, conduits, and natural watercourses.

204.03.10 Surface Removal and Replacement for Trenches

204.03.10A Removal and Replacement of Topsoil

When specified and where trenches within easements cross lawns, garden areas, pasture lands, cultivated fields, or other areas on which topsoil conditions exist, remove all topsoil to a depth of at least 12 inches for the full width of the trench to be excavated. Stockpile topsoil to one side of the easement in a location and do not mix with remaining excavated material. Replace and compact removed topsoil in the top of backfilled trench to the depth removed.

Maintain finished grade of topsoil level with area adjacent to the trench until final acceptance by the Engineer. Repair damage to adjacent topsoil caused by work operations. Remove all rock, gravel, clay, and any other foreign materials from surface; regrade, and add topsoil as required.

In lieu of stockpiling topsoil, Imported Topsoil as defined in Subsection 204.02.07 may be substituted and replaced to the actual depth removed at the Contractor's expense. If, in the opinion of the Engineer, the Contractor does not take precautions to protect the stockpiled topsoil from contamination by rocks, clay, excess water, etc., the Contractor will import topsoil meeting the requirements of Section 204.02.07 at his own expense.

Payment for removing, stockpiling, and replacing topsoil in the trench is included in the bid item, Trench Excavation and Backfill.

204.03.10B Removal of Pavement, Curbs, Driveways, and Sidewalks

Cut all asphalt pavement to full depth with a pavement saw or other suitable pavement cutter prior to excavation of trenches.

Saw Portland Cement concrete pavement, curbs, and sidewalks to a minimum depth of four (4) inches or half the concrete thickness, whichever is greater. Subsequent removal may be accomplished by using a jackhammer. Full depth cut by pavement saw can be done at the option of the Contractor. Use of any machine utilizing a falling or swinging weight in the form of a "headache ball" will not be permitted.

Width of cut shall be as shown on the plans or standard drawings. Remove all loose, undermined or damaged pavement. Remove all pavement between the trench and curb, pavement edge or construction joint whenever the cut is two (2) feet or less from the curb, pavement edge, or construction joint. Prior to paving, all loose, cracked, sunken or otherwise damaged edges will be saw cut in continuous straight cuts. Straight line saw cut lengths will not be less than 50 feet. Cut angles will not exceed 15 degrees.

Pavement and concrete materials removed shall be hauled from the site and not used for trench backfill. Replacement of pavement, curb, and sidewalk shall conform to the requirements of Subsection 212 RESURFACING.

204.03.11 Trench Excavation and Shoring

204.03.11A Maximum Length of Open Trench

Length of trench excavated in advance of the pipe laying shall be kept to a minimum, and in no case shall it exceed two hundred (200) feet unless otherwise authorized. The length of unrestored work area and total unfinished trench construction shall not exceed a length of 800 feet, for each main line pipe laying operation unless otherwise authorized. Trench construction will not be considered completed until all restoration is completed. If the unfinished trench or restoration exceeds 800 feet in length, the main line construction shall be suspended and shall not be resumed until authorized by the Engineer.

In no case will any trench be left unfinished or uncovered overnight or outside working hours.

A section of trench shall be considered as unfinished until excavation, construction, backfilling, compaction, gravel road restoration, Portland Cement concrete pavement, minimum of first lift of asphaltic concrete pavement or cold patch, and cleanup operations have been completed. Cleanup of backfilled and construction area shall include resurfacing and cleaning of area so as to allow use of trench and adjacent construction

area for normal use as required in Section 207 RESTORATION AND CLEANUP.

204.03.11B Trench Width

The maximum trench width at the ground surface will be kept to a minimum necessary to install the pipe in a safe manner. Trenches shall be of sufficient width to allow for shoring and permit proper joining of pipe and compaction of the backfill material along the sides of the pipe. Minimum trench width of unsheeted trenches shall provide a clear working space of at least six inches on each side of the outside diameter of the pipe bell. Sheeting requirements shall be independent of trench widths.

Trench width at the top of the pipe will be the pipe I.D. plus 18 inches, except where specifically shown on the Drawings, or specified in the Special Specifications. The pipe will be centered in the trench on line and grade at all times. When authorized by the Engineer, the Contractor may use pipe of greater strength or install a superior pipe bedding in lieu of maintaining the trench widths shown. If maximum width shown is exceeded by Contractor (without written authorization), the Contractor shall provide pipe of a higher strength designation, a higher class of bedding, or both, as approved by the Engineer, at no expense to the Owner.

Make the excavation for manholes and other structures wide enough to provide a minimum of twelve (12) inches between sides of structure and sides of excavation.

Confine top width of trench to dedicated rights-of-way or construction easements. Special written agreements to extend width may be made by the Contractor with affected property owners, provided such agreements are approved by the Engineer.

204.03.11C Grade

Excavate trench to lines and grades shown or as established by the Engineer, with proper allowance for pipe thickness, pipe bedding, and foundation stabilization. The subgrade upon which bedding is to be placed shall be firm, undisturbed, and true to grade. If the trench is over-excavated, restore to grade with thoroughly compacted foundation stabilization material or pipe bedding material at the Contractor's expense. Place material over full width of the trench in compacted layers to established grade with allowance for pipe bedding.

204.03.11D Shoring, Sheeting, and Bracing of Trenches

Sheet and brace trench when necessary to prevent caving and to protect adjacent structures, property, workers, and the public. Increase trench widths by the thickness of the sheet and maintain sheeting until pipe has been placed and backfilled at the pipe zone. Remove shoring and sheeting as backfilling is done, in a manner that will not damage the pipe or permit voids in the backfill. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the Federal, State, or local agency having jurisdiction. The most stringent of these requirements shall apply.

204.03.12 Dewatering

Furnish, install, and operate all necessary machinery, appliances, and equipment to keep

excavations free from water during construction. Remove and dispose of all water entering the trench excavation continuously during the time the trench is being prepared for the pipe laying, during the pipe laying, when concrete is being placed, and until the backfill has been completed. Dewater and dispose of water so as to prevent injury to public or private property, or nuisance or menace to the public. Drainage of trench water through the pipeline under construction is prohibited unless otherwise approved by the Engineer. At all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage. Have available at all times competent workers for operation of the pumping equipment. Control surface runoff to prevent entry or collection of water in excavations.

Control ground water such that softening of the bottom of excavations or formation of "quick" conditions or "boils" during excavation shall be prevented. Design and operate dewatering systems so as to prevent removal of natural soils and so that ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

Before dewatering is started, submit to the Engineer a statement of the method, installation, and details of the dewatering system proposed to be used. Open and cased sumps shall not be used as primary dewatering for excavations deeper than 3 feet below static water table.

Release ground water to its static level in such a manner as to maintain the undisturbed state of natural foundation soils. Prevent disturbance of compacted backfill and flotation or movement of structures, water mains, sewers, and other utilities.

Dewatering shall be considered as incidental to, and all costs included in, the various contract pay items in the Proposal.

204.03.13 Compaction

Compaction shall be by mechanical methods only.

Compaction equipment shall be of suitable type and adequate to obtain the amount of compaction specified. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort. Compaction equipment for granular materials shall be vibratory plate or vibratory drum compactors.

Any settlement noted in backfill, embankment, or in structures built over the backfill or embankment within the 2-year warranty period in accordance with the GENERAL REQUIREMENTS will be considered to be caused by improper compaction methods and shall be corrected at the Contractor's expense. Structures damaged by settlement shall be restored to their original condition by the Contractor at the Contractor's expense.

204.03.14 Embankment

204.03.14A Roadway Embankment

Preparation of Embankment Foundations:

Prior to construction of embankments, excavate and dispose of unstable material or

unsuitable foundation material. Limit excavation to lines, grades, and cross sections shown. Backfill basements, trenches, and holes which occur within embankment limits with specified material. Compact natural ground underlying embankments to the depth of grubbing or a minimum of 12 inches to density specified for the embankment material to be placed.

Embankment Construction:

Construct embankments to the lines and grades shown. Deposit material in layers not exceeding 8 inches deep across the full width of the embankment. Place material in continuous horizontal layers. Compact each lift to at least 95 percent of maximum dry density as determined by ASTM D1557/AASHTO T-180.

In embankments, the compacted materials within 3 feet of established subgrade elevation shall have a density in place of not less than 95% of relative maximum density, and below 3 feet shall have a density in place of not less than 90% of relative maximum density, and will show no appreciable deflection or adverse reaction under the compacting equipment during compaction.

If the surface of the prepared foundation or the compacted surface of a preceding lift is too dry or smooth to bond properly with the next layer of material, moisten or scarify, or both, before the next layer of material is placed. Compact slopes of all embankments thoroughly, and true to line and grade.

Do not place embankment material when the material, foundation, or previously placed embankment material is frozen. Embankment material shall not be placed in final position until moisture in excess of optimum moisture has been removed. Water settling of embankments will not be permitted.

204.03.14B Pipeline Embankment

Where pipelines are to be placed within an embankment, construct the embankment to its final specified elevation prior to trench excavation for the pipeline. Place pipe bedding and pipe zone materials in accordance with applicable portions of Subsection 204.03.16 and 204.03.17. Place trench backfill material as specified in Subsection 204.03.17 for TRENCH BACKFILL AND COMPACTION.

Additional Pipe Cover:

In locations where insufficient pipe cover exists, place excess excavated trench material suitable for embankment over the pipe to provide a minimum cover of 3 feet. Compact as required for underlying trench backfill.

204.03.14C Embankment for Structural Foundations

Deposit specified materials free from roots, organic material, trash, and stones larger than 3-inch diameter in uniform lifts across the full width of the embankment. Compact each lift to 95 percent of maximum dry density as determined by ASTM D 1557/AASHTO T180.

204.03.15 Pipe or Conduit Pipe Zone Bedding

Construct bedding in conformance with the appropriate Standard Drawing.

Class A pipe zone bedding consists of a pipe cradle of Portland Cement concrete as shown on the appropriate Standard Drawing. Bottom of trench shall be fully compacted before placement of pipe or cradle. Place concrete in such a manner that no dirt or foreign material become mixed with the concrete. Allow concrete sufficient time to reach initial set before any additional backfill material is placed in the trench. Conform to applicable provisions for Concrete Encasement in DIVISIONS 3 and 6 - SANITARY SEWERS and STORM DRAINS.

Class B pipe zone bedding consists of leveling the bottom of the trench or top of the foundation material and placing pipe bedding select material to the horizontal centerline (springline) of the pipe. Bedding select material shall be placed in at least two lifts. Place the first lift to provide the minimum depth of bedding select material shown on the appropriate Standard Drawing before the pipe is installed. Spread smoothly to proper grade so that pipe is uniformly supported along the barrel. Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint. Bedding under pipe shall provide a firm, unyielding support along the entire pipe length. Place subsequent lifts of not more than 6 inches thickness up to the horizontal centerline of the pipe. Bring lifts up together on both sides of the pipe and carefully work under pipe haunches.

Class A, B, and C pipe zone bedding shall be considered to include full width of excavated trench from the bottom of the trench or top of the foundation stabilization material to the top of the bedding.

Particular attention must be given to the area from the invert to the horizontal centerline of the pipe or top of the bedding to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone.

204.03.15A Bedding for Flexible Sewer Pipe

Material for bedding sewer pipe shall be as specified. Place in more than one lift. Material for pipe bedding PVC pipe shall be 3/4" - 0" or crushed rock placed a minimum of 6" under the pipe to 6" over the top of the pipe. First lift shall provide the minimum thickness per Standard Drawing No. 402 under any portion of the pipe or 4", whichever is greater, and be placed before the pipe is installed. Spread smoothly so that the pipe is uniformly supported along the barrel. Install subsequent lifts of not more than 6 inch thickness to the top of pipe zone and individually compact to either 90 percent density as determined by AASHTO 180 (delete paragraph 5.1), or 70 percent relative density as determined by ASTM D 2049. Engineer will select test method appropriate for material used.

204.03.15B Bedding for Water Pipe

Place bedding to a minimum thickness of 6 inches below the outside bottom of the pipe barrel or conduit and compact with mechanical vibrating or impact tampers to 95 percent of maximum density as determined by AASHTO 180 (delete paragraph 5.1), or 70 percent relative density, as determined by ASTM D 2049. Engineer will select test method appropriate for material used. For coal tar coated steel pipe, 3/4" - 0" bedding material is not acceptable.

204.03.16 Pipe Zone Placement

Place pipe zone material carefully around the pipe in 6-inch layers and compact to a minimum of 90 percent maximum dry density as determined by ASTM D1557/AASHTO T-180. Pipe zone material for water pipe shall be compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D 1557/ AASHTO 180. Prevent pipe from movement either horizontally or vertically during placement and compaction of pipe zone material.

204.03.17 Trench Backfill and Compaction

204.03.17A General

For bidding purposes, the type of backfill to be used above the pipe zone is indicated on the Drawings. The right is reserved to modify the use, location, and quantities of the type of backfill during construction as the Engineer considers to be in the best interest of the Owner. Payment will be made based on the type of backfill installed.

Trench backfill above the pipe zone will be either imported or native for the purpose of payment:

Select and Approved Granular Native Backfill will, generally, be limited to streets and roadways and in similar areas where subsequent trench settlement must be held to a minimum. The Engineer will make the determination of acceptability of the granular native materials.

Native backfill will, generally, be limited to use in unsurfaced or unimproved areas.

When backfill is placed mechanically, push the backfill material onto the slope of the backfill previously placed and allow to slide down into the trench. Do not push backfill into the trench in such a way as to permit free fall of the material until at least 2 feet of cover is provided over the top of 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 larger than 6 inches in any dimension.

Take reasonable precautions to prevent excavated material which is designated to be used for backfill from becoming wet and exceeding the critical moisture limits. If native material does become wet and exceeds the critical moisture limits due to the Contractor's operations, replace with imported granular material at the Contractor's expense.

204.03.17B Select Backfill

Backfill the trench above the pipe zone with imported granular backfill material. Compact the entire trench depth in suitable lifts not to exceed 18 inches in depth with mechanical vibrating compactors with sufficient compactive effort to meet the specified density. Determine the type of equipment, method of placing lifts, and the amount of compacting effort required to prevent subsequent settlement. Compaction with hydrahammer equipment will not be approved.

The top 3 feet of select backfill shall be compacted to 95 percent of maximum relative density as determined by ASTM D4253 and D4254 for bar-run or river-run gravels. For one (1) inch-minus crushed aggregate, compact to 95 percent of maximum dry density as

determined by ASTM D1557/AASHTO T-180.

In the zone below the top 3 feet of backfill, except water line trenches, compact to 90 percent of maximum dry density as determined by ASTM D1557/AASHTO 180.

Any subsequent settlement of the finished surface during the warranty period shall be considered to be a result of improper or insufficient compaction and shall be promptly repaired by the Contractor at the Contractor's expense.

204.03.17C Native Backfill

Backfill the trench above the pipe zone with excavated trench material.

In untraveled areas and as shown on the Construction Drawings, leave the trench with the backfill material level with the existing ground for the entire width of the trench. Material will be compacted to a minimum of 85 percent maximum dry density as determined by ASTM D1557/AASHTO T-180. Any deficiency of backfill material which becomes apparent after settlement and within the warranty period shall be corrected by regrading, and adding additional material where required. Unless otherwise directed by Subsection 204.03.11A, remove rocks larger than 2 inches in any dimension from the upper 8 inches of the backfill.

204.03.17D Compaction Testing

Sampling and testing of materials for determination of compliance with the specified compaction requirements may be taken at any location and time as the Engineer may determine. Excavate test pits in the backfill as directed by the Engineer for the purpose of testing the backfill compaction. At the option of the Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift. All costs in connection with excavating test pits, providing and installing safety shoring as required to protect the testing person, and standby time during field density test shall be considered incidental to backfill and shall be included in unit prices bid for the various items involved.

When compaction testing has been performed by the Engineer and the required density has not been obtained by the Contractor, the Contractor shall bear all costs for all subsequent retesting in the areas of non-compliance. All testing shall be performed by the testing laboratory of the Engineer. The Engineer shall keep an accurate account of the time spent for the testing laboratory to perform retesting. The Contractor shall be totally responsible for rescheduling compaction testing with the Engineer. Any and all tests associated with delays due to retesting shall be the sole responsibility of the Contractor.

If required density has not been obtained, remove the backfill from the trench, replace with backfill, and recompact as many times as it is necessary to obtain the required specified minimum densities.

204.03.17E Trench Maintenance

In graveled areas, maintain surface of the backfilled trench level with the adjacent and existing grade, before and after the area is opened to traffic, with 1-inch minus crushed aggregate material. In paved areas, cold mix asphalt pavement shall be used until the final pavement replacement is completed. The cold mix asphalt or steel plating shall be in

place at the end of each workday.

Place cold mix asphalt in conformance with Section 209 RESURFACING.

Maintain backfilled trench surface between any two successive manholes until the following operations have been completed and accepted by the Engineer:

1. Service connections installed, backfilled, and compacted.
2. Construction of manholes and appurtenances.
3. Air testing.
4. Cleanup and restoration of all physical features, including concrete curbs, gutters, and driveways.
5. Utilities restored to their original condition or better.
6. All work required between the two manholes accomplished.

Maintain backfilled trench surface between any two successive valves until the following operations have been completed and accepted by the Engineer:

1. Service connections installed, backfilled, and compacted.
2. Valves, valve boxes, and hydrants installed.
3. Hydrostatic testing.
4. Flushing and disinfection.
5. Cleanup and restoration of all physical features, including concrete curbs, gutters, and driveways.
6. Utilities restored to their original condition or better.
7. All work required between the two valves accomplished.

Do not undertake final pavement replacement until all items outlined above have been completed and accepted.

Maintenance of backfilled trenches is considered as incidental to this item of work, and payment for such maintenance will be considered as included in payment for Excavation and Backfill.

204.04 MEASUREMENT AND PAYMENT

204.04.01 Unclassified Excavation

All unclassified excavation will be measured on a cubic yard basis, or on a linear foot basis for trench excavation and backfill when so shown in the Proposal, all in original position prior to excavation. The quantity measured for payment will include only material excavated from within the limits defined herein. Any additional excavation outside of these limits, unless ordered in writing by the Engineer, shall be considered as having been made for Contractor's benefit and will be considered as incidental to the work. Excavation required for the volume displaced by new concrete curbs, driveway, sidewalks, steps, and pathways shall be considered incidental to the work and no payment will be made for removal of this material.

204.04.01A Roadbed and Slope Excavation

Pay quantities shall be computed to the neat lines of cross sections as staked or as otherwise specified.

204.04.01B Trench Excavation and Backfill

General

Length of all trenches will be measured horizontally along center of pipe or conduit from center-to-center of valves, fittings, couplings, manholes, structures, or end of pipe or conduit, whichever is applicable. Measurement through structures will be deducted if the Proposal carries a separate item of structure excavation applicable to the structures.

Measurement and payment for trench excavation and backfill shall include all work specified herein, or not specifically paid for in other pay items. No separate measurement and payment for trench excavation and native backfill shall be made for waterline projects. See Division 4, Subsection 404.01.

The price per linear foot for trench excavation and backfill shall be considered full compensation for the removal, protection, and replacement if damaged or interfering portions of existing sewers, storm drains, waterlines and other improvements; the plugging or removing of abandoned conduit and structures; the excavations of the trench; disposal of excess excavation; the control of ground and surface waters; the preparation of subgrade; backfilling the trench; removing, stockpiling, and replacing topsoil; and all other work necessary to install the pipe or conduit, complete in place.

Gravity Sanitary Sewers and Storm Drains

When contained in the Proposal, trench excavation and backfill will be paid for on a linear foot basis for type and depth of backfill used, with depth being measured from original ground or paved surface to invert of the pipe. The price bid per linear foot shall include the excavation required to provide space for the pipe bedding and any excavation and backfill necessary to widen the trench for installation of manholes and appurtenances.

For sanitary sewers and storm drains, depth figures shown in the Proposal are inclusive to the nearest 0.1 foot, that is, a trench depth measured as 11.9 feet will be paid for at the unit price for excavation 10 to 12 feet deep. At trench depth measured as 12.0 feet will be paid for at the unit price for excavation 12 to 14 feet deep. Depths measured at less than 8 feet will be included in the base depth of range of zero to 8 feet. Depth of trench will be measured at intervals of 50 feet along the centerline of the trench, and the ends. Depths will be interpolated between each 50-foot station or the ends if the line is less than 50 feet long.

Pressure Sewers, Waterlines, and Conduits

Payment for trench excavation and backfill will be made at the respective unit prices per linear foot stated in the Proposal for the trench excavation, the type of backfill used, and all incidental work, including all extra excavation required to provide space for pipe bedding and shall also include any incidental excavation and backfill necessary to widen the trench for installation of branch-line fittings and appurtenances.

For waterline installations, payment for trench excavation and native backfill will be included within the "Installation of Pipe" (Subsection 404.01) bid item.

204.04.01C Imported Select Backfill

If a portion of the native material is approved as a granular backfill material in areas requiring such, there may be a need for additional granular backfill to be imported. Compensation will be on a cubic yard ("neat-line", in place) or linear foot basis.

All projects where select backfill is used in the trench section, payment shall be by the cubic yard unit price in place. The units shall be computed by multiplying the neat width of the trench, as defined by Standard Drawings, times the depth of the backfill between the asphalt concrete restoration section and the pipe zone, times the horizontal length of the trench to which the backfill is added. If all dimensions are in feet, divide the resulting volume by twenty-seven (27) for cubic yards.

204.04.02 Rock Excavation

204.04.02A Structural Rock Excavation

Rock excavation will be measured on a cubic yard basis for the actual quantity removed within the limits of excavation as defined for unclassified excavation. Quantity for payment shall be the amount approved by the Engineer.

204.04.02B Roadbed and Slope Rock Excavation

Rock excavation will be measured on a cubic yard basis for the actual quantity removed within the limits of excavation as defined for unclassified excavation. Quantity for payment shall be the amount approved by the Engineer.

204.04.02C Trench Rock Excavation

Rock excavation will be measured on a cubic yard basis as follows:

Length

Length will be the entire horizontal distance where rock is encountered measured on a linear foot basis along the centerline of the trench.

In sewer trenches, manholes and other structures will be excluded and will be measured separately. Measurement will commence at the first location where rock is encountered and continue to the point where rock terminates.

In trenches for water mains, valves, fittings, couplings, or structure locations will be included in the linear measurement, unless the Proposal carries a separate item that is applicable to the structures.

Width

For sewers and water mains, the width for payment of trench rock excavation shall be the inside pipe diameter plus 2 feet.

Depth

Measurement for depth will be the vertical distance from the top of the rock to the bottom of the rock or a depth that is 6 inches below the sewer pipe or watermain, whichever is less. Depth will be measured at intervals of 25 feet for sewers and 50 feet for water mains along the centerline of the trench, beginning at the first location that rock is encountered, and the average depth between measuring points will be the depth used for computing depth of rock.

Payment for rock excavation will be based on the unit price per cubic yard stated in the Bid and will be paid in addition to the payment for trench excavation and backfill except for water mains, where the volume paid for rock excavation will be deducted from the volume paid for common trench excavation. Payment for rock excavation shall include full compensation for all work necessary to excavate the rock material. No payment will be made for rock excavated below the required grade or outside the widths mentioned above.

Rock excavation quantities for manholes and other structures shall be computed from the actual profile depth as above, multiplied by the area within a line parallel to and one foot outside of the actual outside dimensions of the manhole or structure base.

204.04.03 Hard Surface Removal and Replacement for Trenches

Measurement and payment for the removal and replacement of Portland Cement concrete pavement, asphaltic concrete pavement and surfaces, curbs, driveways, and sidewalks shall conform to the provisions of Section 209 RESURFACING.

Payment for removal will be covered under excavation unless specifically stated otherwise in this document.

204.04.04 Embankment

Measurement for payment for embankment compacted in place will be made on a cubic yard basis. Computation of volume for payment will be based on field measurement of the actual number of cubic yards constructed within limits shown or directed. Where applicable, this shall be within neat lines of the staked cross section.

No payment will be made for quantities required due to subsidence or settlement of ground or foundation, for settlement of materials within the embankment or for shrinkage, settlement, washout, slippage, or loss regardless of cause, subject however to the provisions of RESPONSIBILITY OF CONTRACTOR in Section 105 of the GENERAL REQUIREMENTS.

No deduction will be made for piers, columns, pipes, or miscellaneous construction features constructed within embankment limits.

Payment shall constitute full compensation for all work and all materials used, whether obtained from the site of work or imported.

Trench excavation, bedding, and backfill placed in the compacted embankment will be paid for separately for the particular item and class of construction.

204.04.05 Foundation Stabilization

Payment for this item will be based on the unit price per cubic yard stated in the Proposal. Measurement will be based upon a trench pay width of the inside pipe diameter plus 2 feet. Payment for this item shall constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials at the site and for placing and compacting it and for the extra depth of excavation required below the pipe base grade structure or roadway to provide for a stable base. 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. Foundation stabilization will only be paid in those areas where the Engineer has given written direction for installation.

204.04.06 Bedding for Sewers, Water Mains, and Conduits

Payment for pipe bedding will be included in the linear foot payment for pipe as specified in Section 301 and/or Section 404.

204.04.07 Pipe Zone Backfill

Payment for pipe zone backfill will be included in the linear foot payment for pipe as specified in Section 301 and/or Section 404.

204.04.08 Riprap and Filter Blanket

Riprap and filter blanket material will be measured for payment on a cubic yard or ton basis only when listed in the Proposal as a separate bid item, or when directed by the Engineer. Measurement will be based upon individual trip tickets of actual truck measure furnished to the Engineer for the cubic yards or tons used under this item. Trip tickets shall be presented to the Engineer for signature on the day the material is delivered. No payment will be allowed on trip tickets not so validated by the Engineer.

Payment for riprap and filter blanket shall include all work necessary to furnish and place the material complete. When not listed in the Proposal, payment for riprap and filter blanket shall be incidental to other items of work.

204.04.09 Imported Topsoil

Measurement and payment for the imported topsoil will be made on a cubic yard or ton basis and only when listed in the Proposal as a separate bid item. Measurement will be based upon individual trip tickets of actual truck measure furnished to the Engineer for the cubic yards or tons used under this item. Trip tickets shall be presented to the Engineer for signature on the day the material is delivered. No payment will be allowed on trip tickets not so validated by the Engineer.

Payment for imported topsoil shall constitute full compensation for all work necessary to furnish materials on site, placing material, and for full compaction in place.

204.04.10 Shoring, Sheeting, and Bracing

Shoring, sheeting, and cribbing, including all work and materials expended in furnishing, placing, and removing such shoring, sheeting, and cribbing necessary to complete the

excavation shall be considered incidental to the pay item for excavation.

204.04.11 Dewatering

Dewatering shall be considered as incidental to and included in the pay item for excavation.

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205 MATERIALS - TYPES AND USE

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205.01 DESCRIPTION

This section covers certain types of materials and their use that are common to appropriate forms of construction contained throughout Divisions 3 through 6.

205.02 MATERIALS

205.02.01 General

Unless specified otherwise in the Contract Documents or Standard Drawings, materials contained herein will be used in required work.

205.02.02 Portland Cement Concrete

Use concrete having a 28 day design strength of 3,300 PSI for curbs, sidewalks, and poured in place manholes and catch basins, and 4,000 PSI for PCC pavement per AASHTO T-22 and T-23 with 1-1/2 inch maximum size aggregate.

High early strength concrete (Type III cement) shall be used when patching trenches in Portland Cement concrete pavement.

Use Type II cement concrete for all sewer and water main construction and appurtenances thereto.

Portland Cement concrete shall be sampled and tested in accordance with the following ASTM test methods:

1.	Sampling Fresh Concrete	C172
2.	Obtaining Drilled Cores	C42
3.	Molding and Curing Specimens	C31
4.	Compressive Strength	C39
5.	Flexural Strength	C78
6.	Slump	C143
7.	Air Content	C173 or C231
8.	Unit Weight Yield	C138
9.	Setting of Mortar	C191 or C266

205.02.03 Cement Mortar

Use either standard premixed mortar conforming to ASTM C 387, or mortar proportioned with 1 part Portland Cement to 2 parts clean, well-graded sand which passes a 1/8-inch screen and which conforms to AASHTO M 45. Admixtures may be used, but do not exceed the following percentages of cement by weight: Hydrated lime - 10 percent and diatomaceous earth or other inert materials - 5 percent. Testing shall conform to the OSHD test for mortar strength.

205.02.04 Cement Grout

205.02.04A Type "A" Grout

Utilize grout which consists of 1 part Portland Cement, 3 parts of clean and well-graded sand. Use minimum amount of water to produce a thick, creamy consistency.

205.02.04B Type "B" Grout

Where type "B" grout is specified, use a mixture consisting of 1 part Portland Cement, 5 parts of clean and well-graded sand, and 7 parts pea gravel, by volume.

205.02.05 Steel Reinforcement

Use steel deformed bars conforming to ASTM A 615, Grade 40, except that longitudinal bars in continuously reinforced concrete pavement shall be Grade 60. See Section 702 REINFORCEMENT.

205.02.06 Dowels

Utilize steel dowels which conform to ASTM A 306 Grade 70. Where specified, dowels shall be coated with plastic or other approved material for bond prevention. See Section 702 REINFORCEMENT.

205.02.07 Structural Joint Material

Use preformed and poured joint fillers conforming to requirements of Subsection 701.02.06 JOINT MATERIALS. For joints in Portland Cement concrete pavement, curbs, gutters, driveways, sidewalks, and pathways, refer to DIVISION 5 - STREETS.

205.02.08 Curing Materials for Portland Cement Concrete

Conform to one or more of the following requirements for curing materials; choice of method to be used is dependent on weather and existing conditions:

1. White Burlap - Polyethylene Sheets	AASHTO M 171
2. Waterproof Paler	AASHTO M 171
3. White - Pigmented Liquid Membrane-Forming Compound	**AASHTO M 148
4. White Polyethylene Film	AASHTO M 171
5. Burlap Cloth (Jute or Kenaf)	AASHTO M 182

**Required for PCC curbs, but do not use on bridges or box culverts. Test in accordance with the OSHD modified procedure.

205.02.09 Epoxy Cement

Epoxy cement shall be a two-compound epoxy resin adhesive conforming to requirements of AASHTO M 235.

205.02.10 Portland Cement

Furnish one or more of the following types as specified:

Type I - For general use when special properties of other type cements are not required.

Type IA - Air-entraining cement for same uses as Type I, where air-entrainment is desired.

Type II - For use when moderate sulfate resistance or moderate heat of hydration is desired.

Type IIA - Air-entraining cement for same uses as Type II, where air-entrainment is desired.

Type III - For use when high early strength is desired.

Type IIIA - Air-entraining cement for same use as Type III, where air-entrainment is desired.

Portland Cement shall conform to AASHTO M 85 for low alkali cement except as follows:

1. Total alkali content (sodium and potassium oxide calculated as $Na_2O+0.658K_2O$) shall not exceed 0.6 percent.

2. Types I, IA, III, or IIIA must contain a maximum of 10 percent tricalcium aluminate.

- Time-of-setting tests shall be by either the Gillmore Test or the Vicat Test or both, as Engineer may elect.

When not otherwise specified, use Type I. Contractor, at his option, may use Type III Portland Cement (high early strength) in lieu of Type I in the identical quantity specified for the latter.

Differing brands or types of cement, or the same brand or type of cement from different plants shall not be mixed during use nor be used alternately. Cement may be sampled either at the plant or site of work at the option of the Engineer.

205.02.11 Water

Water used in all work must be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product. Use water conforming to AASHTO T 26 for mixing and curing Portland Cement concrete, mortar, or grout. Water of approved potable quality may be used without test.

205.02.12 Aggregates

205.02.12A General

Aggregates shall be subject to approval at the source or at the actual stockpile from which the aggregate is taken for incorporation in the work. During production of the aggregate, provide samples of each size for testing if requested by the Engineer. On the basis of

testing, modify or adjust crushing and screening operations to bring each separate size of aggregate within gradings, proportions, and quantities as specified.

In all stages of production, transporting, and stockpiling, handle aggregates in such a manner as will prevent the segregation of materials and the intermingling of separate gradings or kinds of aggregates.

Grading of designated aggregate sizes shall conform to the requirements of appropriate forms of work contained within applicable sections throughout these Specifications.

The determination of sizes and grading of aggregate shall conform to AASHTO T 27 and AASHTO T 11.

205.02.12B Coarse Aggregates

Coarse aggregates shall be natural or crushed rock or gravel which is retained on a No. 4 sieve and free from flat, elongated, soft, or disintegrated pieces, vegetable material, or other deleterious matter.

Use crushed rock or crushed gravel for coarse aggregate in aggregate bases and all asphalt construction requiring coarse aggregate. Total deleterious matter shall not exceed 2 percent by weight.

Use crushed rock, natural gravel, or other inert materials of similar characteristics, or combinations thereof, for coarse aggregate in Portland Cement concrete. Do not allow amount of deleterious substances in Portland Cement concrete to exceed the following amounts:

Lightweight pieces	0.25% (by weight)
Friable particles	0.25% (by weight)
Material passing No. 200 sieve	1.00% (by weight)
Wood waste	0.05% (by weight)

Use coarse aggregates having weighted percentages of loss which do not exceed 12 percent by weight when subjected to five alternations of the sodium sulfate soundness test (AASHTO T 104).

Fracture of Gravel

When crushed gravel is furnished, it shall have at least one mechanically fractured face on not less than the following percentages (by weight) of the material retained on a No. 4 sieve.

Type of Use	Percentages
Asphalt Concrete Pavement	75
Asphalt Surface Treatment	95
Asphalt Treated Bases	75
Aggregate Bases - 1"- 0" crushed gravel	70

Durability

The source material from which coarse aggregate is produced shall meet the following qualifying test requirements:

Test	Test Method	Requirements
Degradation:		
Passing No. 20 sieve	OSHD Standard	30% Max.
Sediment Height	OSHD Standard	3" Max.
Abrasion	AASHTO T 96	35% Max.

Also, other sampling and testing of coarse aggregate shall be in accordance with the following methods:

Sampling	AASHTO T 2
Materials Passing No. 200 sieve	AASHTO T 11
Sieve Analysis	AASHTO T 27
Soundness	AASHTO T 104
Friable Particles	AASHTO T 112
Lightweight Pieces	AASHTO T 113
Fracture	OSHD Standard

205.02.12C Fine Aggregate

Use fine aggregate consisting of finely crushed rock or gravel, fine sand, and other finely divided natural and inert mineral matter, thoroughly washed, and free of clay, loam, shale, alkali, vegetable matter, and other deleterious matter. Do not mix fine aggregate from different geological sources, and do not store in the same pile nor use alternately in the same class of construction or mix.

Portland Cement concrete shall contain fine aggregate which has a deleterious material content not exceeding the following limits:

Friable Particles	1% (by weight)
Lightweight Particles	1% (by weight)
Material Passing No. 200 Sieve	1% (by weight)

When this fine aggregate for Portland Cement concrete is subject to five alternations of the sodium sulfate soundness test (AASHTO T 104), weighted percentage of loss must not exceed 10 percent by weight.

Asphalt cement concrete and surface treatments shall contain fine aggregate having a weighted loss of not more than 15 mass percent when sodium sulfate is used or 20 mass percent when magnesium sulfate is used in five cycles of the soundness test. Total deleterious matter shall not exceed 2 percent by weight.

Use fine aggregates which meet the durability requirements for coarse aggregates contained hereinbefore, and which meet the following Liquid Limit and Plasticity Index requirements:

Quality	Test Method	Requirement
Liquid Limit	AASHTO T 89	NP or 33 Max.*
Plasticity Index	AASHTO T 90	NP or 6 Max.*

*When tested as specified, both the liquid limit and the plasticity index test results shall conform to the following:

Percent of Material Passing No. 40 Sieve	AASHTO T 89 Liquid Limit (Maximum)	AASHTO T 90 Plasticity Index (Maximum)
0.0 to 5.5, inclusive	33	6
5.1 to 10.0, inclusive	30	5
10.1 to 15.0, inclusive	27	4
15.1 to 20.0, inclusive	24	3
20.1 to 25.0, inclusive	21	2
Over 25.0	21	O or N.P.

Sampling and testing fine aggregate shall conform to the following methods:

1.	Sampling	AASHTO T 2
2.	Material Passing No. 200 Sieve	AASHTO T 11
3	Organic Impurities	AASHTO T 21
4.	Sieve Analysis	AASHTO T 27
5.	Mortar Strength	ASTM C 109
6.	Soundness	AASHTO T 104
7.	Friable Particles	AASHTO T 112
8.	Lightweight Pieces	AASHTO T 113
9.	Sand Equivalent	AASHTO T 176

205.02.13 Asphalt Materials

205.02.13A General

Unless otherwise specified herein or in applicable subsections, types and grades of material shall conform to the current Oregon State Highway Division's "Specifications for Asphalt Materials" for Light Duty AC obtainable from the Engineer of Materials, ODOT, Salem, Oregon 97310.

205.02.13B Asphaltic Cement

Use PBA-2 grade asphalt that meets OSHD requirements for Light Duty AC.

205.02.13C Tack Coat

Asphalt shall consist of CSS-1 or CSS-1h emulsified asphalts.

205.02.13D 、 Slurry Seal

Use CCS-1H cationic emulsified asphalt.

205.02.14 Geotextiles

DESCRIPTION: Geotextiles will be accepted for use in various applications according to the provisions of this section.

DEFINITIONS:

(a) **GEOTEXTILE** - A fabric manufactured specifically for use in civil engineering applications. Fibers used in the manufacture of geotextiles consist of long chain synthetic polymers. At least 85 percent by weight of the long chain polymers are polyolephins, polyesters, or polyamides.

1) **DRAINAGE GEOTEXTILE** - For installation in subsurface drains or other drainage locations.

2) **EMBANKMENT GEOTEXTILE** - For installation within or under embankments for stabilization.

3) **RIPRAP GEOTEXTILE** - For installation behind and beneath riprap, buttresses, inlays, shear keys, and erosion control applications.

4) **WALL GEOTEXTILE** - For construction of retained earth walls.

5) **SUBGRADE GEOTEXTILE** - For installation on subgrades and in other material separation applications.

6) **PAVEMENT OVERLAY GEOTEXTILE** - For installation beneath an asphalt concrete overlay.

(b) **MACHINE DIRECTION** - The long, or warp, direction of the geotextile. The cross-machine,
or fill, direction is perpendicular to the machine direction.

(c) **NON-WOVEN GEOTEXTILE** - A textile produced by bonding and/or interlocking of fibers by mechanical, heat, or chemical means.

(d) **ROLL** - Unit of continuous geotextile without transverse seams as furnished by the manufacturer. Roll size may vary between manufacturers and types of geotextiles.

ACCEPTANCE REQUIREMENTS:

(a) **GENERAL REQUIREMENTS** - The geotextile shall:

- Be composed of a polymeric yarn or fiber oriented into a stable network which retains its relative structure during handling, placement, and design service life.

- Meet or exceed the properties outlined under Geotextile Property Values.

- Be free of any chemical treatment or coating which might significantly reduce permeability.
- Have the selvage finished so the outer fibers are prevented from pulling away from the fabric.
- Be free of defects or tears.
- Be resistant to ambient temperatures, acid and alkaline conditions, micro-organisms and insects.
- Be for the intended purpose and have dimensional stability.

(b) Base the actual minimum average roll values furnished by the manufacturer on representative test results from the manufacturing plant which produced the rolls, and shall meet or exceed each of the specified minimum values. Clearly label all rolls as being part of the same production run certified as meeting all applicable requirements.

GEOTEXTILE PROPERTY VALUES

Minimum Value

Geotextile Property Test Method	Drainage (1) Geotextile Type 1/**Type 2**	Riprap (1) Geotextile Type 1/**Type 2**	Subgrade Geotextile	Embankment Geotextile	Wall (1) Geotextile	Pavement (1) Overlay Geotextile
Grab tensile strength minimum in each principal direction - ASTM D4623	80 lb/**180 lb**	200 lb/**260 lb**	180 lb	230 lb	----	80 lb
Grab Elongation - ASTM D 4632	15%	15%	----	----	----	50%
Burst Strength, Diaphragm method - ASTM D 3786 Mod. (OSHA TM 814) (TF 25 Method 3)	130 psi/**290 psi**	320 psi/**430 psi**	290 psi	430 psi	----	----
Puncture Strength - ASTM D 4833 or ASTM D 3787 Mod. (OSHD TM 816)	35 lb/**80 lb**	80 lb/**110 lb**	80 lb	110 lb	----	----
Apparent opening size (AOS), U.S. Std. Sieve - ASTM D 4751 (CW-02215 Corps of Engr.)	No. 70 sieve or smaller opening	No. 70 sieve or smaller opening	No. 30 sieve or smaller opening	No. 30 sieve or smaller opening	(2)	----
Water permeability - ASTM D 4491	0.1 cm/sec	0.1 cm/sec	0.005 cm/sec	0.005 cm/sec	(2)	----
Ultraviolet stability - ASTM D 4355 at 500 hours	----	70% strength retained	----	----	70% strength retained	----
Wide strip tensile strength - ASTM D 4595	----	----	----	----	(2)	----
Asphalt retention - OSHD TM 817 (TF25 Method 3) (3)	----	----	----	----	----	0.20 gal/sq. yd.
Melting point - ASTM D 276	----	----	----	----	----	300° F

205.03 CONSTRUCTION

205.03.01 Description

This work consists of furnishing and placing geotextiles in drains, under embankments, for embankment reinforcement, under riprap, buttresses, inlays, shear keys and erosion control applications, behind retaining structures, over roadbed subgrades, and beneath pavement overlays as shown on the plans and at other locations as directed.

205.03.02 Geotextile Installation Requirements

Acquisition and Storage - Provide complete rolls of geotextile as furnished by the manufacturer and protect against damage and deterioration. Store all geotextile rolls in a dry place and off the ground at all times according to ASTM D 4873. Cover all rolls and partial rolls with a dark protective covering when received. The geotextile will be rejected for use if the Engineer determines it has defects, deterioration, or has been damaged.

Placement:

(1) Surface Preparation - Prepare the surface receiving the geotextile to a smooth condition free of obstructions, depressions and debris unless otherwise directed. Do not drag the geotextile on the ground or mishandle in any way.

Loosely place the geotextile without wrinkles so placement of the overlying material will not tear the geotextile. Lap or sew the geotextile at the ends and sides of adjoining sheets as specified.

(2) On Slopes - Place the geotextile with the machine direction oriented up-down the slope. Lap the upper sheets over the top of the lower sheets. When the geotextile is placed on a slope steeper than 6:1, securely anchor the laps to the ground surface with pins or stakes as necessary to prevent slippage and tearing of the geotextile. Start placement of fill material on the geotextile at the toe of the slope and proceed upwards.

(3) Where Exposed To Water - If geotextiles are placed under water or in areas where water will flow, the geotextile may be placed with the machine direction parallel to the direction of water flow instead of the placement direction specified. Overlap sheets so the upstream sheet is placed over the top of the downstream sheet. Adequately secure the geotextile to prevent slippage. As the geotextile is placed under water, place the backfill material on it to the required thickness. Do not place geotextile more than 50 feet ahead of the specified cover material.

Overlaps - Minimum overlap requirements for geotextiles are:

GEOTEXTILE APPLICATION	MINIMUM OVERLAP REQUIREMENTS, INCHES
Drains	12
Embankment Stabilization	24
Geotextile Wall Reinforcement	24
Pavement Overlays	**
Riprap and Rock Buttresses	24
Roadbed Subgrade Stabilization	24

* Refer to 00350.44
** Use sufficient overlap to insure closure, but not more than 6 inches.

If the Engineer determines the specified overlap is not sufficient, increase the overlap to provide adequate coverage or sew the geotextile together in the field. If field sewn, the provision of 00350.20 and 00350.40(d) apply.

Field Seams:

(1) General - Obtain the Engineer's approval before field seaming and stitching. Sew field seams with polymeric thread consisting of polypropylene, polyester, or kevlar, and as resistant to deterioration as the geotextile being sewn. Use a color of thread that contrasts with the geotextile being sewn so the stitches are exposed for inspection when the geotextile is placed.

(2) Seam Type - Obtain the geotextile manufacturer's recommendation for the type of seam and stitch to be used. If the Contractor does not obtain and provide the foregoing technical information, use a "J" seam with at least 3 stitches per inch. The flat, or prayer, seam may be used for repair of damaged in-place geotextile.

Protection of Geotextile - Protect the geotextile at all times from ultraviolet (UV) rays, contamination by surface runoff, and construction activities.

Traffic or construction equipment will not be permitted directly on the geotextile except as authorized.

When placed for construction, cover the geotextile with specified cover material as soon as possible. Do not leave in uncovered condition for more than 5 days, except when used with temporary retained earth walls and asphalt overlays.

Place cover material on the geotextile in a manner that the geotextile is not torn, punctured, or shifted. Use a minimum 6 inches thick cover layer or twice the maximum aggregate size, whichever is thicker. End-dumping cover material directly on the geotextile will not be permitted.

Limit construction vehicles in size and weight so rutting in the initial layer above the geotextile is not more than 3 inches deep or 1/2 the layer thickness, whichever is lesser. Turning of vehicles on the first layer will not be permitted.

Repair of Geotextile - Repair or replace all torn, punctured, or contaminated goetextiles during construction at no cost to the Division. Repair by placing a patch of the specified geotextile over the affected area. Overlap the existing geotextile with the patch. Where geotextile seams are required to be sewn, repair any damaged sheet by sewing unless otherwise indicated on the plans or special provisions or as directed.

205.03.02A Drainage Geotextile

When used in trenches for drains, place the geotextile in the trench as shown on the plans to loosely conform to the shape of the trench with no wrinkles or folds.

205.03.02B Embankment Geotextile

Construct embankment stabilization according to details shown on the plans. Place the geotextile layers so the geotextile machine direction is transverse to the embankment centerline. Spread the geotextile so all slack and wrinkles are eliminated.

205.03.02C Riprap Geotextile

Place geotextile behind and beneath riprap, buttresses, inlays, shear keys, and erosion control applications according to the details shown. Demonstrate to the satisfaction of the Engineer that the combination of the rockfill drop height and the thickness of any aggregate cushion, when specified or required, are adequate to not puncture or damage the geotextile when placing the riprap or stone embankment material. In addition, the following limits apply:

	Maximum Drop Height, Feet	
Size of Rock Material	Onto Geotextile	Onto an Aggregate Cushion Blanket
Greater than 200 lbs.	0	3
200 lbs. or less	3	3

After placing the riprap, backfill all voids in the riprap face so the geotextile is completely covered and not visible.

205.03.02D Wall Geotextile

(a) General - Begin wall construction at the lowest portion of the excavation and place each layer horizontally as shown on the plans. Complete each layer in its entirety before the next layer is started. Seams will be allowed only at the wall face. Either overlap geotextile sheets perpendicular to the wall or sew seams parallel to the wall face. Stretch the geotextile in a perpendicular direction to the wall face to eliminate slack before backfilling.

(b) Forming the Wall - Use a temporary form system at the wall face during construction. A typical temporary form system and a sequence of wall construction required are shown in the plans. Use pegs, pins, or the manufacturer's recommended method as approved by the Engineer, in combination with the forming system, to hold the geotextile in place until the cover material is placed.

(c) Backfill for Wall Construction - Compact the backfill for the wall within the limits shown or directed. Compact each layer to 95 percent of maximum density as determined by OSHD TM 109. Maintain the water content to within +/- 3 percent of the optimum moisture content. Sheepsfoot rollers and vibratory rollers or other rollers with protrusions will not be allowed within 3 feet of the wall face. Compact this area using approved light mechanical tampers, without damaging or distorting the wall facing or reinforcing layers.

205.03.02E Subgrade Geotextile

For roadbed subgrade separation, prepare the subgrade according to Section 501.

Correct geotextile failures, as evidenced by soil pumping or roadbed distortion, by removing any covering material in the affected area and placing a geotextile patch on the exposed geotextile. The patch shall overlap the exposed geotextile a minimum of 12 inches. Cover the patch with the specified cover material and compact before proceeding.

205.03.02F Pavement Overlay Geotextile

(a) General - Place geotextile and pavement overlay in four basic steps:

- Surface preparation
- Sealant application
- Geotextile placement
- Overlay placement

As outlined according to Section 508.

205.04 MEASUREMENT AND PAYMENT (GEOTEXTILE)

Square Unit Basis (Measurements) – Each geotextile installation will be measured along the lines and grades of the installation to the nearest square yard of surface area actually covered according to the plans or as required, except for drainage and wall geotextile applications.

The number of square yards of drainage geotextile will be computed by multiplying the length of the trench where geotextile is used by the perimeter of the trench as determined from the neat lines shown, or as directed.

Geotextile walls will be measured to the nearest square foot of wall face computed by multiplying the length times the sloped height of the wall.

No separate measurement will be made for constructing laps, seams, joints, or patches unless more than the specified lap is ordered, in which case the added lap width will be measured.

Square Unit Basis (Payment) – The accepted quantities for geotextiles will be paid for at the contract price per unit of measurement for the following items:

	UNIT OF PAY ITEM	MEASUREMENT
(a)	Drainage Geotextile	Square Yard
(b)	Embankment Geotextile	Square Yard
(c)	Riprap Geotextile	Square Yard
(d)	Wall Geotextile	Square Foot

(e) Subgrade Geotextile Square Yard
(f) Pavement Overlay Geotextile Square Yard

Item (d) includes all backfilling costs and geotextile as shown on the plans.

Item (f) includes preparation work, sealant, and geotextile.

Payment will be payment in full for all equipment, tools, labor, and incidentals necessary to complete the work. No separate payment will be made for constructing laps, seams, joints, and patches unless the Engineer orders additional amounts over the minimum. For laps wider than the minimum or specified width, payment will be made for the added lap width at the contract unit prices.

If the Engineer orders geotextiles with properties more stringent than specified, price adjustment for the difference in material cost only will be allowed.

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206 LANDSCAPING AND LANDSCAPE RESTORATION

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206.01 DESCRIPTION

This Section covers the work necessary for: (A) finish grading, addition of topsoil, fertilizer, and weed control, establishment of lawns or grass areas by sod or seeding, and maintenance of lawn or grass areas, complete; (B) mulching, fertilization, and planting of ground cover, establishment of nursery stock, such as trees, shrubs, and small plants, and maintenance of ground cover and nursery stock, complete; (C) irrigation system and subsurface drainage, complete.

206.02 MATERIALS

206.02.01 Plants

Names of plants to conform to standardized names of the American Joint Committee on Horticultural Nomenclature. Names of varieties not included therein conform to names generally accepted in the nursery trade. Provide plants which are nursery-grown with habit of growth that is normal for the species, sound, healthy, vigorous, and free from insects, diseases, and injuries and equal to or exceeding measurements specified, measured before pruning with branches in normal position. Provide sizes and methods of handling according to the code of standards recommended by the AAN.

206.02.02 Seed

Provide tested grass and legume seed from blue tag stock and from the latest crop available. Deliver each variety or mixture in standard containers labeled in accordance with Oregon State laws and U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Provide with label showing the following: seed variety, percentage of purity, germination, maximum weed content, and date of test (must be within 9 months of date of delivery). Seed must be tested as set forth in the General Seed Certification Standard by the Oregon State University Certification Board. Mold or evidence of container having been wet or otherwise damaged will be cause for rejection of each lot of seed.

206.02.03 Sod

Provide grass sod from certified or approved source, strongly rooted, and free of pernicious weeds. Sod should be composed of several seed varieties excluding blue and bent grass varieties.

206.02.04 Topsoil

206.02.04A Native Topsoil

Save, store, protect, and reuse approved native topsoil taken from the top 12 inches of the excavation. Ensure that topsoil is free from grass, overburden and roots, sticks, hard clay, and any stones which will not pass a 1-inch square opening. Wherever native topsoil cannot be saved or is not satisfactory for reuse, use imported topsoil conforming to Subsection 204.02.07 IMPORTED TOPSOIL, but only with the approval of the Engineer.

206.02.05 Sand

Conform to the requirements of Subsection 205.02.12C FINE AGGREGATE.

206.02.06 Organic Material for Soil Amendment

Use a peat consisting of natural residue formed by decomposition of reeds, sedges, or mosses from freshwater site. Peat must be free from lumps, roots, stones, and capable of absorbing at least 4 times its dry weight of water. It must contain organic matter not less than 90 percent on a dry weight basis, and have a maximum moisture content at time of delivery of 65 percent by weight.

206.02.07 Lime

Provide a lime composed of ground dolomitic limestone not less than 85 percent total carbonates and magnesium, ground so that 50 percent passes 100 mesh sieve and 90 percent passes 20 mesh sieve. Coarser material may be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing 100 mesh sieve.

206.02.08 Subdrains

Use perforated PVC drain pipe, meeting the requirements of Subsection 601.02.04 PVC PIPE, unless otherwise specified, and as approved by the Engineer.

206.02.09 Irrigation and Water Systems

206.02.09A Pipe

Use copper pipe, Type K hard copper, conforming to ASTM B 88, with commercially pure wrought copper solder joint fittings. Make joints with 95-5 wire solder, ASTM B 32, grade 95 TA. The use of cored solder will not be permitted.

Use PVC pipe (SDR-PR), conforming to ASTM D 2241, and fittings of PVC with deep socket dimensions conforming to ASTM D 2466.

206.02.09B Gate Valves

Install the following gate valves: up to and including 3-inch with bronze bodies, 4-inch and larger with either bronze or iron bodies, all having bronze stems, bronze seat rings, and bronze disc faces, and conforming to ASTM B 62.

206.02.09C Pressure Reducing Valves

Use adjustable, heavy duty bronze pressure reducing valves. Must have approved stainless steel or monel strainer to permit quick cleaning or replacement without dismantling or removing the valve from the line and with integral or independent union.

206.02.09D Control Valves

Provide manual control valves of brass or bronze for underground installation. Valves shall have cross or slot type handle for operation with a standard key, a removable bonnet and stem assembly, an adjustable packing gland, a rising stem to assure full opening of the valve, renewable disc-type washer seat, and integral or independent union.

Use electrically operated control valves of bronze, brass, or stainless steel. These shall be of the normally closed type, having an open or close time greater than 4 seconds, and capable of manual control during power failure. Provide with a motor assembly or operating parts which are removable without disturbing the valve body. Must be all waterproof for underground burial, and with integral or independent union for supply line connection.

206.02.09E Quick-Coupling Valves

Supply one-piece or two-piece body type, locking cap, having body of approved heavy duty brass or bronze, watertight before and after the coupler is inserted, and designed so that the valve seat is closed before the coupler is removed. Provide valve couplers, keys, and hose swivels of compatible design to quick-coupling valves.

206.02.09F Risers

Connect sprinkler heads and quick-coupling valves to galvanized steel pipe water supply lines with galvanized steel pipe risers. Heads and valves connected to plastic pipe water supply lines shall, in addition, be provided with an approved swing joint.

206.02.09G Vacuum Breakers

Install bronze-bodied machined valve seat, with working pressure rating to 150 PSI. Provide pressure type vacuum breaker as an assembly consisting of vacuum breaker, 2 gate valves, check valve union, and nipples, as approved.

206.02.09H Backflow Preventers

Use either reduced pressure or double check valve assemblies, as indicated in Contract Documents, of a type and size approved by the Owner.

206.02.10 Fertilizer

Use fertilizer conforming to the recommended content as provided for in 206.03.02 SOIL TEST. Furnish fertilizer in moisture-proof bags with weight and the manufacturer's certified analysis of the contents showing the percentage for each ingredient. Furnish fertilizer in a dry condition free from lumps and caking, in a uniform granular or palletized form, of standard commercial grade conforming to all State and Federal regulations and to the standards of the Association of Official Agricultural Chemists. Fertilizer may be furnished in bulk form if an approved transfer hopper is provided.

206.02.11 Mulch and Ground Covers

Use one or more of the following types of mulch:

1. Organic mulch of clean ground Douglas fir or hemlock bark graded so that 50 percent consists of particles larger than 1/4-inch, but not exceeding 1-inch, and 20 percent will pass a No. 10 sieve.

2. Stone mulch of screened washed bank gravel with rounded pebbles. Submit sample for approval of color and size.
3. Fiber-glass mulch of approved commercial grade fiber-glass yarn mat.

4. Straw mulch of threshed straw of oats, wheat, or rye, free from seed of noxious weeds or clean salt hay.

5. On steep slopes use approved mesh to reinforce mulch or plantings such as fiber mulch of heavy, twisted jute mesh or other material as approved, with openings between strands approximately 1-inch square.

6. Spray mulch of a verdyol complex, with nontoxic, 100 percent organic water soluble powder binding agent with silva fiber used in hydraulic seeding operations.

206.02.12 Tie Downs

Use one or more of the following materials as the need arises:

1. Eye-bolt masonry anchors of galvanized steel, with approved lead shield or flush shell for setting into masonry joint or concrete.

2. Wood stakes, 2-inch by 2-inch by 96-inch, clear straight cedar, or approved.

3. Wire of 12 gauge, pliable galvanized steel, for guys, or for fastening trees to stakes.

4. Hose for guy wire encasement will be of 2-ply reinforced rubber garden hose, having a minimum 5/8-inch diameter threaded openings fitted with screw eyes.

5. Turnbuckles will be zinc-coated, with a 6 1/2-inch lengthwise opening, and 3/8-inch diameter threaded openings fitted with screw eyes.

206.02.13 Soil Sterilant

Soil sterilant shall be as approved by the Engineer for the purpose specified and shall be

applied conforming to manufacturer's recommendations.

206.03 CONSTRUCTION

206.03.01 General

Conform to the manufacturer's and supplier's recommendations and instructions and to accepted practices in the industry.

206.03.02 Soil Test

If directed by the Engineer, have a soil test performed before the project schedule is submitted. The test may be performed by any Oregon State University County Extension Agent or by any other approved soils testing laboratory. The soils analysis shall provide a chemical analysis of the soil and recommendations for soil improvement for the vegetation to be grown. The recommendations shall be used to select the particular fertilizer and soil improvement materials to be used prior to planting.

206.03.03 Lawns and Grass

206.03.03A Project Schedule

Within 20 calendar days of the date specified for commencement of work, submit for approval a time schedule indicating dates for beginning and completion of the following operations:

1. Delivery of Materials
2. Preparation of Seedbed
3. Planting Grass
4. Maintenance

206.03.03B Delivery, Handling, and Storage of Sod

Deliver sod immediately on lifting and after lawn bed is prepared for planting. Protect sod from drying by covering during delivery to protect from sun and wind. Store materials only in designated areas.

If sod is not laid within 2 days of delivery, spread out flat with grass side up in cool place and keep moist. Rolled or stacked sod that becomes yellow will not be accepted.

206.03.03C Preparation of Subgrade

After rough grading is completed and before topsoil is spread, apply lime and/or super phosphate as determined by soil analysis, and mix to a depth of 4 to 6 inches. Conform to manufacturer's recommendations for applying lime and super phosphate simultaneously, and schedule application or applications accordingly.

206.03.03D Subsurface Drainage

Lay drainage pipe on firm bed of gravel with minimum fall of 0.5 percent and located as shown on the plans. Place pipe at a minimum depth of 24 inches and not any deeper than required to produce minimum fall. Cover backfill with fiberglass mat to prevent infiltrations

of soil. Backfill trenches with gravel to within 4 inches of subgrade.

Place other drain materials in conformance with the applicable requirements in DIVISION 5 - SEWERS. Complete backfilling of trenches with a 4-inch layer of coarse sand and tamp for compaction, as approved.

206.03.03E Topsoil and Finish Grading

Spread topsoil and soil conditioner over the prepared rough grade using a rubber-tired tractor with grader blade or equivalent, weighing a maximum of 3 1/2 tons. Imported topsoil must be incorporated with at least a 2-inch layer of subsoil. Thoroughly mix the applied materials to a depth of 8 inches using a disc or cultivator over the entire area in two directions at right angles. Rake topsoil areas to a uniform grade so that all areas drain, as shown on the plans or as approved. Remove all trash and any stones exceeding 2 inches in diameter from the area to a depth of 2 inches prior to preparation and planting grass.

206.03.03F Soil Sterilant

Apply specified soil sterilant at the rate recommended and by the method approved by the manufacturer or as specified.

206.03.03G Seeding

Plant grass seed only at times when local weather and other conditions are favorable to the preparation of the soil and to the germination and growth of grass seed. Sow grassed areas evenly with a mechanical spreader at the recommended rate and method approved by Oregon Department of Agriculture Extension Service. Method of seeding may be varied, as approved, however, the responsibility to establish a smooth, uniformly grassed area will not be waived. Hydroseeding will be permitted, unless otherwise specified.

206.03.03H Sodding

Before sod is laid, correct soft spots and irregularities in grade of the prepared bed, as approved. Lay sod, and tamp or roll so that no voids occur. Water sod thoroughly. Complete sod surface true to finished grade, even and firm. On slopes steeper than 1 to 2, fasten sod with wooden pins 6 inches long driven through the sod into the soil, flush with the top of the sod at approved intervals.

206.03.03I Mulching and Protection of Slopes

Mulch all areas with a slope from 5 percent to 20 percent by spreading a uniform light cover of straw mulch over the seeded area at a rate of 1 1/2 tons per acre.

In areas with a slope steeper than 20 percent, and up to 25 percent, install erosion control netting. In non-turf areas, cover netting with fir bark mulch.

Mulch all areas with a slope steeper than 25 percent with spray mulch applied at a rate of 15 gallons per 1,000 square feet after wetting the ground with water penetrating at least 1 inch deep.

Protect new seeded area from pedestrian traffic. Unless otherwise approved, erect a

fence of 2-inch by 2-inch posts 4 feet high spaced 10 feet on center and strung with jute, hemp, or a single strand of No. 12 gauge wire marked with cloth strips at 3-foot intervals between posts.

206.03.03J Maintenance

Begin maintenance immediately after each portion of lawn is planted and continue for 8 weeks after all lawn planting is completed.

Water to keep surface soil moist. Repair washed out areas by filling with topsoil, fertilizing, and seeding. Replace mulch on banks when washed or blown away. Repair fencing as needed. Mow to 2 inches after grass reaches 3 inches in height, and mow frequently enough to keep grass from exceeding 2 1/2 inches. Weed by local spot application of selective herbicide only after first planting season when grass is established.

206.03.03K Lawn Guarantee

If, at the end of the 8-week lawn maintenance period, a satisfactory stand of grass has not been produced, immediately renovate and reseed the unsatisfactory portions of lawn, or when approved, reseed at the beginning of the next planting season. If a satisfactory stand of grass develops by June 1st of the following year, the lawn will be accepted. If the lawn is not accepted, a complete replanting will be required during the ensuing planting season.

A satisfactory stand is defined as a lawn or section of lawn that has:

1. No bare spots larger than 3 square feet.

2. Not more than 10 percent of the total area with bare spots larger than 1 square foot.

3. Not more than 15 percent of the total area with bare spots larger than 6 inches square.

206.03.03L Inspection for Acceptance

Submit a written notice eight weeks after the start of maintenance on the last section of completed lawn. Within 15 days of such written notice the Engineer will make an inspection of the lawn to determine if a satisfactory stand of grass has been produced.

206.03.04 Trees, Shrubs and Ground Cover

206.03.04A Delivery, Preparation and Storage

Dig plants designated as Balled and Burlapped in the Contract Documents with firm, natural balls of earth of diameter and depth sufficient to encompass the fibrous and feeding root system required for full recovery of the plant. Firmly wrap balls with burlap and bind with twine, cord, or wire mesh. Where necessary to prevent breaking or cracking of the ball during the process of planting, or where the tree exceeds 4 inches in diameter, secure the ball to a platform. Meet or exceed AAN Standards, current edition.

Dig bare root plants during dormant period to remove earth with the least possible injury to the fibrous root system. Cover the roots with thick coating of mud immediately after

digging by puddling or wrapping in wet straw, moss, or other suitable packing material for protection until delivery.

Furnish container grown plants with self-established root systems sufficient to hold earth together after removal from the container but not root-bound. Plants shall have grown for at least 3 months in the container with inside diameter specified. Meet or exceed AAN Standards, current edition.

If plants are not in the dormant state, spray with anti-desiccant to cover foliage as recommended by manufacturer, prior to digging the plants. During shipment, protect the plants with tarpaulin or other approved covering to prevent excessive drying from the sun and wind.

Cover balls of balled and burlapped plants, and containers of container grown plants, which cannot be planted immediately upon delivery, with moist mulch to protect from drying. Plant or heel-in bare root plants immediately upon delivery. Water plants as necessary to prevent drying until planted. Do pruning only at the time of planting.

Open and separate all bundles of heeled-in bare root plants before the roots are covered. Avoid leaving air pockets among the roots.

206.03.04B Soil Conditioning

After the specified chemical analysis report for topsoil is received, prepare the topsoil mixture for plant pits and beds by thoroughly mixing the approved topsoil with soil conditioner materials, fertilizer, and lime. Thoroughly mix with rotary mixer or other approved method in the following proportions:

	Required Mixture		Parts by Volume		
Topsoil Classification by Clay Content	Top Soil	Sand	Peat	Fertilizer*	Lime
Clay 5 - 10 Percent	4	0	1 LB/CY	(½) LB/CY	(1)
Clay 10 - 15 Percent	2	2	1 LB/CY	(½) LB/CY	(1)
Clay 15 - 25 Percent	2	4	1½ LB/CY	(½) LB/CY	(1)

*Adjust in accordance with Soil Test chemical analysis report.

Store and protect topsoil mixture and other materials at designated area of the site. Protect topsoil mixture from excessive leaching by covering with tarpaulin if stored for more than 6 weeks.

206.03.04C Planting Procedures

Within 20 calendar days after receiving the notice to proceed, submit a time schedule for

approval indicating dates for commencement and completion of the following operations:

1. Tagging of plants in the nurseries
2. Survey and staking of plant locations
3. Delivery of topsoil and other materials
4. Digging and preparation of plant pits and beds
5. Delivery of trees and plants to the site
6. Planting of trees and other plants
7. Fertilization and application of pre-emergent herbicide
8. Guying, staking and mulching
9. Completion of work for start of guarantee period

At least 20 days before start of the guarantee period, submit a schedule of proposed maintenance operations indicating the number of man-hours contemplated for each operation by season during autumn, winter, spring and summer.

Locate new planting where shown on plans, except make approved adjustments where obstructions below ground are encountered or where changes have been made in the construction. Place no planting, except ground cover, closer than 18 inches to pavements and structures. Dig plant pits and have soil mixture for planting ready before plants are delivered. Excavate circular pits with vertical sides a minimum of two feet greater than the diameter of the ball. For trees, shrubs, and vines excavate pits to depth sufficient to accommodate ball or roots when plant is set to finished grade. Place 3 inches of compacted soil mixture in the bottom of pit. Set plants upright and face as approved to give the best appearance or relationship to adjacent structures. Remove wire, burlap, and surplus binding from top and sides of balls. Spread roots in normal position. Cut all broken or frayed roots off cleanly. Place prepared soil mixture and compact carefully to avoid injury to roots and to fill voids. When hole is nearly filled, add water as necessary and allow to soak away. Fill hole to finished grade. When directed by Engineer, form shallow saucer around plant by placing ridge of topsoil around edge of pit two feet greater than diameter of ball. After ground settles, fill with additional soil to level of finished grade.

Plant trees before surrounding smaller plants and covers are placed. Position trees as shown on plans or, where spacing dimensions or locations are not clear, as approved.

Plant shrubs on centers as shown on plans with spacing adjusted if required to evenly fill bed using specified quantity of plants.

Plant hedges on centers as shown on plans. Excavate trenches a maximum of 4 inches deeper and 12 inches wider than spread of roots or diameter of balls. Make adjustments to spacing if necessary to fill trench evenly with the quantity of plants shown on plans.

Plant ground covers in beds having minimum 8 inch of prepared soil mixture. Treat ground cover beds with soil fumigant, after preparation for planting, but before any plants are installed within bed area, to destroy weed seeds. Apply according to Manufacturer's directions, delaying planting for the recommended minimum period to allow dissipation of herbicide. Space plants as shown on plans. Mulch and water immediately after planting.

Plant bulbs in ground cover beds to recommended depths for each bulb type as shown on plans.

Provide trees and planting beds with 3 inch layer of fir or hemlock bark mulch within 2

days after planting and keep at this depth throughout maintenance period. Mulch to entirely cover area of saucer around each tree.

Use four guys equally spaced as shown on plans for all trees greater than 4 inches in diameter.

Use three guys equally spaced as shown on plans for all trees 4 inches in diameter or less.

Where shown on plans, wrap trunks of trees spirally from ground line to height of second branches. Make all wrappings neat and snug and hold material in place by raffia cord at top and bottom.

206.03.04D Pruning and Repair

At completion of planting work, prune and repair injuries at all plants. Limit amount of pruning to minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of planting operations. Do not change natural habit or shape of plant. Make cuts to branch collar, leaving no stubs. On all cuts over 3/4 inch in diameter and bruises or scars on bark, trace the injured cambium back to living tissue and remove. Smooth and shape wounds so as not to retain water. Coat with approved tree wound paint.

206.03.04E Plant Guarantee

Guarantee all plants for a minimum of 1 year to be alive and in vigorous growing condition at the end of guarantee period. Guarantee period shall extend 1 year from date of Acceptance of Work as defined in Subsection 101.01 DEFINITIONS. Remove unsatisfactory plants and replace with plants of the same kind, quality and size as originally provided as specified. Guarantee all plant replacements to be alive and in vigorous growing condition 1 year after replacement. Bear all costs of replacement except for replacements resulting from removal, loss or damage due to occupancy of project in any part, vandalism or acts, of neglect on part of others. Replace plants that die immediately, unless during a season unfavorable for planting. When season is unfavorable, plant during the first month of the next favorable planting season.

206.02.04F Maintenance

Begin maintenance immediately after each plant is installed and continue to maintain until the end of the guarantee period.

Perform the following operations: (1) Watering as often as required to maintain capillary water within 2 inches of the soil surface around plants, (2) weeding of plant beds, planting saucers and plantpockets to keep free of weeds, using approved selective herbicide according to the Manufacturer's directions for use, and/or weeding by hand methods, (3) mulching monthly to replenish mulch and keep at required 2 inch minimum depth, (4) tightening and repairing guys to keep trees erect and supported without damage to bark, (5) resetting plants to proper grades or upright position, (6) restoration of planting saucers, (7) seasonal spraying to control disease or insect pests that may impair plant vigor.

Replace plants required by the plant guarantee on a regular monthly basis, except during the months of December, January and February.

206.03.05 Irrigation Systems

206.03.05A General

Install components of the irrigation system as shown and as recommended by the equipment manufacturers. All sprinkler runouts shall be evenly graded to the drain points shown on plans. Piping beneath paved areas shall have a minimum cover of 30 inches. Construct irrigation system in areas to receive topsoil after topsoil is spread, compacted, and rough graded. Copper tubing may be bedded using excavated material. Bed PVC pipe in sand, as shown on plans and backfill to a minimum of 3 inches above the pipe with sand. Determine the final number and location of sprinkler heads after grading is complete, such that complete coverage of all sprinkled areas is provided. Flush out system thoroughly and pressure test before installing sprinkler heads. Adjust flow on each head for proper coverage.

Repair and replace irrigation parts and winterize as necessary.

206.03.05B Copper Tubing

Cut tubing square and remove burrs. Clean both inside of fittings and outside of tubings with steel wool and muriatic acid before sweating. Take care to prevent annealing of fittings and hard-drawn tubing when making connections. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted.

206.03.05C PVC Pipe

Cut, make up, and install PVC pipe in accordance with the manufacturer's recommendations, as approved. Lay PVC pipe using the practice of snaking from one side of the trench to the other, 1 cycle per 40 feet or less. Use strap wrenches for tightening threaded plastic joints. Take care not to over-tighten fittings. Do not lay PVC pipe when the temperature is below 40` F. Sprinklers and valves shall be installed in accordance with the manufacturer's recommendations, as approved.

206.04 MEASUREMENT AND PAYMENT

206.04.01 Incidental Basis

When not specified or shown as a separate pay item in the proposal, payment for all landscape work is considered to be incidental to the construction.

206.04.02 Unit Price Basis

When so listed in the Bid, payment for the landscaping items will be made on a unit price basis for the number of items actually placed and accepted.

206.04.03 Lump Sum Basis

When so listed in the Bid, measurement and payment will be made at the contract lump sum pay item for Landscaping, complete.

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207 RESTORATION AND CLEANUP

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207.01 DESCRIPTION

This section covers the work necessary to restore and clean up the site, and remove all construction equipment, refuse, and unused materials of any kind resulting from project activities.

207.02 MATERIALS

Provide all materials required to accomplish the work as specified.

207.03 CONSTRUCTION

207.03.01 Surface Dressing

Slopes, sidewalk areas, planting areas, and roadway shall be smoothed and dressed to the required cross section and grade by means of a grading machine insofar as it is possible to do without damaging the work or existing improvements, trees, and shrubs. Unless specified otherwise, the maximum slope shall be 2 to 1 in cut and fill. Supplement machine dressing by hand work as necessary.

Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. Grade all areas true to line and grade as shown. Excavated areas adjoining new walkways and curbs shall be backfilled with top soil. Where the existing ground is below the sidewalk and curb, fill and dress the area to the walk. Wherever fill material is required in the planting area, make finish surface high enough to allow for final settlement. Surface improvements other than topsoil which are adjacent to new walkways or curbs, such as asphalt paving or brickwork, shall be replaced with like materials.

207.03.02 Removal of Materials

Remove and dispose of all excavated or construction materials, equipment, and trash of all kinds resulting from the work. Where brush and trees have been disturbed, remove and dispose of or restore same as directed by the Engineer at the Contractor's expense.

207.03.03 Cleaning Drains

Clean all drainage facilities such as inlets, catch basins, culverts, and open ditches of all excess material or debris which is the result of the work.

207.03.04 Cleaning Paved Surfaces and Appurtenances

Clean all pavement surfaces, whether new or existing within the limits of the project. All haul routes will be kept free of dust, dirt, gravel, and debris at all times. Clean existing improvements such as curbs, gutters, walls, sidewalks, castings for manholes, monuments, water gates, lamp poles, vaults, signs, and other similar installations.

Flush the street with a pressure type flusher and hand broom or flush all sidewalks.

207.03.05 Restoring Planted Areas

Hand-rake and drag all former grasses and/or planted areas leaving disturbed areas free from rocks, gravel, clay, or any other foreign material and ready, in all respects, for seeding. The finished surface shall conform to the original surface, be free-draining and free from holes, rough spots, or other surface features detrimental to a seeded area.

207.03.06 Restoring Mobilization, Borrow and Disposal Areas

Clean all properties which were disturbed during construction of the project. Dispose of all uprooted stumps, felled trees, brush, excess excavation, rock, discarded materials, rubbish, and debris. Remove all plant, equipment, tools, and supplies and restore the property occupied to a neat, clean, and orderly condition, in equal or better condition to that existing before move in.

207.03.07 Removal of Signs

Do not remove warning, regulatory, guide, or project signs prior to formal acceptance, except as directed.

207.03.08 Restoring Curbs, Sidewalks and Driveways

Repair or replace all curbs, sidewalks, driveways, and other structures damaged during construction of the work. Construct curbs, sidewalks, driveways, and other structures in conformance with the applicable requirements in DIVISION FIVE - STREET TECHNICAL REQUIREMENTS.

207.04 MEASURE AND PAYMENT

207.04.01 Lump Sum Basis

When restoration and cleanup is listed as a separate pay item on the Proposal, it will be paid for on a Lump Sum Basis.

207.04.02 Incidental Basis

When not listed in the Proposal for separate payment, all restoration and cleanup will be considered incidental work for which no separate payment will be made.

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208 BORING AND JACKING

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208.01 DESCRIPTION

208.01.01 Boring

Boring shall include all methods by which a pipe or conduit is pushed or pulled into place and by which the excavation method precludes the stationing of a worker within the pipe or conduit without stopping or removing the excavation equipment.

208.01.02 Jacking

Jacking shall include all methods by which a pipe or conduit is pushed or pulled into place and one or more workers inside the conduit excavate and assist in keeping the conduit on a straight and true grade and alignment.

208.01.03 Permits

Permitter shall designate the owner of railroad tracks or other facilities with prior rights, under which a pipe or conduit must be bored or jacked.

All necessary permits for the undercrossing will be obtained by the City.

The operation across the Permitter's right-of-way must conform to the requirements of the Permitter as outlined in a pipeline crossing agreement made between the Permitter and the City. The Contractor shall conform with all requirements of the pipeline crossing agreement. Before work is commenced, the Contractor shall be solely responsible for obtaining and delivering to the Permitter a public liability and property damage insurance policy in the amount required in the pipeline crossing agreement. The insurance company writing the policy shall be authorized to do business in the State of Oregon and shall be satisfactory to the Permitter. The insurance policy or policies shall be delivered to and remain in the possession of the Permitter. If any special agreement is required between the Contractor and the Permitter, it shall be completed and signed before the Contractor enters upon or commences work on the Permitter's property.

208.02 MATERIALS

208.02.01 Pipe Bedding and Pipe Zone Material

Conform to the requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL.

208.02.02 Pipe

Conform to Section 301 PIPE AND FITTINGS (SANITARY SEWERS) or Section 402 WATERWORKS MATERIALS for the strength, class, and type as shown or specified.

208.02.03 Casing

Provide casing of size to permit proper construction to the required lines and grades. Casing shall be the type shown in the table below.

Use minimum gauge or wall thickness corresponding to the size of casing selected from the following; however, be responsible for selecting the gauge consistent with the operations and the specified requirements of the perimitter.

Diameter Inches	Smooth Steel Pipe Min. Thickness
12 & Under	3/16 ASTM A-53
15 - 24	1/4 ASTM A-53
30 - 36	5/16 AWWA C-201
48 - 78	Not Allowable

Equip jacked casings with nipples at the springline and crown at 10-foot centers when pressure grouting is specified.

208.02.04 Grout

Grout for filling the annular space between the carrier pipe and casing pipe shall be a mixture of Portland Cement, sand, and pea gravel proportioned to allow complete filling of the annular space. The mixture shall have a creamy consistency which enables it to be pumped with a concrete pump.

Grout for pressure grouting outside jacked carrier or casing pipe shall be a mixture of Portland Cement (Type 1-P) and water proportioned to allow complete filling of all voids. The maximum allowable slump shall be less than 5 inches.

208.02.05 Stainless Steel Bands

One-half inch wide by 0.020-inch thick steel bands, or equal.

208.02.06 Supports and Skids

Lumber shall be No. 2 West Coast Douglas fir graded in conformance with WWPA Current Grading Rules for Western Lumber. Material shall be pressure treated with Creosote or pentachlorophenol in mineral spirits in accordance with AWPA C14, C8, C9, and C2 as applicable. Minimum retention shall be as designated for contact with ground. Method of treatment shall be in accordance with the applicable portion of the AWPA standards. Insofar as practicable, all timbers shall be cut to size before the material is given the preservative treatment.

208.03 CONSTRUCTION

208.03.01 General

Conform to all Federal, State and local laws and regulations pertaining to tunneling and specifically to the standards set forth in the Oregon Safety Code for Places of Employment, Chapter 24, Safety Code for Mining, Tunneling and Quarrying, published by the Oregon Industrial Accident Commission, latest revision.

Before the start of the work, submit satisfactory evidence to the Engineer that all insurance coverage requirements called for by the Permitter have been complied with. If required, proposed construction methods and materials shall be submitted to the Permitter before the start of construction. Written authorization to proceed from the Permitter shall be submitted to the Engineer before the start of construction.

Prior to starting construction, all required labor, materials, and equipment shall be on the site. Notify all Permitters at least 48 hours in advance of working within their right-of-way unless otherwise specified in the permit.

208.03.02 Excavation

Excavation shall be unclassified and shall include whatever materials are encountered to the depths as shown or as required. The boring Contractor or Subcontractor will visit the site and make an estimate of the kind and extent of various materials which may be encountered in the

excavation.

208.03.03 Alternate of Jacking or Boring

Jacking or boring may be allowed in lieu of the open trench method. However, written authorization by the Engineer must first be obtained. The Engineer retains the right to reject either the jacking or boring method without rejecting the other. Authorization by the Engineer shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the requirements set forth herein.

208.03.04 Jacking and Boring

Equip the leading section of pipe or conduit with a jacking head securely anchored thereto to prevent any wobble or alignment variation during the jacking or boring operation. For jacking, all excavation shall be carried out entirely within the jacking head, and no excavation in advance thereof shall be permitted. For jacking, every effort shall be made to avoid any loss of earth outside the jacking head. Remove excavated material from the pipe or conduit as excavation progresses, and do not allow such material to accumulate within the pipe or conduit.

Jack or bore all pipes or conduits to true line and grade. Should any deviation from true line and grade be considered excessive, in the judgment of the Engineer, the Contractor shall correct at no expense to the Owner.

Should appreciable loss of ground occur during the jacking or boring operations, backpack all voids promptly. Fill all remaining voids upon completion of the operations; such filling or backpacking shall be with grout.

The design of all sewer pipe or conduit is based upon the superimposed loads and not upon the loads resulting from the jacking or boring operations. The Contractor shall be responsible for any increase in pipe strength necessary to withstand jacking or boring loads and grouting.

208.03.05 Concrete Pipe and Box Section

Protect the driving ends of concrete pipe or conduit against spalling and other damage. Intermediate joints shall be similarly protected by the installation of sufficient bearing shims to properly distribute the bearing stresses. Remove any section of pipe or conduit showing signs of failure and replace with a new section.

208.03.06 Smooth Steel Casing

Join sections of smooth steel casing to be jacked or bored by welding the joints with a continuous weld for full circumference or by other approved means. Provide joints which are capable of resisting the jacking and boring forces without failure.

Brace pipe or conduit installed in a casing to prevent shifting and flotation. Fill the void between the casing and the pipe or conduit with grout, or other material as specified or approved.

If not shown on Plans or specified, the casing diameter shall be the option of the Contractor. Provide casing of such strength as to withstand the jacking or boring loads and of such diameter to allow filling the void between the pipe or conduit and casing with the approved

material.

208.03.07 Grouting Voids Outside Casing or Carrier Pipe

After the casing, or carrier pipe where no casing is specified, has been jacked or bored into position, pressure grout to fill all voids outside the casing through the grout holes provided. Start grouting at the spring line hole at one end and pump grout until grout appears in the grout hole at the crown, then start grouting through the opposite spring line hole until grout appears at the hole in the crown. Next grout through the hole at the crown until grout appears in the next set of holes along the pipe. Plug the holes at the starting point and move to the next set of holes and repeat grouting sequence until full length of jacked pipe has been grouted. Grouting once commenced at any one point shall be completed without stopping.

Nipples installed in grout holes must be removed and the holes grouted flush with the pipe wall or nipples should be cut off flush with pipe wall and grouted over or use flush mount pipe nipples and plugs.

208.03.08 Cased Pipe

Provide strapped timber cradle under barrel of pipe, join pipe, and slide into casing. Pipe barrel shall bear continuously on cradles. Pipe, installation shall conform to applicable requirements in Section 301 PIPE AND FITTINGS (SANITARY SEWERS) or Section 402 WATERWORKS MATERIALS, including hydrostatic or air testing and line and grade.

208.03.09 Filling Void Between Carrier Pipe and Casing

Completely fill the annular space between the casing and the carrier pipe with dry sand or grout (See Subsection 205.02.04B) or as specified. Fill the voids by continuously blowing sand or pumping grout from one end of casing pipe until material appears at the other open end. When grouting, use low pressure grouting equipment. The grouting pressures shall not be greater than the design loads of the carrier pipe. The Contractor shall, at his sole expense, remove and replace any pipe sections which fail during the filling process.

208.03.10 Railroad Crossings

The right is reserved by the Owner to require jacking or boring under any or all crossings.

Should open trench construction be required by the Owner at a railroad crossing, the railroad will take up and relay the tracks at no expense to the Contractor. Submit a schedule of operations to the railroad company and to the Owner 72 hours before trenching within 20 feet of the railroad right-of-way. Construct the pipe crossing and compact backfill through the track location within 72 hours after the tracks have been removed by the railroad unless otherwise specified.

208.03.11 Contractor's Responsibility

The Contractor shall be fully responsible for settlement or deterioration of the finished crossing until a period of two years after final acceptance by the Owner.

208.04 MEASUREMENT AND PAYMENT

208.04.01 Boring and Jacking

Measurement and payment for bored and jacked pipe or conduit will be made on a linear foot basis, complete in-place. Payment will include but is not limited to all excavation, shafts, portals, jacking pits, backfill, lubricant, grouting voids outside of casing, filling the annular space between the pipe and the casing, pipe, casing and all appurtenances.

Where casing is not required but is used at the option of the Contractor, the casing and the backfill between the pipe or conduit and the casing shall be included in the pay item for Boring or Jacking as applicable, and no separate payment for pipe will be made.

Measurement for jacking and boring will be made on a linear foot basis along the centerline of the pipe or conduit between the limits shown. Jacking and boring extensions beyond the limits shown shall be considered to be for the Contractor's convenience, unless ordered in writing, and measurement and payment for said extension shall be made as if the open trench method of construction had been used.

Final payment for each crossing will be made after the Contractor furnishes a satisfactory release from the Permitter stating that all claims for labor and materials have been satisfied and that the Contractor's work across the Permitter's right-of-way has been completed to the satisfaction of the Permitter.

208.04.02 Jacking or Boring In Lieu of Open Trench

Where jacking or boring of a conduit is authorized in lieu of open trench construction, measurement and payment will be made as though the open trench method had been used and will include all the pay items that would have been applicable if the open trench construction method had been used.

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209 RESURFACING

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209.01 DESCRIPTION

This section covers the work necessary to replace all pavement, pavement base, curbs, sidewalks, rock surfacing and other surface features damaged either directly or indirectly by the operations incidental to the construction of sewers, storm drains, water distribution systems, and conduits.

209.02 MATERIALS

209.02.01 Asphalt Concrete

Use hot mix asphalt concrete Class C mix conforming to the requirements for hot mix asphalt concrete in Section 505 ASPHALT CONCRETE PAVEMENT and Section 205 MATERIALS - TYPES AND USE.

209.02.02 Vacant

209.02.03 Vacant

209.02.04 Vacant

209.02.05 Pavement Base

Use pavement base material for resurfacing trenches which conform to Section 503 AGGREGATE BASES.

209.02.06 Forms

All forms shall conform to requirements for forms in DIVISION 7 - CONCRETE STRUCTURES.

209.02.07 Rock Surfacing

Rock surfacing shall be 1-1/2-inch or 1-inch minus crushed aggregate as specified in Section 204.02.06B.

209.02.08 Subgrade

Subgrade material shall conform to the requirements for subgrade in Section 501 SUBGRADE.

209.02.09 Joint Materials

209.02.09A Preformed Expansion Joint Fillers for Concrete

Preformed expansion joint fillers for concrete shall conform to the requirements of AASHTO M 153 or AASHTO M 213 except those furnished under AASHTO M 213 shall be tested in conformance to ASTM D 1751. Fillers conforming to AASHTO M 213, except the binder, if other than bituminous material, may be used provided they otherwise meet this specification and they have been demonstrated to be rot and vermin proof for a period of at least 5 years. Unless otherwise specified or called for by the plans, the kind furnished may be one or another of the above specified as the Contractor may elect.

209.02.09B Preformed Elastomeric Joint Seals

Preformed elastomeric joint seals shall conform to the requirements of AASHTO M 220.

209.02.09C Poured Filler

Poured filler for concrete joints shall conform to the requirements of AASHTO M 173 (ASTM D 1190).

209.02.09D Rubber Gaskets for Concrete Pipe and Precast Section Joints

Rubber gaskets for use in concrete pipe and precast manhole section joints shall conform to the requirements of AASHTO M 198 except that rubber gaskets for use in concrete siphon pipe joints shall conform to the composition and property requirements set forth in ASTM C 361.

209.02.09E Joint Mortar for Concrete Pipe Joints and Precast Manhole Section Joints

Joint mortar shall consist of one part Portland cement and two parts approved sand with water as necessary to obtain the required consistency. Mortar shall be used within 30 minutes after its preparation unless conditions during use necessitate a shorter time.

209.02.09F Plastic Compound for Precast Manhole Section Joints

Compound for use in precast manhole section joints shall be a putty-like, preformed homogeneous blend of hydrocarbon resins and rubber or plasticizing materials with not more than 50% by weight of inert mineral filler. The compound shall be specifically manufactured for the intended use and shall be pliable at temperatures between 32°F and 135°F. A specimen at 77°F and 1/2" square in cross section shall stretch at least 1-1/2 inches before rupture when tested with the apparatus described in ASTM D 113. It shall adhere firmly and cohesively to the precast manhole sections when the compound-sealed joint is flexed to its maximum extent. The compound shall be accompanied by and used with such primer solution as the manufacturer of the compound may recommend. Compound conforming to Federal Specification SS-S-00210 (GSA-FSS) is representative of an acceptable material.

209.02.09G Water Stop

Water stop shall be either plastic or rubber as the Contractor may elect conforming to the following:

(a) Plastic - Polyvinylchloride water stop shall be manufactured to the dimensions called for on the plans from virgin polyvinylchloride (P.V.C.) compound. No reclaimed P.V.C. will be allowed. The water stop shall have the following properties:

ASTM Test Method		Specification
Tensile, PSI	D 412	1800
Elongation %	D 412	350
100% Modulus, PSI	D 412	760
Low Brittle Temperature	D 746	50°F
Cold Bend Test*		No Failures

*Samples maintained at -70°F for two hours, then bent quickly around a 1/4" mandrel to 180°.

The supplier shall furnish test samples of the material from which his water stop is to be manufactured. Samples shall be in sheet form having a uniform thickness of from 1/16 to 1/8 inch and having a total area of not less than 2 sq. ft. Each sample shall be comprised of pieces not smaller than 6 in. x 6 in.

(b) Rubber - Rubber water stop shall be manufactured to the dimensions shown on the plans in such a manner that the finished product shall have an integral cross section which will be dense, homogeneous, and free from porosity and other imperfections. The water stop shall have the following properties:

Hardness - The shore A Durometer hardness shall be 60 to 70 when tested in accordance

with ASTM D 2240.

Elongation - Minimum of 450%.

Tensile strength - Minimum of 3000 pounds per square inch.

Water absorption - Maximum of 55% by weight after immersion in water for two days at 158°F.

Tensile strength after aging - The test specimen, after accelerated aging of 7 days at 158°F, shall retain not less than 80% of the original tensile strength. The tensile strength of the test specimen, after accelerated aging of 48 hours in oxygen at 158`F and tensile stress of 300 pounds per square inch, shall be not less than 80% of the original tensile strength.

Compression set - After 22 hours at 158°F shall be not more than 30% when tested in accordance with ASTM D 395, method B.

Specific gravity - 1.17 ± 0.03.

Defects - Minor surface defects such as surface peel covering less than one square inch, surface cavities or bumps less than one-quarter inch in longest lateral dimensions and less than one-sixteenth inch deep will be acceptable.

209.03 CONSTRUCTION

209.03.01 Street Maintenance

Maintain all trenches as specified under Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL.

209.03.02 Temporary Cold Mix Asphalt

All excavations on hard surfaces shall be paved with a temporary cold mix asphalt patch at the end of each workday.

Place and compact temporary cold mix asphalt to a minimum depth of one inch over the backfilled and compacted trench areas as specified under Section 204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL. Spread with a mechanical spreading machine, or place by hand methods. Distribute into place by means of shovel or suitable forks and spread with rakes in a loose layer of uniform density.

After spreading, the mixture shall be thoroughly and uniformly compacted with a power-driven roller capable of providing compression of 200 to 300 pounds per linear inch as soon as raking is complete. Compact areas inaccessible to the roller by tamping. After compaction, the temporary cold mix asphalt shall have the minimum thickness specified and shall match the adjacent existing grade. The temporary cold mix asphalt patch shall be maintained such that a continuous surface will exist without depressions or potholes.

209.03.03 Pavement Base

Place pavement base to the specified depth; when not specified, place to a compacted depth

of 12 inches. Bring the top of the pavement base to a smooth, even grade at a distance below finished grade equivalent to the required pavement depth.

Compact the pavement base with mechanical vibratory or impact tampers to a density of not less than 95 percent of the maximum dry density as determined by ASTM D1557/AASHTO T-180.

209.03.04 Asphalt Concrete Pavement

209.03.04A Tack Coat

Tack coat all edges of existing pavement, manhole and clean-out frames, inlet boxes and like items. Apply an asphalt tack coat to the base lift of asphalt at a rate of 0.05 to 0.15 gallons per square yard prior to placing the second lift when the time between placing the second lift is greater than four hours after placement of the initial lift.

209.03.04B Asphalt Concrete Placement

Saw cut the existing pavement a minimum of 6 inches from the edge of the existing pavement at the side of the trench. The saw cut shall be a straight line and shall follow lines parallel to the pipe centerline to remove any pavement which has been damaged or which is broken and unsound. The saw-cut pavement edges shall be free of irregularities. Provide a smooth, sound edge for joining the new pavement. Excavate the material immediately below the cutback area and replace with 1"-0" compacted crushed gravel base.

Place the asphalt concrete on the prepared subgrade over the trench to the specified depth, or the depth of the adjacent pavement, whichever is greater. When a prime coat is specified, place asphalt concrete after the prime coat has set. Place the asphalt concrete in a minimum of two lifts. Maximum thickness for any one lift of pavement shall not exceed 2 1/2 inches. The minimum thickness for placement of compacted pavement shall not be less than 1 inch. 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 or impractical.

Roll with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Begin the rolling from the outside edge of the replacement progressing toward the existing surfacing, lapping the existing surface at least 1/2 the width of the roller. If existing surfacing bounds both edges of the replacement, begin rolling at the edges of the replacement, lapping the existing surfacing at least 1/2 the width of the roller, and progress toward the center of the replacement area. Overlap each preceding track by at least 1/2 the width of the roller and make sufficient passes over the entire area to remove all roller marks and to produce a smooth, uniform surface. Density requirements for asphalt concrete pavement shall conform to those in Section 505 ASPHALT CONCRETE PAVEMENT.

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

209.03.04C Seal Coat

Immediately after the new paving is completed, apply a seal coat of liquid asphalt conforming to Subsection 205.02.13, ASPHALT MATERIALS, to all joints between the new and original asphalt pavement. The seal coat shall be a minimum of 12 inches in width and shall be centered on the joint. The liquid asphalt shall be applied to the point that it begins to run off. The minimum application rate shall be 1.7 gallons per 100 linear feet.

Immediately after the liquid asphalt has been applied and before the asphalt has solidified, cover the seal coat asphalt with clean-dry masonry sand. The sand shall be applied in a layer thick enough to prevent tracking of seal coat. Before opening the street to traffic, the Contractor shall clean up all loose sand.

209.03.04D Surface Smoothness

The top surface of the asphalt concrete pavement, when tested with a 12-foot straightedge furnished and operated by the Contractor, shall not vary by more than 0.02 foot either parallel to or perpendicular to the centerline. The Engineer will observe this testing and may require additional testing. The means of correction of a surface that does not meet the smoothness requirements shall have the approval of the Engineer.
When tests show the pavement is not within the above tolerances, the Contractor shall take immediate action to correct equipment or procedures in his paving operation to eliminate the unacceptable pavement roughness.

Any surface irregularities exceeding the above tolerances shall be corrected by the Contractor using a method or methods listed herein and approved by the Engineer.

Corrective Action - Corrective measures by the Contractor requiring one or more of the following actions approved by the Engineer shall be performed on deficient areas:

1. Remove and replace the surface course.
2. Place an overlay of a thickness approved by the Engineer.
3. Grind the pavement surface utilizing diamond blades up to maximum depth of 0.3 inch and apply an emulsion fog coat as directed by the Engineer.

All corrective work shall be completed within 10 working days following notification from the Engineer that the pavement does not meet the specified tolerances, unless otherwise directed by the Engineer.

All corrective work, including furnishing of materials, shall be performed at the Contractor's expense and no adjustment in contract time will be made for corrective action work.

209.03.04E Weather Conditions

Asphalt concrete mixtures shall be placed on dry prepared surfaces when the air temperature in the shade and the surface temperature is not less than those specified in the following table:

SURFACE TEMPERATURE LIMITATIONS

Compacted Thickness of Individual Courses	Travel Lanes/ Wearing Course	All Other Courses
Less than 1-1/2 inches	60°F	55°F
1-1/2 inches to 2-1/2 inches	50°F	45°F Over
2-1/2 inches and other	40°F	35°F

Placing of any mixture during rain or other adverse weather conditions normally will not be permitted, except that mix in transit at the time these adverse conditions occur may be laid if the mix is of proper temperature, if the mix has been covered during transit, if placed on a foundation free of pools, or flow of water and if all other requirements of these specifications are met. Asphalt concrete mixtures shall not be placed when the underlying layer is frozen, or when, in the opinion of the Engineer, weather conditions either existing or expected will prevent the proper handling, finishing, or compaction of the mixtures.

Do not apply asphalt for tack coat when the surface temperature is less than 50 degrees F.

209.03.04F Protection of Structures

Provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other 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 existing structures (e.g., water valve boxes, manholes, catch basins, or other underground utility appurtenances) are within the area to be surfaced, make the resurfacing level with the top of the existing finished elevation of these facilities. The Contractor shall be responsible for adjusting the existing structures as specified in ADJUSTMENT OF EXISTING STRUCTURES TO GRADE (See Section 511 of Street Technical Requirements). Consider any delays experienced from such obstructions as incidental to the paving operation. No additional payment will be made. Protect all covers during asphalt application.

209.03.04G Excess Materials

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

209.03.05 Portland Cement Concrete Pavement

Pavement replaced shall be the same thickness as that removed, or a minimum of 6 inches. Protect the newly placed concrete from traffic for a period of at least 7 days.

Saw cut the existing pavement a minimum of 6 inches from the edge of the existing pavement at the side of the trench. The saw cut shall be a straight line following lines parallel to the pipe centerline and shall remove any pavement which has been damaged or which is broken and unsound. The saw cut pavement edges shall be free of irregularities.

Provide a smooth, sound edge for joining the new pavement.

Handle, place, finish and cure concrete pavement in conformance with the applicable provisions of Section 506 PORTLAND CEMENT CONCRETE PAVEMENT.

209.03.06 Rock Surfacing

Place rock surfacing only where shown or directed on streets, driveways, parking areas, street shoulders, and other areas disturbed by the construction. Spread the rock by tailgating and supplement by hand labor where necessary. Level and grade the rock surfacing to conform to adjacent existing grades and surfaces as directed.

209.03.07 Concrete Driveways, Sidewalks and Curbs

Replace concrete driveways, sidewalks and curbs to the same section, width, depth, line and grade as that removed or damaged. Saw broken or jagged ends of existing concrete on a straight line and to a vertical plane. Prior to replacing the concrete sections properly backfill and compact the backfill to prevent subsequent settlement.

Replace concrete driveways and sidewalks between scored joints unless otherwise directed by the Engineer. Provide a minimum 2-inch thick compacted leveling course of clean 3/4" - 0" minus crushed aggregate. All concrete replacement work shall be completed prior to the placement of adjacent asphalt concrete. Restoration and clean up shall be as specified under Section 207.

Construct forms to match existing. Place concrete and finish exposed surfaces similar to adjacent surface in conformance with Section 507 CURBS, GUTTERS, DRIVEWAYS AND SIDEWALKS.

209.04 MEASUREMENT AND PAYMENT

209.04.01 Temporary Cold Mix Asphalt

Payment for temporary cold mix asphalt pavement placed in all paved areas to be maintained over trench backfill shall be based on the unit price per linear foot stated in the Proposal.

The unit price will include all work and materials required to place and maintain the surface. If not included in the proposal then it will be considered incidental to the work and included in the unit price for pavement replacement.

209.04.02 Rock Surfacing

Payment for replacement of rock surfacing shall be based on the unit price per ton or cubic yard as stated in the Proposal. The quantity of rock replaced shall be the actual number of tons or cubic yards used as directed by the Engineer, and shall be based on weight tickets from state certified weigh stations. The Contractor will supply certified conversion factors to get from ton to cubic yard. Trip tickets shall be presented to the Engineer for his signature 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.

209.04.03 Asphalt Concrete and Portland Cement Pavement Placement

When the pipe centerline crosses, or is under or at, the edge of existing pavement, payment for asphalt concrete and Portland cement concrete pavement will be based on the unit price per square yard stated in the Proposal for each. The number of square yards will be measured by the Engineer. The pay width for determining square yardage will be as shown on the plans.

The unit prices shall include payment for excavation and dig out required to provide space for the surfacing and compacted crushed rock, preparation of the trench, surfacing, disposal of all excess excavated materials, temporary cold mix asphalt, if not a separate pay item, and all other work required to complete the resurfacing. The crushed rock base and leveling course, crushed rock for the dig out area, and seal coat will also be considered as included in the bid price per square yard for pavement replacement as stated in the Proposal.

209.04.04 Sidewalk and Driveway Replacement

Payment for sidewalk and driveway replacement will be based on the unit price bid per square foot, as stated in the Proposal. No differentiation will be made between concrete and asphalt sidewalks.

The leveling course will be considered as included in the bid price for sidewalk and driveway replacement, as stated in the Proposal.

Payment for replacing damaged sidewalks and driveways lying parallel to the pipe centerline shall be based on the unit price per square foot as stated in the Proposal. Payment will, however, be limited to sidewalks and driveways replaced within three feet of the pipe centerline. All sidewalks and driveways damaged outside these limits shall be replaced at the expense of the Contractor.

The leveling course shall be included in the bid price per square foot as stated in the Proposal.

209.04.05 Curb Replacement

Payment for replacing concrete curbs, curb and gutter, or gutter sections shall be based on the unit price bid per linear foot of for each crossing, as stated in the Proposal.

No differentiation for payment will be made between curb and monolithic curb and gutter sections.

Payments for replacing curbs lying parallel to the pipe centerline shall be based on the unit price per linear foot as stated in the Proposal. Payment will, however, be limited to curbs replaced within three feet of the pipe centerline. All curbs damaged outside these limits shall be replaced at the expense of the Contractor. No differentiation for payment will be made between curb and monolithic curb and gutter sections.

209.04.06 Removal and Replacement of Culverts, Storm Drains or Catch Basins

Payment for the removal and replacement of existing culverts or storm sewers lying parallel to and within three feet of pipe centerline will be based on the unit price per linear foot, irrespective of size, as stated in the Proposal. Payment shall be considered to include full compensation for all work and material required to remove and replace the pipe and restore the culvert or storm sewer to at least its original condition and function. Replacement of

existing culvert headwalls will also be included in this payment.

Payment for removal and replacement of catch basins will be based on the unit price for each, regardless of size or shape, as stated in the Proposal. Payment shall be considered to include full compensation for all work required to remove and replace the catch basins and restore the basins to their original condition and intended function.

END OF DIVISION

DIVISION THREE
SANITARY SEWER TECHNICAL REQUIREMENTS

****

301 PIPE AND FITTINGS (SANITARY SEWER)

****

301.01 DESCRIPTION

This section covers the following work:

1 Gravity and pressure sewer pipe
2. Fittings
3. Service line sewers

301.02 MATERIALS

301.02.01 General

Use all sewer pipe and fittings of the size, strength, material and joint type specified on the Drawings and/or the Proposal. Use jointing material as hereinafter specified for each pipe material. Each piece of pipe shall be clearly identified as to strength, class and date of manufacture. The manufacturer or fabricator shall furnish appropriate certification, based on manufacturer's routine quality control tests, that the materials in the pipe and fittings meet the requirements specified herein. Strength, permeability, hydrostatic tests and pipe joints will be used as the basis of acceptance as described under Proof Tests herein. Minimum length of pipe shall be 3.5 feet.

It is not intended that materials listed herein are to be considered equal or generally inter changeable for all applications. The Engineer shall determine the materials suitable for the project and so specify.

Use pipe and fittings for service lines of one type of material throughout; no interchanging of pipe and fittings will be allowed. Use 6-inch diameter pipe for residential services when not otherwise specified.

Do not coat pipes for sewers internally or externally with any substance of any type in an attempt to improve its performance when air tested.

301.02.02 Concrete Pipe

301.02.02A Non-reinforced Concrete Pipe

Nonreinforced concrete pipe shall conform to ASTM C 14 Class as shown or specified and the following additional requirements:

1. Cement shall be Type II conforming to ASTM C 150.
2. The minimum Portland Cement content shall be 564 pounds per cubic yard.

3. The water/cement ratio shall not exceed 0.49.
4. The Contractor shall provide the Engineer with a Certificate of Compliance from the pipe manufacturer that the pipe and concrete mix conform in all respects to these specifications and other nonconflicting requirements of the referenced ASTM Specifications.

301.02.02B Reinforced Concrete Pipe

Reinforced concrete pipe shall conform to ASTM C 76 Class as shown or specified with Wall B design and the following additional requirements:

1. Cement shall be Type II conforming to ASTM C 150.
2. The minimum Portland Cement content shall be 564 pounds per cubic yard.
3. The water/cement ratio shall not exceed 0.49.
4. Elliptical reinforcing is not permitted.
5. The area of the outer circular reinforcing cage shall not be less than 75 percent by the inner cage.
6. The Contractor shall provide the Engineer with a Certificate of Compliance from the pipe manufacturer that the pipe and concrete mix conform in all respects to these specifications and other nonconflicting requirements of the referenced ASTM Specifications.

301.02.03 Ductile Iron Pipe

Ductile iron pipe centrifugally cast of 60-42-10 iron shall conform to ANSI A21.51 Class 150 or AWWA C151, with Push-on Joint or Mechanical Joints as specified, conforming to ANSI Specification A21.11/AWWA C111. Ductile iron pipe shall be lined with cement mortar and seal coated in accordance with ANSI Standard A21.4/AWWA C104.

When specified, tube type polyethylene encasement shall conform to ANSI A21.5/AWWA C105.

301.02.04 PVC Non-pressure Pipe and Perforated PVC Pipe

PVC sewer pipe shall conform to ASTM D 3034 SDR 35.

301.02.05 PVC Pressure Pipe

PVC pressure pipe shall conform to AWWA C900 class as specified.

301.02.06 Service Connection Markers

New 2" x 4" utility grade lumber, or better, in one piece shall be used. No splicing will be permitted.

301.02.07 Jointing Materials

Only lubricants for jointing materials approved by the manufacturer shall be used.

Furnish in duplicate a certified statement from the manufacturer of the gaskets, setting forth the basic polymer used in the gaskets and results of the tests of the physical properties of the compound. Gaskets shall be shipped in containers with identification of the batch from which the gaskets were fabricated.

301.02.07A Concrete Pipe

Rubber gaskets for bell and spigot pipe shall conform to ASTM C 443. Use captive gasket in groove design for pipe 24-inch diameter and larger. Mortar for tongue and groove pipe shall conform to Section 205 MATERIALS - TYPES AND USE.

301.02.07B Cast Iron and Ductile Iron Pipe

Rubber gaskets shall conform to ANSI A21.11/AWWA C111.

301.02.07C PVC Pipe

Rubber gaskets for PVC pipe shall conform to ASTM F 477.

301.02.08 Proof Tests

301.02.08A General

The intent of this requirement is to prequalify a joint system, components of which meet the joint requirements, as to the water tightness capability of that joint system. This proof test shall be understood to apply to all sanitary sewers. Material and test equipment for proof testing shall be provided by the manufacturer. Joints shall meet the requirements of yard testing specified below. The pipe manufacturer shall submit results of the yard tests made, certified by a testing agency acceptable to the Engineer. In general, each pipe material and joint assembly shall be subject to the following three proof tests at the discretion of the Engineer:

1. **Pipe in Straight Alignment** - No less than three nor more than five pipes selected from stock by the Engineer or the testing agency shall be assembled according to the manufacturer's installation instructions with the ends suitable plugged and restrained against internal pressure. The pipe shall be subjected to 13 psi hydrostatic pressure for 10 minutes. Free movement of water through the pipe joint or pipe shall be grounds for rejection of the pipe.

2. **Pipe in Maximum Deflected Position** - A test section shall be deflected as described hereinafter for each pipe material. The pipe shall be subjected to 10 psi hydrostatic pressure for 10 minutes. Free movement of water through the pipe joint or pipe wall shall be grounds for rejection of the pipe.

3. **Joints Under Differential Load** - The test section shall be supported on blocks or otherwise as described hereinafter for each pipe material. There shall be no visible leakage when the stressed joint is subjected to 10 psi internal hydrostatic pressure for 10 minutes.

301.02.08B Concrete Pipe

For deflected position, create a position 1/2-inch wider than the fully assembled position, on one side of the outside perimeter of each joint.

For differential load test, assemble three pipes according to the manufacturer's instructions in straight alignment with the ends suitably plugged and restrained against internal hydrostatic pressure. The end pipes of the test section shall be supported on blocks or otherwise so that the center pipe is suspended freely between the adjacent pipe and

bearing only the joints. The pipe section shall be filled with water and a load of 150 pounds per inch of pipe diameter, in addition to the weight of the pipe, shall be supplied over an arc of not less than 120 degrees along a longitudinal distance of 12 inches immediately adjacent to one of the joints. For pipe 24-inch and larger, the applied load shall be reduced by 1/2 of the weight of water in the suspended pipe.

301.02.08C Cast Iron Pipe and Ductile Iron Pipe

For deflected position, create a position 1/2-inch wider than the fully compressed section on one side of the outside perimeter.

For differential load, support so that one of the pipes is suspended freely between adjacent pipe, bearing only on the joints. Apply a force per the following table along a longitudinal distance of 12 inches, immediately adjacent to one of the joints.

PIPE SIZE	FORCE - POUNDS	PIPE SIZE	FORCE - POUNDS
4 inches	1,000	15 inches	3,700
6 inches	1,500	18 inches	4,400
8 inches	2,000	21 inches	5,000
10 inches	2,500	24 inches	5,500
12 inches	3,000	and over	----

301.01.08D PVC Pipe

PVC pipe joints shall be tested by and meet the requirement of ASTM C 3212 for gravity sewers and ASTM D 3139 for pressure sewers.

301.02.09 Fittings

301.02.09A General

Provide tee or wye fittings in the sewer main for service line sewers and catch basin or inlet connections. Tee and wyes for service line sewers shall be six inches inside diameter, unless otherwise specified. All fittings shall be of sufficient strength to withstand all handling and load stresses encountered. All fittings shall be of the same materials as the pipe unless otherwise specified. Material joining the fittings to the pipe shall be free from cracks and shall adhere tightly to each joining surface. Use the same type of joints on all fittings that are used on the main sewer pipe. Tee or wye fittings shall not be closer than 12 inches to any joint or bell of main line sewer which is 12 inches or less in diameter.

301.02.09B Concrete Pipe

Use shop fabricated fittings on all concrete pipe.

Submit fabrication details for shop fabricated fittings for review prior to delivery of fittings to the job site.

301.02.09C Cast Iron and Ductile Pipe

Use mechanical joint cast iron fittings conforming to ANSI A21.10/AWWA C110, and a

class of at least equal to that of the adjacent pipe. Use push-on fittings of gray cast iron with body thickness and radii of curvature conforming to ANSI A21.10 and joints conforming to ANSI A21.11/AWWA C111.

301.02.09D PVC Pipe

PVC pipe shall be connected to sanitary manholes using an approved adapter specifically manufactured for the intended service. PVC pipe adapters shall be Fernco CMA, Romac LCT, Tylox Manhole Adapters, Vassalo Series 32850, Kor-N-Seal, Sealtite, Z-Lok-XP, or equal commercial product. Field-fabricated waterstops or improvised adapters such as gaskets stretched over the pipe will not be allowed.

Adapters requiring the use of grout for installation shall be anchored and finished using an approved non-shrink grout. Mortar is not acceptable.

301.02.10 Pipe Coupling Adapters

Use flexible mechanical compression joint coupling with No. 305 stainless steel bands manufactured by Joints, Inc., Fernco Joint Sealer, or equal.

301.02.11 Cleanouts

Cleanouts will be of the same material and size as the main line.

301.03 CONSTRUCTION

301.03.01 Excavation and Backfill

Conform to the requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL. All excavation shall be unclassified.

301.03.02 Line and Grade for Gravity and Pressure Sewers

Do not deviate from line or grade, as established by the Engineer, more than 1/2 inch for line and 1/4 inch for grade, provided that such variation does not result in a level or reverse sloping invert. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness. Establish line and grade for pipe by the use of lasers or by transferring the cut from the offset stakes to batter boards at maximum intervals of 25 feet.

301.03.02A Line and Grade for Service Line Sewers

The Engineer will establish line and grade to the tract of land to be serviced by the sewer system. At the preselected location of the service line, a stake will be driven into the ground showing the depth of excavation required at the property line.

Lay the pipe on a straight line and at a 2% grade between the tee or riser and the stake. Lay the pipe by means of a builder's level of good quality and not less than 24 inches in length.

301.03.03 Pipe Distribution and Handling

Distribute material on the job no faster than it can be used to good advantage. Unload pipe only by means recommended by the pipe manufacturer. Do not unload pipe of any size by

dropping to the ground. Do not distribute more than one week's supply of material in advance of laying, unless approved.

Pipe shall not be unloaded or stored in the public right-of-way or easement unless it has been certified and accepted by the Engineer. Inspect all pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are used. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

Use proper implements, tools, and facilities for the safe and proper protection of the work. Lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. Remove all damaged pipe from the job site. Do not drop or dump pipe into trenches.

301.03.04 Pipe Laying and Jointing of Pipe and Fittings

301.03.04A General

Proceed with pipe laying upgrade with spigot or tongue ends pointing in direction of flow. Place pipe in such a manner as to ensure a continuous and uniform bearing and support for the full length of the pipe between joints. Take care to properly align the pipe before forced entirely home. Upon completion of pipe laying all pipe joints shall be in the "home" position, which is defined as the position where the least gap (if any) exists, when the pipe components that comprise the join are fitted together as tightly as the approved joint design will permit. Gaps at pipe joints shall not exceed that allowed by the manufacturer's recommendations.

For curved sewers the normal gap will be the gap existing when the pipe joints are in the "home" position as described above, for the pipe in the specified deflected position. After installation, prevent movement from any cause including uplift or floating.

Take special care to prevent movement of the pipe after installation when laid within a movable trench shield.

When laying operations are not in progress, protect the open end of the pipe from entry of foreign material and block the pipe to prevent movement or creep of gasketed joints.

Plug or close off pipes which are stubbed out for manhole construction or for connection by others.

Provide all sewer pipes, 36 inches or smaller in diameter, entering or leaving manholes or other structures, with flexible joints within 18 inches of the exterior wall. Pipes larger than 36 inches in diameter shall have this flexible joint within a distance from the exterior wall equal to one-half the inside pipe diameter.

When cutting and/or machining the pipe is necessary, use only tools and methods recommended by pipe manufacturer.

When shown or approved to deflect pipe from a straight line, either in the vertical or horizontal plan, or when long-radius curves are shown, the amount of deflection shall not exceed that specified or approved by the Engineer. The pipe manufacturer's recommendation will serve as a guide, but the decision of the Engineer shall be final.

301.03.04B Concrete Pipe

Use rubber ring gasket joints.

301.03.05 Installation of Service Line Sewers, Tees and Wyes

Install tee and wye fittings and service line sewers as shown on the Standard Drawings. Provide pipe bedding material compacted to a minimum of 90% of maximum density as determined by ASTM D 1557/AASHTO T-180 under all tees and wyes and branch fittings, extending to the springline of the fittings. Place pipe bedding material on undisturbed native material or compacted foundation stabilization material.

Maximum deflection permissible with any one fitting shall not exceed 45 degrees and shall be accomplished with long-radius curves or bends.

Connect service lines to manholes only when directed. Make the connection so the standard pipe joint is located not more than 1.5 feet from the structure.

Provide ends of all service lines and fittings with approved watertight plugs, caps, or stoppers, suitably braced to prevent blowoff during internal air testing. Such plugs or caps shall be removable and their removal shall provide a socket suitable for making a flexible joint lateral connection or extension.

301.03.06 Markers

In new subdivisions, undeveloped areas, and where connections will not be made in the contract, after the service line is installed, block the capped or plugged end and install 2" x 4" marker. Extend markers at least 12 inches above the ground surface. Paint the top portion of the marker after its installation with first-quality green, quick-drying enamel. After the paint has dried, use black, quick-drying enamel and neatly indicate the distance from the natural ground surface to the top of the service line pipe in feet and inches.

Take precautions during the backfilling operation to ensure the position and location of the marker. If the marker is broken or knocked out of vertical alignment during the backfilling operation, reopen the trench and replace the marker.

New curbs shall be branded with an "S" to mark the service lateral location.

301.03.07 Concrete Closure Collars

Only where specified on Drawings, construct concrete closure collars in conformance with the details provided. Wash pipe to remove all loose material and soil from the surface on which the concrete will be placed. Construct forms with materials that will ensure that no concrete shall enter the line. Make entire collar in one placement, and do not place collars in water. Concrete closure collars shall be placed using an approved commercial concrete bonding agent applied to all surfaces in contact with the collar. Where concrete closure collars are necessary to join PVC pipe, the PVC surface shall first be prepared for bonding to the concrete by applying a dense coating of clean mortar sand to the pipe using PVC solvent cement. After the cement has cured, commercial concrete bonding agent shall be applied to the sand surface prior to placement of concrete. Water as a substitute for commercial bonding agent will not be allowed. Do not backfill the trench until the concrete has sufficient strength.

301.03.08 Disconnection and Reconnection of Existing Service Lines

When shown or directed, disconnect existing service lines from existing sewers and reconnect them to the new sewers. The Contractor shall be responsible for locating the existing service lines prior to installing the tee or wye in the new sewer line. The contractor shall verify and reconnect all active services to the main line sewer.

301.03.09 Field Fabricated Connections

Field fabricate tees or wyes for required connections when shown or directed. Make all field fabricated tees or wyes similar to approved manufacturer supplied tees or wyes and provide for a flexible joint at the point of connection to the tee or wye. Do not allow tee or wye to protrude past the inside wall surface of the sewer pipe, and finish the inside wall surface of the sewer pipe to provide a smooth surface for uninhibited flow through the sewer. Fabricate fittings by inserting a stub into a hole cut in the pipe and grout with a nonshrinking grout. Coat surfaces to receive grout with an epoxy bonding agent prior to grouting. Fabrication details for fittings shall be submitted to the Engineer for review prior to fabrication.

301.03.10 Testing

301.03.10A General

1. All gravity sanitary sewers including service line sewers and appurtenances shall successfully pass an air test prior to acceptance and shall be free of leakage. Manholes shall be tested as specified in Section 302 MANHOLES AND CONCRETE STRUCTURES.

2. All pressure sewer force mains shall be tested in accordance with applicable portions of Section 403 WATER PIPE AND FITTING, when not otherwise specified.

3. The City may make a televised inspection of the sanitary sewer pipe. Any defects in material or workmanship shall be satisfactorily corrected prior to final acceptance of the work.

301.03.10B Cleaning Prior to Testing and Acceptance

Prior to final testing, acceptance and final manhole-to-manhole inspection of the sewer system by the Engineer, ball, flush and clean all parts of the system. Remove all accumulated construction debris, rocks, gravel, sand silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, use mechanical rodding or bucketing equipment.

Upon the Engineer's final manhole-to-manhole inspection of the sewer system, if any foreign matter is still present in the system, reflush and clean the sections and portions of the lines as required.

301.03.10C Testing Procedure

Perform the tests in a manner satisfactory to the Engineer. Any arrangement of testing equipment which will provide observable and accurate measurements of air leakage under the specified conditions will be permitted. Calibrate gauges for air testing with a standardized test gauge provided by the Contractor at the start of each testing day. The calibration shall be witnessed by the Engineer; notify the Engineer 24 hours prior to each

test.

301.03.10D Time of Test

Make tests of sections of constructed sanitary sewer for acceptance only after all service connections, manholes, backfilling, and compaction are completed between the stations to be tested. Owner may require testing of manhole-to-manhole sections as they are completed in order to expedite the acceptance of sections of sewer and allow connections prior to the whole system being completed.

301.03.10E Repairs

Repair or replace, in a manner satisfactory to the Engineer, any section of pipe not meeting the air test requirements, or which has leakage.

Infiltration of ground water in an amount greater than herein specified, following a successful air test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the pipeline has occurred. Correct such failures occurring within the warranty period in a manner satisfactory to the Engineer at the Contractor's sole expense.

The Contractor, in contracting to do this work, agrees that the leakage allowances as indicated herein are fair and practical.

301.03.10F Air Testing

General

The Engineer may, at any time, require a calibration check of the instrumentation used. Use a pressure gauge having minimum divisions of 0.10 psi and an accuracy of 0.0625 psi. (One ounce per square inch.) All air used shall pass through a single control panel.

All plugs used to close the sewer for the air test must be capable of resisting the internal pressures and must be securely braced. Place all air testing equipment above ground and allow no one to enter a manhole or trench where a plugged sewer is under pressure. Release all pressure before the plugs are removed. The testing equipment used must include a pressure relief device designed to relieve pressure in the sewer under test at 10 psi or less and must allow continuous monitoring of the test pressures in order to avoid excessive pressure. Use care to avoid the flooding of the air inlet by infiltrated ground water. (Inject the air at the upper plug if possible.) Use only qualified personnel to conduct the test.

Ground Water

The presence of ground water will affect the results of the test. Determine the average height of ground water over the sewer immediately before starting the test.

In every case, determine the height of the water table at the time of the test by exploratory holes or such other methods satisfactory to the Engineer. The Engineer will make the final decisions regarding test height for the water in the pipe section being tested.

Method

Use the Time-Pressure Drop Method for all air testing. The test procedures are described as follows:

1. Clean the sewer to be tested and remove all debris where noted.
2. Wet the sewer prior to testing, if desirable.
3. Plug all sewer outlets with suitable test plugs. Brace each plug securely.
4. Check the average height of the ground water over the sewer. The test pressures required below shall be increased 0.433 psi for each foot of average water depth over the sewer.
5. Add air slowly to the section of sewer being tested until the internal air pressure is raised to 4.0 psig greater than the average back pressure of any ground water that may submerge the pipe.
6. After the internal test pressure is reached, allow at least 2 minutes for the air temperature to stabilize, adding only the amount of air required to maintain pressure.
7. After the temperature stabilization period, disconnect the air supply.
8. Determine and record the time in seconds that is required for the internal air pressure to drop from 3.5 psig to 2.5 psig greater than the average back pressure of any ground water that may submerge the pipe.

Acceptance

The sewer shall be considered acceptable when tested as described herrinbefore if the section under test does not lose air at a rate greater than 0.0015 cfm per square foot of internal sewer surface.

For test sections containing over 625 square feet of surface area, the time measured by this method for 1.0 psi pressure drop shall be calculated according to the following formula:

$T = d^2L/42$

T = test duration, seconds
d = pipe diameter, inches
L = section length, feet

42 = conversion factor

For test sections containing less than 625 square feet of internal surface area, the time measured by this method for 1.0 psi pressure drop shall be calculated according to the following formula:

$T = 56d$

The internal surface area of pipeline sections may be calculated using the formula A = piLd/12.

The surface areas of lateral lines of differing lengths and diameters may be accommodated in Equations 1 and 2 above by using the sums $d_1^2L_1 + \ldots + d_n^2L_n$ and $d_1 + \ldots + d_n$ in place of d^2L and d, respectively.

301.03.11 Deflection Test for PVC Pipe

In addition to air testing, perform a deflection test for all sanitary sewers and culverts constructed of PVC pipe after the trench backfill and compaction has been completed. The test shall be conducted by pulling an approved solid pointed mandrel or variable deflection measuring gauge through the completed pipeline a minimum of 30 days after compaction is completed. The diameter of the mandrel shall be 95 percent of the internal pipe diameter. Conduct testing on a manhole-to-manhole basis and only after the line has been completely flushed clean with water. Locate and repair any sections failing to pass the test and retest the section, at the Contractor's sole expense.

301.03.12 Television Inspection of Sanitary Sewers

Upon completion of all sewer construction, repairs, cleaning, and required tests, notify the Engineer that all lines are ready for televiewing inspection.

Subsequent to being notified, the Owner shall commence examination of lines. Findings will be recorded. Correct all deficiencies at the Contractor's sole expense.

Upon correction of deficiencies revealed by televiewing, notify the Engineer; the same steps listed above may be repeated until all work is acceptable.

The City of Newberg may, at its own option, perform a deflection test at the same time it performs its television inspection.

301.03.13 Subsequent Failure

Infiltration of ground water in an amount greater than 0.96 gallons per day per inch diameter per 100 feet, following a successful air test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the pipeline has occurred. The Contractor shall correct such failures at the Contractor's sole expense should they occur within the warranty period.

301.03.14 Cleanouts

Cleanouts will be constructed per the City Standard Details. The cleanout will stand vertical and the Contractor will bring compacted bedding material up around the vertical portion to the top.

301.03.15 Service Risers

The service risers will be constructed with a tee fitting at the main line. If a wye fitting is necessary then a 1/8 bend will be utilized at the wye in place of the tee. Payment will begin at the upper end of the 1/8 bend if the Contractor chooses to use this method.

301.04 MEASUREMENT AND PAYMENT

301.04.01 Sanitary Sewer Pipe

Measurement and payment for sanitary sewer pipe, including gravity sewers, pressure line sewers and pipe stubouts from manholes, will be made on a linear foot basis for the various classes, types and sizes of pipe listed in the Proposal and as actually installed. All pipe except service line pipe will be measured horizontally from center-to-center of manholes or to

the ends of the pipe, whichever is applicable. No deductions will be made for fittings or for structures, unless specifically called out in the construction drawings or elsewhere in this document.

Measurement and payment for service line pipe will be made on a horizontal foot basis for the type and size of pipe installed as shown in the Proposal. Length will be measured as the horizontal distance, commencing at the point of connection to the tee, wye, manhole or pipe as applicable and terminating at the end of the pipe or at the point of reconnection to the existing service line pipe, including all fittings, measured along the horizontal centerline of the service if risers are not included in the Proposal. If risers are included in the Proposal as a separate pay item then the horizontal distance will start at the top of the riser, and terminate at the end of the pipe or point of reconnection to the existing service line.

Payment shall constitute full compensation for the pipe in place, including furnishing, placing and compacting pipe bedding and pipe zone material, testing, plugs and the markers for service line pipe.

Measurement and payment for disconnecting and reconnecting existing service lines will be made at the unit price for each as shown in the Proposal. Payment shall include full compensation for locating the existing service line, rerouting any flow, making the disconnection and reconnecting the new service line with the existing service line. When not shown as a separate item in the Proposal the disconnection and reconnection will be included in the service lateral cost.

301.04.02 Service Risers

Measurement and payment for service risers will be made on a linear foot basis for type and size of pipe installed as shown in the Proposal. Length will be measured from the tee at the main line to the bend at the top of the riser. Compensation will include all pipe, fittings, bedding, pipe zone, backfill, labor and equipment to install the riser complete in place. If no separate item is included in the Proposal then compensation for the riser assembly will be included in the price per foot for the service line.

The Engineer will determine the length of each riser. That length will be set by the lateral depth requirement at the property line with a 2% slope back to the top of the riser. Risers will be utilized when ever possible.

301.04.03 Tee and Wye Fittings

Measurement and payment for service tees and wyes installed in the sewer lines will be made at the unit price for each size and type as shown in the Proposal. If no item is listed in the proposal, then the tee and wye fittings will be incidental to the service lateral and main line installation and no extra compensation will be allowed. Since no deduction will be made under the payment item for Pipe for the length of the tee or wye, the unit price for tee and wye fittings shall include only the additional cost of furnishing and installing the tee or wye fitting, over the cost of furnishing and installing an equivalent straight run of pipe. Payment will include full compensation for pipe plugs, stoppers, or caps installed.

301.04.04 Siamese Connections

Measurement and payment for siamese connections will be made at the unit price each as shown in the proposal and actually constructed. Payment shall include installation of the wye, end plug, miscellaneous fittings, labor and equipment to install the connection as shown in the

Standard Details. If no item for siamese connections is included in the proposal then the material, labor and equipment necessary will be considered incidental to the service lateral installation, and no extra compensation will be allowed.

301.04.05 Concrete Closure Collars

Measurement and payment for concrete closure collars will be made at the unit price each as shown in the Proposal and actually constructed. Payment shall include full compensation for all materials, equipment and labor necessary to complete the work.

301.04.06 Field Fabricated Connections

Measurement and payment for field fabricated connections will be made at the unit price each for the type and size as shown in Proposal. Payment shall include full compensation for all materials, equipment and labor necessary to complete the work.

301.04.07 Cleanouts

Measurement and payment for cleanouts will be made at the unit price each for the type and size as shown in the Proposal. Payment shall include full compensation for all materials, equipment and labor necessary to complete the work.

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302 MANHOLES AND CONCRETE STRUCTURES

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302.01 DESCRIPTION

This section covers the work necessary for the construction of the following items:

1. Manholes
2. Drop Assemblies
3. Special Concrete Structures
4. Concrete Encasement

302.02 MATERIALS

302.02.01 Base Rock

One inch minus base rock, conforming to the requirements for aggregate base material in Subsection 204.02.06 SELECT BACKFILL MATERIAL.

302.02.02 Forms

Forms for exposed surfaces shall be steel or plywood. Others shall be matched boards, plywood or other approved material. Form all vertical surfaces. Trench walls, large rock or earth shall not be used as form material.

302.02.03 Concrete and Reinforced Steel

Concrete and reinforcing steel shall conform to Section 205, MATERIALS - TYPES AND USE.

302.02.04 Cement Mortar

When specified for use, cement mortar shall conform to Section 205, MATERIALS - TYPES AND USE. Consistency of mortar shall be such that it will readily adhere to the pipe if using the standard tongue-and-groove type joint. Mortar mixed for longer than 30 minutes shall not be used.

302.02.05 Manholes

302.02.05A Standard Precast Manhole Sections

Furnish sections as specified conforming to the details on the Standard Drawings and to ASTM C 478. Cones shall have same wall thickness and reinforcement as manhole section. Provide eccentric cones with precast grooves for all manholes over six feet in depth. Flat slab tops with precast grooves reinforced to withstand AASHTO H20 loadings shall be provided for manholes four feet deep from crown of pipe and less. Top and bottom of all sections shall be parallel.

Prior to the delivery of any size of precast manhole section on the job site, yard permeability tests will be conducted at the point of manufacture. The precast sections to be tested will be selected at random from the stockpiled material which is to be supplied for the job. All test specimens will be mat tested, and shall meet the permeability test requirements of ASTM C 14 and ASTM C 497.

302.02.05B Precast Concrete Bases

Manholes, except as otherwise specified or approved by the Engineer, shall be constructed using precast, reinforced concrete bases in all traveled areas. Construction of precast bases shall conform to the requirements of ASTM C478. THE BASE RISER SECTION SHALL BE INTEGRAL WITH THE BASE SLAB.

302.02.05C Poured in Place Manhole Bases

The Contractor may use poured in place manhole bases in untraveled areas. Concrete shall conform to Section 302, MANHOLES AND CONCRETE STRUCTURES.

302.02.05D Manhole Grade Rings

Concrete grade rings for extensions shall be a maximum of 6 inches high.

302.02.05E Jointing Materials

Preformed plastic gaskets conforming to the requirements of AASHTO M-198 or joints using confined O-ring with rubber gaskets conforming to ASTM C443 shall be used.

302.02.06 Pipe and Fittings

Conform to requirements of Section 301 PIPE AND FITTINGS (SANITARY SEWER).

302.02.07 Manhole and Cleanout Frames and Covers

302.02.07A General

All castings shall be true to size, weight and tolerances shown on the Standard Drawings. Delivered weight shall be +/- 5 percent of the specified weight. The bearing seat shall not rock when checked by the test jig. The foundry shall supply all test gauges and shall not subcontract any of the work other than testing procedure, patterns, and machining and cartage. The casting shall not be made by the open mold method and shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted. All castings shall be shot or sandblasted, and the application of paint or other coating will not be permitted. All manhole frames and covers located outside of the right-of-way shall be tamper-proof.

302.02.07B Materials

Conform to ASTM A 48, Class 30B with the following revisions:

Tensile Strength	30,000 psi
Traverse Strength:	(1.2" diam. bar - 18" centers)
Load - Pounds	2,600 - 3,000
Deflection - Inches	0.22 - 0.34
Brinell Hardness (as cast)	173 - 200

The foundry shall certify as to the tensile and traverse properties and the Brinell Hardness. The Owner reserves the right to require a Rough Transverse bar (size of bar 1.2" diam. by 20" long) and/or a tensile bar as per ASTM A 48 for each 20 castings or heat when less than 20 castings are made.

302.02.07C Inspection

Notify the Owner at least 24 hours in advance of casting the units or bars. At least 24 hours notice shall also be given prior to final gauging and inspection. When directed, the following strength test shall be made on the manhole cover. The cover, while resting it its frame, shall sustain a concentrated load of 40,000 lbs. applied at its center through a 2 1/2-inch plug. The Engineer may, at any time, require up to 5 percent of the job and/or order and in no case less than one (1) cover to be tested in this manner. In case of failure during the test, additional covers shall be furnished until the tests prove satisfactory. Covers that do not pass this test shall not be used.

302.02.07D Cap Screws

Cap screws and washers for tamperproof and watertight manhole covers shall be stainless steel with 60,000 psi minimum tensile strength conforming to ASTM A 453.

302.02.08 Steps for Precast Manholes

Steps for precast manholes shall be of 3/4 inch diameter structural steel in conformance with the Standard Details or be of steel reinforced polypropylene plastic, M.A. Industries, Inc., No PS-2PFS, or Lane No. P-13850, or approved equal. All steps shall be in conformance with ASTM C-478 and shall be aligned vertically. All steps within a manhole shall be of the same design, type and size (mixing of unmatched steps within the same manhole is not permitted).

Loose steps shall be cause for rejection of that manhole cone or section.

Steps of 3/4 inch diameter structural steel shall conform to ASTM A 36 and galvanized in accordance to ASTM A 123. Steps shall be safety type 12" x 8" x 2" pattern as shown on the Standard Plans.

Steel reinforced polypropylene steps are to be driven into pre-formed holes in precast concrete manhole cones and sections by the manhole manufacturer prior to delivery to job site and shall be in conformance with the following specifications:

ASTM A-615 Grade 60, 1/2" deformed steel rod
ASTM 2146-78 Type II, Polypropylene

302.02.09 Non-shrink Grout

Non-shrink grout shall be Sika 212, Euco N-S, Five-Star, or equal non-metallic cementitious commercial grout exhibiting zero shrinkage per ASTM C-827 and CRD-C-621. Grout shall not be amended with cement or sand, and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used.

Non-shrink grouts shall be placed or packed only with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout being used. Water as a substitute for commercial bonding agent for non-shrink grout will not be allowed in sanitary sewer construction.

302.03 CONSTRUCTION

302.03.01 General

302.03.01A Excavation and Backfill

Conform to applicable provisions in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Backfill around manholes, inlets, catch basins, and other appurtenances shall be of the same quality as the trench backfill immediately adjacent. All excavation shall be unclassified.

302.03.01B Base Rock

Place crushed aggregate base rock and thoroughly compact with a mechanical vibrating or power tamper.

302.03.01C Foundation Stabilization

If material in bottom of excavation is unsuitable for supporting manholes and other sewer appurtenances, excavate below subgrade as directed and backfill to required grade with rock conforming to Foundation Stabilization in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL.

302.03.02 Manholes

All manholes, except as otherwise specified, shall be constructed using precast, reinforced concrete base sections, riser sections, and other precast appurtenances conforming to ASTM

C478. Base riser sections shall be integral with the base slabs.

Preformed plastic gaskets shall be installed in strict accordance with the manufacturer's recommendation. Only pipe primer furnished by the gasket manufacturer will be approved. When using preformed plastic gaskets, manhole sections with chips or cracks in the joint surfaces shall not be used. Completed manholes shall be rigid and all manholes for sanitary sewers shall pass the hydrostatic test. Construct manhole inverts in conformance with the Standard Drawings with smooth transitions to ensure an unobstructed flow through manhole. Cover exposed edges of pipe completely with mortar. Trowel all mortar surfaces smooth.

The inside of all manholes will be grouted smooth with all spaces between risers, rings, and cones filled with grout flush with the inside of the manhole.

Holes for installing pipe into precast manhole sections shall be cast in place or saw cut.

Channels shall conform accurately to sewer grade. Channel shall be formed to accept a three (3) foot long by six (6) inch T.V. camera. Construct cast in place channel and shelf, in field, in one operation. Finish concrete shelf between channels with a brush.

302.03.03 Drop Assemblies

Construct drop assemblies at locations indicated and as shown on the Standard Drawings.

302.03.04 Pipe Stubouts and Manholes

Install stubouts from manholes at locations as shown or directed. Concrete pipe connections to sanitary manholes shall be grouted watertight with non-shrink grout using an approved commercial concrete bonding agent applied to all concrete surfaces being grouted. Provide manhole with resilient connector for PVC pipe connectors. Saw cut opening in manhole walls with concrete saw. Pipe connections to the cone section of a manhole are strictly prohibited.

302.03.05 Manhole Grade Rings

In general, manhole grade rings will be used on all manholes in streets or roads or other locations where a subsequent change in existing grade may take place. Extensions will be limited to a maximum height of 12 inches.

Install appropriate combination of grade rings to a height that will accommodate the finish manhole surface elevation as shown on the Drawings. Lay grade rings in mortar with sides plumb and tops level. All mortared sanitary sewer manhole necks and all grade ring joints made with mortar shall be constructed using an approved commercial concrete bonding agent applied to all cured concrete surfaces being mortared. No joints, necks, frames, or grade rings on sanitary sewers shall be mortared without an approved bonding agent. Water as a substitute for commercial concrete bonding agent will not be approved. Grade ring extensions shall be watertight. All mortared sanitary sewer manhole necks and all grade ring joints made with mortar shall be constructed using an approved commercial concrete bonding agent applied to all cured concrete surfaces being mortared. No joints, necks, frames, or grade rings on sanitary sewers shall be mortared without an approved bonding agent. Water as a substitute for commercial concrete bonding agent will not be approved.

302.03.06 Adjustment of Manholes and Cleanouts to Grade

The frame and cover will be adjusted to final grade after the first lift of A.C. has been placed

and prior to the final lift. The void between the frame and the first lift of A.C. will be filled with type B grout conforming to Section 205, MATERIALS - TYPES AND USE.

302.03.07 Hydrostatic/ Vacuum Testing

All sanitary sewer manholes shall be tested for acceptance after backfilling, compaction, and paving. However, the contractor may test prior to backfilling or paving for his own information.

The test shall consist of plugging all inlets and outlets and filling the manhole with water. Each manhole shall be filled to the rim at the start of test. Leakage in each manhole shall not exceed 0.2 gallons per hour per foot of head above the invert. Leakage shall be determined by replacement using a calibrated container for refilling. Manholes may be filled 24 hours prior to the time of testing to permit normal absorption into the manhole walls.

Manholes may be vacuum tested in lieu of hydrostatic testing at the contractor's option.

A. Each manhole may be tested immediately after assembly and prior to backfilling for contractor information and ease of repair if necessary. Acceptance testing will be accomplished after backfilling and final paving is complete.

B. All lift holes shall be plugged with an approved non-shrink grout. Manhole frame to grade ring or cone connection shall use commercial concrete bonding agent and non-shrink grout.

C. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.

D. The test head shall be placed at the inside of the top of the manhole frame and the seal inflated in accordance with the manufacturer's recommendations. The seal at grade rings and frame shall be subject to the test.

E. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the time is greater than 60 seconds for 48" diameter, 75 seconds for 60", and 90 seconds for 72" diameter manholes.

F. If the manhole fails the initial test, necessary repairs shall be made with an approved non-shrink, quick-setting grout. Retesting shall proceed until a satisfactory test is obtained.

302.03.08 Concrete Encasement for Sanitary Sewer

Conform to the requirements shown on the Standard Drawings and to applicable requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Foundation stabilization, if required, shall be completed and the bottom of the trench compacted.

Support pipe true to line and grade before and during placement of concrete. Encasement shall be placed in a minimum of two lifts. Provide a keyway on both sides of the encased pipe and vertical reinforcing bond steel as shown on Standard Drawing. Adequately support the pipe to prevent pipe deflection during concrete placement and initial set.

After concrete encasement has been placed and taken an initial set, cure by covering with well-moistened earth or backfill material for 5 days before conducting air test.

302.03.09 Special Concrete Structures

Conform to the details as shown.

302.03.10 Placing Precast Units

If material in bottom of trench is unsuitable for supporting unit, excavate as directed and backfill to required grade with foundation stabilization material in conformance with Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Set units to grade at locations shown or directed.

302.03.11 Cleaning

Upon completion, clean each structure of all silt, debris and foreign matter.

302.04 MEASUREMENT AND PAYMENT

302.04.01 Manholes

Measurement and payment for manholes will be made on a Unit price basis for each type shown in the Proposal for Manholes 8 feet deep, plus the unit price per foot shown in the Proposal for extra depth of manholes over 8 feet. No deduction will be made for depths less than 8 feet. Measurement of manhole depth will be from the top of the manhole frame and cover to the manhole invert at the center of the manhole to the nearest 1/10 foot. Payment shall include full compensation for all materials, labor, steps and equipment required to construct manhole in-place.

302.04.02 Drop Assemblies

Measurement and payment for drop assemblies, regardless of size, will be made on a unit price basis as shown in the Proposal for drop assemblies 2 feet in depth, plus the unit price per foot shown in the Proposal for extra depth over 2 feet. No deduction will be made for depths less than 2 feet. Drop assemblies will be vertically measured from the invert of the pipe at the top of the assembly to the invert of the pipe into the manhole base at the bottom of the assembly to the nearest 1/10 foot. Payment shall include full compensation for all materials, labor and equipment required to construct the work complete in place.

302.04.03 Pipe Stubouts from Manholes

Measurement and payment for pipe stubouts from manholes shall be made at the unit price per Subsection 301.04.01 for pipe of equal size. Unit price will include all required materials, fittings (including end plug), and work to install the stubout.

302.04.04 Tamperproof and Watertight Manhole Frame and Covers

Measurement and payment for tamperproof and watertight manhole frame and covers will be made on a unit price basis for each type installed. Since payment for furnishing and installing standard frame and covers is already included in the bid price for manholes, this unit price will include only the additional compensation for providing the watertight frame and cover complete in place. If called out in plans and not included as a pay item in the proposal, this item will be paid at the same rate as the standard frame and cover; i.e., no extra compensation.

302.04.05 Concrete Encasement

Measurement and payment for concrete encasement will be made on a linear foot basis as shown in the Proposal for the size pipe to be encased. Length shall be measured along the centerline of the pipe. Payment shall include full compensation for all materials, equipment and labor required to construct the work complete in place.

302.04.06 Special Concrete Structures

Measurement and payment for special concrete structures will be made on a lump sum each basis. Payment shall constitute full compensation for materials, equipment and labor required to construct the work complete in place.

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303 WORK ON EXISTING SANITARY SEWERS

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303.01 DESCRIPTION

This section covers the work necessary to join new work to existing, the abandoning of sanitary sewer lines, storm drains and structures, and adjusting existing utility structures to finished grades.

303.02 MATERIALS

Conform to requirements of Section 205, MATERIALS - TYPES AND USE and to the requirements for related work referred to herein.

303.02.01 Prefabricated Inside Drops (Oregon Drops)

This type of connection will only be allowed with prior approval by the Engineer. Materials proposed to be used in construction shall be submitted to the Engineer for approval.

303.03 CONSTRUCTION

303.03.01 Excavation and Backfill

Conform to requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. All excavation shall be unclassified.

303.03.02 Manholes Over Existing Sewers

Advise Engineer of system for diverting sewage flow and obtain authorization before starting. The Contractor shall be totally responsible for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

Construct manholes over existing operating sewer lines at locations shown. Perform necessary excavation and construct new manholes in conformance with applicable requirements of Section 302 MANHOLES AND CONCRETE STRUCTURES.

Construct manholes as shown on the Detail Drawings or Standard Drawings. Densify the

concrete base by vibrating or working as approved and screed to provide a level, uniform bearing for precast sections.

Place the first precast section of manhole in concrete base before concrete has set and deposit sufficient mortar on the base to assure a watertight seal between the base and the manhole wall. First section shall be properly located and plumb. Stacking additional precast manhole sections shall be prohibited until the concrete has cured a minimum of twenty-four (24) hours in moist conditions.

After pouring concrete base, remove the top section of the existing pipe to the full width of pipe and diameter of the manhole. Cover exposed edges of pipe completely with mortar. Trowel all mortar surfaces smooth.

Manholes shall be constructed over existing concrete sanitary sewers after first cleaning and applying approved commercial concrete bonding agent to all surfaces of the pipe that will be in contact with the manhole. Manholes shall be constructed over existing PVC sanitary sewers after first applying a dense coating of clean mortar sand to all pipe surfaces that will be in contact with the manhole, using PVC solvent cement. After the cement has cured, commercial concrete bonding agent shall be applied to the sand prior to placement of concrete. Water as a substitute for commercial bonding agent will not be allowed.

Prevent broken material or debris from entering sewer flow. Maintain flow through existing sewer lines at all times. Protect new concrete and mortar for a period of 7 days after placing. All sanitary sewer manholes shall be hydrostatically tested in accordance with Subsection 302.03.07. Premature breakage into the existing sewer prior to testing shall not excuse the requirement for testing.

303.03.03 Connection to Existing Main

No service line or building sewer shall be connected to an existing sewer without prior inspection and approval of the pipe for watertightness and proper construction in accordance with the state plumbing code. Previous use of the service line or building sewer for septic tank or other application, or absence of usable cleanouts for accessing the building sewer, shall not excuse the requirement for testing except as may be authorized by the state building codes inspector.

Connections of service lines to existing sewers shall be made watertight. Connection shall be made where possible to existing tees or wyes previously installed and plugged. The plug shall be removed and connection made in accordance with the applicable portions of Section 303 WORK ON EXISTING SANITARY SEWERS. Transition couplings between dissimilar pipe materials shall be made using approved commercial adapters with stainless steel bands such as Fernco, Caulder, or equal.

Where tees or wyes for connection are absent or unusable, connection of service lines shall be made with an approved tap such as Sealtite saddle, Fowler tap, Fowler tee, Tap-Tite tee, or equal commercial tap.

All taps shall be inspected and approved by an authorized representative of the local jurisdictional authority.

Taps shall be installed without protrusion into or damage to the existing sewer. No compromise of the sewer will be allowed, such as undermining and settlement of the sewer grade, debris in the sewer, or longitudinal or transverse cracking of the sewer pipe.

303.03.04 Removal of Existing Pipes, Manholes and Appurtenances

Existing pipelines, manholes and appurtenances which lie in the line of and are to be replaced by the new construction shall be removed from the site and disposed of as provided for in Section 203 CLEARING AND GRUBBING.

303.03.05 Filling Abandoned Manholes, Inlets and Catch Basins

Existing manholes shown to be abandoned shall be filled with granular material as specified in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Compact to at least 90 percent maximum density as determined by ASTM D1557. Remove manhole cone station and plug all pipes with permanent plugs as specified in section 303.03.06.

303.03.06 Permanent Plugs

Clean interior contact surfaces of all pipes to be cut off or abandoned. Construct concrete plug in end of all pipe 18 inches or less in diameter. Minimum length of concrete plugs shall be 8 inches. For pipe 21 inches and larger, the plugs may be constructed of common brick or concrete block. Plaster the exposed face of block or brick plugs with mortar. All plugs shall be watertight and capable of withstanding all internal and external pressures without leakage.

303.03.07 Adjusting Existing Structures to Grade

Existing manholes, inlets, catch basins and similar structures shall be brought to the specified finished grade by methods of construction as required in Section 511 ADJUSTMENT OF EXISTING STRUCTURES TO GRADE.

303.03.08 Connection to Existing Manholes

All sanitary sewer pipe connections, including those at invert level and penetrations for drop connectors, conduits, and pass-throughs, shall conform to the requirements of applicable portions of Sections 301 and 302.

303.04 MEASUREMENT AND PAYMENT

303.04.01 Manholes Over Existing Sanitary Sewers

Measurement and payment for manholes over existing sanitary sewers or storm drains will be made at the unit price for each. Payment will include compensation for excavation and backfill, constructing manhole over existing sewer, final adjustment to grade, maintaining flow and forming new flow channel.

303.04.02 Removal of Existing Pipes, Manholes and Appurtenances

Payment for removal and disposal of existing pipes, manholes and appurtenances will be considered as incidental to the work and included in the bid item for excavation and backfill as specified in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL.

303.04.03 Connection to Existing Manholes

Measurement and payment for connection to existing manholes will be made on a unit price each basis.

303.04.04 Prefabricated Inside Drops (Oregon Drops)

Measurement and payment for prefabricated inside drops will be made on a unit price each basis.

303.04.05 Filling Abandoned Manholes

Measurement and payment to filling abandoned manholes will be made on a unit price each basis.

303.04.06 Adjust Existing Structures to Grade

Measurement and payment for adjusting existing manholes, cleanouts, and similar structures will be made on a unit price each basis for the type shown in the Proposal.

303.04.07 Reconstruct Manhole Base

Measurement and payment for reconstructing manhole base will be made on a unit price each basis.

END OF DIVISION

DIVISION FOUR
WATER TECHNICAL REQUIREMENTS

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401 WATER LINE TRENCH EXCAVATION, BEDDING, AND BACKFILL

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The work necessary in excavating, bedding, and backfilling water pipelines shall conform with the requirements of Division 2.

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402 WATER PIPE AND FITTINGS

****

402.01 DESCRIPTION

This work consists of furnishing and installing water pipe and fittings normally used for water distribution systems.

402.02 MATERIALS

402.02.01 Certification

The contractor shall furnish materials certifications in accordance with Division 1.

402.02.02 Ductile Iron Pipe

Ductile iron pipe shall be cement-mortar lined and seal-coated and shall conform with ASTM 536, AWWA C 151, AWWA C 104, and AWWA C 111.

402.02.03 Polyvinyl Chloride (PVC) Plastic Pipe

PVC pressure pipe with diameters of 4 through 12 inches shall conform with AWWA C 900. The pipe shall have elastomeric gasket joints conforming with ASTM D 3139. Gaskets shall conform with ASTM F 477 and ASTM D 1869.

PVC pressure rated pipe shall conform with ASTM D 2241. Joints shall be elastomeric gasket or solvent cement welded. Gasket joints shall conform with ASTM F 477 and ASTM D 1869. Solvent cemented joints shall conform with ASTM D 2672 or ASTM D 3036. Solvent cement shall conform with ASTM D 2564.

402.02.04 Glass Fiber Reinforced Thermosetting-Resin Pressure Pipe

Glass-fiber-reinforced thermosetting-resin pressure pipe shall conform with ASTM D 339.

402.02.05 Reinforced Concrete Steel Cylinder Pipe

Reinforced concrete steel cylinder pipe shall conform with AWWA C 300. Before starting

fabrication, the contractor shall furnish the engineer with two sets of shop drawings conforming with Division 1. The drawings shall include a laying plan and details of a standard pipe section, special fittings, and bends. Dimensions, coating and lining, and other pertinent information shall be shown. The laying plan shall show the location of each pipe section and each special length with each piece numbered or otherwise designated in sequence.

402.02.06 Prestressed Concrete Steel Cylinder Pipe

Prestressed concrete steel cylinder pipe shall conform with AWWA C 301. Shop drawings shall be furnished in accordance with Division 1.

402.02.07 Reinforced Concrete Pipe

Reinforced concrete pipe shall conform with AWWA C 302

402.02.08 Pretensioned Reinforced Concrete Steel Cylinder Pipe

Pretensioned reinforced concrete steel cylinder pipe shall conform with AWWA C 303. The contra ctor shall furnish the engineer with working drawings in accordance with Division 1.

402.02.09 Steel Pipe

Steel pipe 6 inches and larger in diameter shall conform with AWWA C 200. Protective coatings and linings shall conform with AWWA C 204, AWWA C 205 and AWWA C 210. Field welding shall conform with AWWA C 206.

402.02.10 Service Line Pipe

Service line pipe shall conform with AWWA C 800.

402.02.11 Pipe Fittings

Pipe fittings shall be at least equal in class to the pipe on which they are used. Joint materials shall be compatible with the adjacent pipe. All tees, crosses, elbows, reducers, and other miscellaneous iron fittings shall be cement-lined gray or ductile cast iron conforming with AWWA C 110. Cement lining shall conform with AWWA C 104. All fittings shall have minimum pressure ratings of 150 psi. Cast bronze fittings for making threaded joint connections shall conform with ANSI B16.15. Fittings for making connections with flared copper tubing shall conform with ANSI B16.26. Pipe fittings shall conform with AWWA C 800 excluding lead pipe.

402.02.12 Joint Lubricant

Joint lubricant, when required, shall be in accordance with the pipe or joint manufacturer's recommendations and shall be water soluble and non-toxic.

402.02.13 Nuts, Bolts and Washers

Nuts, bolts and washers shall be ductile iron or zinc coated steel. Zinc coating shall be by the hot-dip process and shall conform with ASTM B 6.

402.02.14 Thrust Blocks

Portland cement concrete shall be Class 2400-1 1/2 and shall conform with Section 212. Metal reinforcement shall be Grade 40 and shall conform with Section 504.

402.02.15 Valve Boxes and Vaults

402.02.15A Cast Iron

Cast iron boxes and box components shall conform with ASTM A 48.

402.02.15B Portland Cement Concrete Blocks

Portland cement concrete blocks shall conform with ASTM C 139. Overall thickness of blocks shall be 6 inches with optional lengths and widths. Curved manhole blocks shall be used for round valve chambers.

402.02.15C Portland Cement Concrete

Portland cement concrete shall be Class 3000-1 1/2 and shall conform with Section 212.

402.02.15D Mortar

Mortar shall conform with Section 306.

402.02.15E Concrete Brick

Concrete brick shall conform with ASTM C 55, Grade A.

402.02.16 Joint Restraint

Mechanical joint restraint shall be incorporated into the design of the follower gland, and consist of individually actuated wedges that increase their resistance to pull-out as pressure or external forces increase. The device shall be capable of full mechanical joint deflection during assembly and flexibility of the joint shall be maintained after burial. The joint restraint ring and its wedging components shall be made of grade 60-42-10 to ductile iron conforming to ASTM A536-84. The wedges shall be ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions shall be appropriate to match pipe materials being utilized. Torque limiting twist-off nuts shall be used to insure proper actuation of the restraining wedges. The system shall be rated for working pressures of at least 350 psi for pipes 16 inches and smaller and diameter and 250 psi for larger sizes. The devices shall be UL listed up through 24 inch diameters and FM approved through 12 inch diameters. The restraint systems and devices shall be Series 1100 Megalug restraint, as produced by EBAA Iron, Inc., or approved equal.

402.02.17 Polyethylene Encasement

All ductile iron pipelines on the project shall be provided with polyethylene encasement for corrosion protection. The material shall be 4-mil high density cross-laminated (HDCL) polyethylene, in accordance with AWWA C105-93, and ASTM A674.

402.03 Construction

402.03.01 Handling and Storage

All material shall be handled with care to avoid damage. Material shall not be dropped, bumped, or allowed to impact on itself. The contractor shall provide safe storage for material until it has been incorporated into the work. The interior of all pipe, couplings, rings, fittings, and other accessories shall be kept free from dirt and other foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing. Damaged materials shall be replaced by the contractor at no expense to the owner.

402.03.02 Alignment and Grade

All pipe shall be laid to and maintained at the lines and grades required by the engineer. Fittings, valves, air vents, and hydrants shall be installed at the required locations with joints centered, spigots home, and valve and hydrant stems plumb.

402.03.03 Installation

402.03.03A Ductile Iron Pipe

Installation of ductile iron pipe shall conform with AWWA C 600.

402.03.03B PVC Pipe

Installation of PVC pipe shall be in accordance with the manufacturer's recommendations.

402.03.03C Concrete Steel Cylinder Pipe

Installation of concrete steel cylinder pipe shall be in accordance with the manufacturer's recommendations.

402.03.03D Reinforced Concrete Pipe

Installation of reinforced concrete pipe shall be in accordance with the manufacturer's recommendations.

402.03.03E Steel Pipe

Installation of steel pipe shall be in accordance with the manufacturer's recommendations.

402.03.03F Valves, Fittings, Plugs and Caps

Valves, fittings, plugs, and caps shall be set and joined to the pipe in the manner specified. Valves 12 inches and larger shall be provided with special support such as crushed rock or concrete pads so that the pipe will does not support the weight of the valve. Adjacent pipe shall be supported so as to prevent stress on the valve. Valves shall not be used to bring misaligned pipe into alignment during installation. All dead ends on new mains shall be equipped with blowoff assemblies and shall be closed with plugs or caps suitably restrained to withstand test pressure. Blowoff assemblies preceding the plugs or caps shall be restrained.

402.03.03G Valve Boxes and Vaults

Valve boxes and vaults shall be installed so as not to transmit shock or stress to the valve. The box cover shall be flush with the surface of the area in which installed. The valve operating nut shall be readily accessible for operation through the opening in the box or vault.

402.03.04 Testing

Testing shall be by the hydrostatic method and shall conform with AWWA C 600, Section 4. The test pressure for PVC pipe shall not exceed 150 percent of the rated operating pressure of the lowest rated component in the system. Prior to testing, the pipeline shall be backfilled or anchored to prevent movement during the test.

402.03.05 Disinfection

Disinfection shall conform with AWWA C 601.

402.03.06 Polyethylene Encasement

Installation shall be in accordance with AWWA C105. In addition, methods described in the publication "Polyethelene Encasement", published by the Ductile Iron Pipe Research Association (DIPRA) shall be strictly adhered to.

402.04 Measurement and Payment

402.04.01 Pipe

Pipe will be measured and paid for on a lineal foot basis, to the nearest foot, for the types and sizes listed in the bid schedule including polyethylene encasement. No reduction in length will be made for valves and fittings.

402.04.02 Fittings

Fittings will be paid for at the unit price for each size and type listed in the bid schedule.

402.04.03 Thrust Blocks

Thrust blocks will be measured and paid for at the unit price listed in the bid schedule.

402.04.04 Incidental Work

When not listed in the bid schedule, thrust blocks and fittings, hardware and supplies such as couplings, joint lubricant, nuts, bolts, washers, and polyethylene encasement will be considered incidental work.

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403 VALVES AND METERS

****

403.01 Description

403.01.01 General

This work consists of furnishing and installing valves and meters.

403.01.02 Certification

The contractor shall furnish materials certifications in accordance with Division 1.

403.02 Materials

403.02.01 Gate Valves

Gate valves 3 inches through 48 inches in diameter shall conform with AWWA C 500 or C 509-80. Valves shall open when the stem is rotated counterclockwise. Resilient seated gate

valves shall conform with AWWA C 509.

403.02.02 Butterfly Valves

Butterfly valves shall conform with AWWA C 504. Valves shall be Class 150B.

403.02.03 Ball Valves

Ball valves shall conform with AWWA C 507.

403.02.04 Check Valves

403.02.04A Swing Check Valves

Swing check valves 2 inches through 24 inches in diameter shall be bronze mounted with cast or ductile iron body with outside lever and spring.

403.02.04B Spring-Loaded Plug or Disc Valves

Spring-loaded plug or disc check valves shall be bronze mounted with bronze, cast or ductile iron body, bronze plug or disc, stainless steel spring and resilient seating suitable for clear cold water service. The plug or disc of the check valves shall be easily replaceable.

403.02.04C Hydraulic Cushion Valves

Hydraulic cushion check valves shall be of bronze, cast or ductile iron, with bronze disc and disc faces, seat rings, and pivot pins. The valve shall provide drop-tight sealing. The valve shall be provided with an adjustable-speed integrally-mounted oil dashpot mechanical snubber system.

403.02.05 Hydraulically Operated Valves

Hydraulically operated valves shall be pilot controlled and diaphragm operated. Valves shall be suitable for 175 psi operation and shall be globe or angle valves. Closing speed shall be adjustable on all valves. Self-cleaning strainers for pilot water supply and valve position indicators shall be provided.

403.02.06 Combination Air and Vacuum Release Valves

Combination air and vacuum release valves shall be constructed to permit the escape of large volumes of air when the pipeline is being filled with water, so that smaller amounts of accumulated air will be released under normal operating conditions, and so that air may reenter the line to break any vacuum caused by the water leaving the pipeline rapidly. Valves shall have cast iron bodies and covers and stainless steel floats. Float guides, bushings, and lever pins shall be stainless steel or bronze. Valves shall be designed for operating service to 300 psi.

403.02.07 Backflow Prevention Devices

Backflow prevention devices shall conform with AWWA C 506, *Accepted Procedure and Practice in Cross Connection Control Manual* (8-80), Pacific Northwest Section AWWA.

403.02.08 Meters

The units of measure shall be cubic feet.

403.02.08A Displacement Meters

Displacement meters shall conform with AWWA C 700.

403.02.08B Turbine Meters

Turbine meters shall conform with AWWA C 701.

403.02.08C Compound Meters

Compound meters shall conform with AWWA C 702.

403.02.08D Fire Service Meters

Fire service meters shall conform with AWWA C 703.

403.02.08E Propeller Meters

Propeller meters shall conform with AWWA C 704.

403.02.08F Multi-Jet Meters

Multi-jet meters shall conform with AWWA C 708.

403.02.09 Remote Registration Systems

403.02.09A Direct Reading Type

Direct reading remote registration systems for meters shall conform with AWWA C 706.

403.02.09B Encoder Type

Encoder type remote registration systems for meters shall conform with AWWA C 707.

403.02.10 Sluice Gates

Sluice gates shall conform with AWWA C 501.

403.02.11 Valve Boxes

Valve boxes shall consist of a top section, cover, and extension section. The top section shall be 6 1/2 inch inside diameter ductile iron pipe 15 inches long with bell end. The cover shall be of cast iron and have the word "water" cast in its top. The cover shall be circular and designed so as to prohibit debris from entering the enclosure. The extension stem shall be PVC pipe or cast iron with a nominal outside diameter of 6 inches. The length shall be that necessary to properly enclose the valve shaft at each particular location.

403.02.12 Plug Valves

Flanged connection, DeZurik Eccentric Plug Valve, Model 118.F, for approved equal.

403.02.13 Non-Freeze Post Hydrant

Non-freeze post hydrants shall be Zurn Z-1385, size as indicated on the drawings, complying with ANSI A112.21.3M. All non-freeze post hydrants shall be accompanied by a plastic placard affixed to the unit, or nearby declaring "NON-POTABLE WATER - DO NOT DRINK".

403.02.14 Custom Combination Air/Vacuum Valves

Custom Duplex body combination air valve (C.C.A.V.), APCO Catalog No. 623, Model No. 1106A, or approved equal.

403.03 Construction

403.03.01 Valves

Valves shall be installed so that the shafts are vertical. Jointing procedures shall conform with the applicable AWWA specification.

403.03.02 Meters

Meters shall be installed in conformance with the manufacturer's recommendations.

403.03.03 Remote Registration Systems

Remote registration systems shall be installed in conformance with the manufacturer's recommendations.

403.03.04 Sluice Gates

Sluice gates shall be installed in conformance with AWWA C 501 or the manufacturer's recommendations.

403.03.05 Backflow Prevention Devices

Backflow prevention devices conforming with Oregon State Health Division and UPC requirements shall be installed according to the manufacturer's recommendations.

403.03.06 Valve Boxes

Valve boxes shall be centered on the valve shaft. Construction shall conform with Section 402.

403.04 Measurement and Payment

403.04.01 Valves

Valves will be paid for at the unit price for each size and type listed in the bid schedule.

403.04.02 Backflow Prevention Devices

Backflow prevention devices will be paid for at the unit price for each size and type listed in the bid schedule.

403.04.03 Meters

Meters will be paid for at the unit price for each size and type listed in the bid schedule.

403.04.04 Remote Registration Systems

Remote registration systems will be paid for at the unit price for each size and type listed in the bid schedule.

403.04.05 Sluice Gates

Sluice gates will be paid for at the unit price for each size and type listed in the bid schedule.

403.04.06 Valve Boxes

Valve boxes will be paid for at the unit price for each size and type listed in the bid schedule.

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404 FIRE HYDRANTS

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404.01 Description

This work consists of furnishing and installing fire hydrants.

404.02 Materials

404.02.01 General

Materials shall conform with AWWA specifications. The contractor shall furnish materials certifications in accordance with Section 106.

404.02.02 Hydrants

Hydrants shall be of the dry-barrel type and shall conform with AWWA C 502. The bury length shall be a minimum of 3 1/2 feet. Outlet nozzle threads shall conform with NFPA 194, Appendix A, National Standard Thread. Hydrants shall be furnished with two 2 1/2-inch hose nozzles and one 4 1/2-inch pumper nozzle. The nominal diameter of the main valve opening shall be 5 1/4 inches. The base of the hydrant shall be provided with a flange-type joint connection. Gaskets, nuts and bolts for this connection shall be furnished by the contractor. The drain outlet shall be tapped to receive a drain pipe.

404.03 Construction

Hydrant installation shall conform with AWWA Manual M 17 and AWWA C 600. Extensions required for hydrant adjustment shall be installed to the manufacturer's specifications.

404.04 Measurement and Payment

Fire hydrants will be paid for at the unit price listed in the bid schedule.

*** END OF DIVISION ***

DIVISION FIVE
STREET TECHNICAL REQUIREMENTS

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501 SUBGRADE

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501.01 DESCRIPTION

This section covers work necessary for preparation of the subgrade, complete. See also Section 203 for CLEARING AND GRUBBING, and Section 204 for EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL.

Subgrade is defined as the area of new or existing roads, streets, alleys, driveways, sidewalks, or locations upon which additional materials are to be placed as a part of work covered in other Sections or by future work. Where applicable, subgrade may be considered to extend over the full width of the specified base course.

501.01.01 Untreated Subgrade

The material placed in fills or unmoved from cuts in the normal grading of the roadbed and which is brought to true line and grade, shaped and compacted as required by these specifications to provide a foundation for the pavement structure.

501.02 MATERIALS

501.02.01 Water

Conform to the requirements in Subsection 205.2.11 Water.

501.03 CONSTRUCTION

501.03.01 PREPARATION

In advance of setting line and grade, complete clearing and grubbing as specified in Section 203 of these specifications. Drain all depressions or ruts which contain water. Blade and shape subgrade to remove irregularities and secure a uniform surface.

Subgrade upon which pavement, sidewalk, curb and gutter, driveways, or other structures are to be directly placed shall not vary more than .10 foot from the specified grade and cross section. Subgrade upon which subbase or base material is to be placed shall not vary more than .10 foot from the specified grade and cross section at any point. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.

In advance of setting line and grade, the Contractor shall clear and dispose of brush, weeds, vegetation, grass and debris from the subgrade. The Contractor shall drain all depressions or ruts which contain water.

Prior to starting subgrade work, including backfill, all underground work contemplated in the area of the subgrade shall be completed. This requirement includes work on the contract, work to be performed by the owner or by others.

The Contractor shall remove all soft or otherwise unsuitable material as directed and replace with approved material from the excavation. The Contractor shall compact to a line one foot beyond the edge of paving, curb or form.

Subgrade areas which cannot be compacted to specified density, but in the judgment of the engineer otherwise meet the requirements herein, may be removed and aerated or stabilized with an approved soil stabilizing material, all at no additional expense to the Owner.

Subgrade materials which cannot be compacted to specified density because of excess moisture shall be dried out to bring materials to the optimum moisture content. The Contractor shall aerate, drain, rehandle, or by other means at his option remove the excess moisture. Unless otherwise specified in the special conditions, all costs involved in the removal of excess moisture from the subgrade material will be considered incidental and be included in the various other items of work in the Proposal.

501.03.02 Grading of Areas Not to be Paved

When specified, areas within and adjacent to the project which are intended for lawns, planting areas, flower beds and similar uses shall be finished with four (4) inches of topsoil and graded smooth as directed. Topsoil, for such finishing shall be fertile, loamy natural surface soil consisting of sands, silts, clays and organic matter and shall be free of toxic substances, weeds, roots, refuse, sticks, large rocks or lumps. Topsoil available from required excavation shall be used to the greatest extent possible in this work and the provisions of Section RW-02, prohibiting the premature disposal of suitable materials shall apply to topsoil materials.

501.03.03 Overexcavation and Foundation Stabilization

When, in the opinion of the Engineer, unsuitable material or other conditions are discovered which render the subgrade, unable to be compacted to the specified density, then the Engineer may order the Contractor to remove and dispose of the unsuitable material and then backfill with crushed rock as specified in the applicable portions of Section 204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL.

501.03.04 Embankment Construction

The Contractor shall place embankments and fills of all kinds in approximately horizontal layers of a maximum of 8 inches in thickness and compact each layer separately and thoroughly to the density specified.

In the immediate vicinity of curbs, walks, driveways, inlets, manholes and similar structures, in holes and where embankment and fill materials cannot be reached by the normal compacting equipment, the Contractor shall compact to specified density by approved methods.

Where embankments are constructed predominantly of rock fragments, the Contractor shall place material in layers of the thickness as directed, but not greater than three feet. Placing of individual rock fragments having dimensions greater than three feet will be permitted provided that they have no dimensions greater than six feet, that clearances between adjacent fragments provide adequate space for the placing and compacting of material in horizontal layers as specified, and that no part comes within four feet of subgrade. The Contractor shall distribute

and manipulate rock so that the interstices between the larger pieces are filled with smaller places, forming a dense and compact mass.

The Contractor shall exercise caution to ensure that embankment construction and fill does not move, endanger or overstress any structure. The Contractor shall place and compact embankments at the end of bridges prior to the time that work begins on the bridge.

Embankments shall not be constructed when the embankment material, or the embankment on which it would be placed is frozen.

501.03.05 Slides and Slipouts

Material outside the planned roadway or ditch slopes which is unstable and constitutes potential slides, in the opinion of the Engineer, material which has come into the roadway, channel or ditch, and material which has slipped out of new or old embankments shall be excavated and removed. The material shall be excavated to designated lines or sloped either by benching or in such manner as directed by the Engineer. Such material shall be used in the construction of the embankments or disposed of as directed by the Engineer.

The above provisions shall not be so construed as to relieve the Contractor of his obligation to maintain all slopes true and smooth.

501.03.06 Slopes

Excavation and embankment slopes shall be finished in conformance with the lines and grades shown on the plans.

501.03.07 Finishing and Cleanup

All roadbeds, planting areas, ditches, embankments and other areas on which earthwork is performed shall be trimmed reasonably close to established lines, grades, and cross sections and shall be finished in a thoroughly workmanlike manner. They shall be kept free, throughout the work, of debris and foreign matter of all kinds and prior to final acceptance the entire right-of-way shall be cleaned up and finished as directed.

501.03.08 Compaction and Density Requirements

The density of compacted materials in place will be determined by AASHTO T191, and the maximum density by AASHTO T99 OR T180 as specified.

The Contractor shall compact all embankments, fills and backfills within three feet of established subgrade elevation to a minimum density in place of 95 percent of maximum density. Below said three-foot limit, compaction shall be a minimum density in place of 90 percent of maximum density.

Roadbed cuts and foundations for structures to a depth of 1 foot below established subgrade or foundation elevation shall be three-inch maximum material and shall be compacted to a minimum density in place of 95 percent of maximum density.

501.04 MEASUREMENT AND PAYMENT

501.04.01 Measurement

501.04.01A Incidental Work

No measurement will be made for work involved in draining water from the subgrade, smoothing the subgrade in preparation for staking, or blading, shaping, and compacting the subgrade including roadbed materials to a depth of 12 inches below the subgrade, to final line, grade, and cross section. All work involved in these processes will be considered incidental to and included in the various other items of work in the Proposal.

Water used in the work (compaction, dust control, etc.) will be considered incidental to and included in the various other items of work in the Proposal.

501.04.01B Untreated Subgrade

No measurement and payment will be made for preparation of untreated subgrade unless otherwise provided.

501.04.01C Overexcavation and Foundation Stabilization

Measurement for overexcavation will be made on cubic-yard basis for quantities removed, and foundation stabilization will be made on a ton basis for the number of tons of crushed rock used to backfill the overexcavated areas, as weighed on approved and tested scales. Trip tickets shall be given to Engineer as specified in Subsection 503.04.01C.

501.04.01D Embankment Measure

"Embankment in Place" will be measured by the cubic yard in embankment as set forth in the two paragraphs which follow.

The pay quantities of "Embankment in Place" will be determined by cross-section measurement of the material in place in final embankment position in the work as specified and in accordance with the directions of the Engineer. The pay quantities of "Embankment in Place" will be limited to the neat lines of specified cross-sections, lines, grades, and slopes and above the ground or base elevations existing at the time embankment construction thereon begins. The pay quantities will not include additional quantities required due to subsidence and settlement of the ground or foundation, to settlement of materials within the embankments, or to shrinkage, settlement, washout, slippage, or loss regardless of cause.

There will be no measurement of overhaul on "Embankment in Place" materials.

501.04.02 Payment

501.04.02A Overexcavation and Foundation Stabilization

Payment for overexcavation will be made on a cubic-yard basis, and foundation stabilization will be made on a ton basis for crushed rock incorporated in the work.

501.04.02B Embankment in Place

Payment for "Embankment in Place" will comprise full compensation for the excavating, selecting, handling, hauling, placing, and compacting of the materials and all other costs incurred in the construction of the embankments involved.

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502 WATERING

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502.01 DESCRIPTION

This section covers work necessary to furnish and apply water for roadway excavations, fills, subgrades, roadbeds, backfill, subbases, bases, and surfacings, and water used for the alleviation or prevention of dust within the project limits.

502.02 MATERIALS

502.02.01 WATER

Water shall be free of silts and other deleterious matter. Make all necessary arrangements and pay all costs for obtaining water. Maintain an adequate supply of water at all times to complete the required work.

502.03 CONSTRUCTION

The Contractor shall make all arrangements necessary for the procurement of water and its application. The Contractor shall obtain a hydrant meter from the Engineer for the purposes of measuring all water used on the project.

Water by means of tank trucks equipped with spray bars, by hose and nozzle, or by other approved equal means which ensure uniform and controlled application. The use of splash boards will not be permitted without prior approval.

Perform watering at any hour of the day and on any day of the week as necessary.

502.04 PAYMENT

502.04.01 WATER ON INCIDENTAL BASIS

When neither specified nor shown in the Proposal for separate payment, all water will be considered incidental to the other items of work and no separate payment will be made.

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503 AGGREGATE BASES

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503.01 DESCRIPTION

This section covers work necessary to furnish and place one or more courses of aggregates and water, as base, on a prepared surface.

503.02 MATERIALS

Aggregates for aggregate base shall be crushed gravel or crushed rock. Aggregate for subbase shall be crushed gravel or crushed rock including sand.

503.02.01 Aggregate

Coarse and fine aggregates shall conform to requirements of Section 205 MATERIALS - TYPES AND USE and to additional requirements contained herein.

503.02.02 Sand Equivalent

Base aggregates to be incorporated in the work shall have a sand equivalent of not less than 30 when tested in conformance with AASHTO T 176.

503.02.03 Liquid Limit and Plasticity

Base aggregate shall meet the requirements for Liquid Limit and Plasticity Index of Subsection 205.02.12C FINE AGGREGATE.

503.02.04 Grading Requirements

The base aggregates shall be uniformly graded from coarse to fine and shall conform to one or another of the following grading requirements as specified:

	Separated Sizes				
	2½" - 0	2" - 0	1½" - 0	1" - 0	¾" - 0
Sieve Size	Percentages (by weight)				
3"	100				
2½"	95 - 100	100			
2"		95 - 100	100		
1½"			95 - 100	100	
1¼"	55 - 75				
1"		55 - 75		90 - 100	100
¾"			55 - 75		90 - 100
½"				55 - 75	
3/8"					55 - 75
*¼"	30 - 45	30 - 45	35 - 50	40 - 55	40 - 60

*Of the fraction passing the 1/4-inch sieve, 40 percent to 60 percent shall pass the No. 10 sieve.

For determination of sizes and grading conform to AASHTO T 27. Where 1"-0 base aggregate is approved for use, at least 70 percent (by weight) of the material passing the 1/4" sieve but retained on the No. 10 sieve shall have at least one mechanically fractured face.

503.02.05 Acceptance

Materials will be subject to acceptance as follows:

Construction Method	Time of Acceptance
Stationary plant mixed	Immediately following mixing
Travel plant mixed	After mixing and before laying
Road mixed	After mixing and before compacting

Acceptance will be based on periodic samples taken following mixing, or gradation test reports supplied by the Contractor.

503.03 CONSTRUCTION

503.03.01 Preparation of Subgrade

Ensure that all surfaces and materials on which subbase or base is to be constructed are firm and have been prepared as specified in the applicable portions of Section 501 SUBGRADE.

503.03.02 Mixing

Mix to provide a homogeneous mixture of unsegregated and uniformly dispersed materials which will compact to not less than 95 percent maximum density as specified in Subsection 503.03.04. Add water during mixing in amount sufficient to provide optimum moisture content plus or minus two percentage points.

503.03.03 Placing

503.03.03A Weather Limitations

When the weather is such that satisfactory results cannot be secured, the Contractor shall suspend operations. Place no surfacing materials in snow or on a soft, muddy, or frozen subgrade. Owner will not be liable to damages or claims of any kind or description by reason of operations being suspended due to weather limitation.

503.03.03B Equipment

Furnish equipment that will provide for efficient and continuous operations insofar as practicable.

Aggregate bases shall be deposited on the roadbed at a uniform quantity per linear foot so that the Contractor will not resort to spotting, picking up, or otherwise shifting of aggregate base material. Segregation of aggregates shall be avoided and the material as spread shall be free of pockets of coarse or fine material.

Spreading equipment shall have an adjustable screed or strike-off assembly and it may

have a receiving, mixing, and distribution system. It may be a complete and integral unit, self-propelled and powered; a crawler-track or wheeled type tractor intimately combined with a receiving, mixing, spreading, and screeding unit attached thereto; or a heavy-duty self-propelled grader, of an approved type, equipped with at least an eight-foot blade. Equipment shall be capable of spreading or striking off material to the designed line, grade, and transverse slope with surface texture of uniform appearance without excessive segregation or fracture of material.

Spreading equipment may be provided with an automatic control system if Contractor so elects or if specified.

503.03.03C Thickness of Lifts

If the required compacted depth of the base course exceeds six inches, construct in two or more layers of approximately equal thickness. Maximum compacted thickness of any one layer shall not exceed six inches. Place each layer in spreads as wide as practicable and to full width of the course before a succeeding layer is placed.

503.03.04 Compaction

At the time compaction begins, the materials shall be at optimum moisture content, plus or minus 2%. Compaction of each layer shall continue until a density of 95% of Relative Maximum Density has been obtained according to OSHD TM 106 and OSHD TM 306C. Water shall be added to the materials, as necessary during the compaction, to maintain the proper moisture content and upon completion of each layer, the Contractor shall maintain the materials in specified conditions until it is covered by the following layer or course.

503.03.05 Surface Finish

Surface of the base shall parallel the established cross section and grade for the finished surface within 0.04 foot. The finished surface of base, when tested with a 12-foot straight edge shall not vary from the testing edge by more than 0.04 foot at any point.

503.04 MEASUREMENT AND PAYMENT

503.04.01 Measurement

503.04.01A Square Yard Basis

Measurement of aggregate base made on a square yard basis will be made of width and length of each separately constructed strip of aggregate base incorporated in the work and accepted, wherein width is the design width or edge-to-edge width of aggregate base, whichever is the lesser, and length is from end to end along the center of the strip. Measurement shall be on the surface of the aggregate base to the nearest 0.1 foot and the square yardage shall be to the nearest full square yard.

Extra thickness of aggregate base, when directed by the Engineer, will be measured by conversion on a proportionate volume basis to an equivalent number of square yards of specified standard thickness of base.

503.04.01B Cubic Yard In Place Basis

Measurement of aggregate base made on a cubic yard in place basis will be made taking

depth tests or cores at the rate of 1 depth test for each 300 square yards of base course, or by means of average end areas on the complete work computed from elevations to the nearest 0.01 foot. On individual depth measurements, thicknesses more than 1/2-inch in excess of that shown shall be considered as specified thickness.

503.04.01C Ton Basis

Measurement made on a ton basis will be for the number of tons of aggregate base, as weighed on approved and tested scales. Give trip tickets to the Engineer for his signature as the material is delivered. Each trip ticket shall show the date and time of delivery, truck number, driver's name, net weight of material, and will be considered as valid delivery receipts only when signed by the Engineer. Deductions in weight will be made at the point of weighing for moisture in excess of the optimum moisture content determined for the material being supplied.

503.04.02 Payment

Payment will be made on square yard, cubic yard, or ton basis as shown on the Proposal.

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504 CEMENT TREATED BASE

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504.01 DESCRIPTION

This section covers the work necessary for the furnishing and construction of the cement treated base complete.

504.02 MATERIALS

Composition of Mixture

The CTB mixture shall be comprised of aggregate, Portland cement, and water in the proportions and amounts established by the mix design. The cement content normally is to be between 4.5 and 5.5 percent of the dry weight of the aggregate. The mixture shall be proportioned to provide for a minimum 28-day ultimate compressive strength of 1,000 psi. The proportions of the materials will be subject to change as required to meet the herein specifications.

In all plants, the weight or rates of feed of aggregates and water shall be within five percent of the amounts of each material that are specified. The weights or rates of feed of cement shall be such that the variations in cement content in samples, taken from any part of a mixed batch or from different batches, or from time to time from the product of continuous mixers, or from mixtures spread on the roadbed, shall not have variations above or below the cement content designated by the Engineer of more than 0.5 of a percentage point.

504.02.01 Aggregate

The aggregate shall meet the requirements of Section 503 AGGREGATE BASES and shall be crushed rock or gravel including sand conforming to specifications.

504.02.02 Portland Cement

Cement to be used shall be Portland cement Type I or Type II conforming to the requirements of AASHTO M 85 for low alkali cement. The total alkali content shall not exceed 0.8 percent and the tricalcium aluminate content shall not exceed 10 percent.

504.02.03 Water

Water used in mixing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable matter, or other substance injurious to the finished product, and shall meet the requirements of AASHTO T-26.

504.02.04 Asphalt Materials

The asphalt used for the curing seal shall be emulsified asphalt meeting the requirements of Subsection 205.02.13, Asphalt Materials.

504.02.05 Mix Design and Certification

Ten days prior to production, the Contractor shall furnish the Engineer a complete mix design showing the proportions of all constituents proposed for use and strength test results of samples prepared using the proposed proportions and constituents for a minimum of 7 day, 14 day, and 28 day curing periods. Also, accompanying the mix design, the Contractor shall submit the manufacturer's certification and a copy of test results with respect to the product involved. The certification shall consist of the name of the project, the name and address of the manufacturer and the testing agency and the date of testing. The certification shall also set forth a means of identification which will permit field determination of the product delivered to the project as being the product covered by the certification.

The Contractor shall be responsible for all costs of certification and testing of products in connection therewith.

504.03 CONSTRUCTION

Preparation of Underlying Course

Prior to the production or placing of cement treated base, complete all utility work and prepare the subgrade in strict accordance with Section 501 SUBGRADE.

504.03.01 Mixture

The CTB mixture shall be mixed at a centrally located plant of the batch type or of the continuous mixing type, capable of providing a mix of aggregate, cement, and water of uniform proportions and consistency as designated by the mix design.

The charging of the materials into the mixer shall be by means whereby the quantities of the several materials are accurately controlled. Mixing shall continue until a uniform and homogeneous mixture of aggregate, cement, and water has been obtained. In general, the time of mixing shall not be less than 30 seconds, except that the time may be reduced when tests indicate that the requirement for the variation of cement content, as specified, can be consistently complied with.

504.03.02 Weather Limitations

The CTB shall be constructed in accordance with the weather limitations as set forth in Section 701 CONCRETE STRUCTURES.

504.03.03 Equipment

Equipment used shall conform to the following requirements unless otherwise approved:

504.03.03A Hauling Equipment

Vehicles for hauling the mixture shall be watertight, agitating, or nonagitating, and capable of discharging the mix without waste and with practicable minimum amount of separation.

504.03.03B Spreading Equipment

Spreading of the CTB mixture shall be by a machine which has an adjustable screed or strike-off assembly and it may have a receiving and distribution system. The equipment shall be capable of spreading the material and striking it off to the required thickness and the designated line, grade, and transverse slope without segregation, dragging, or fracture of material. The spreading and screeding equipment may be a complete and integral unit, self-propelled and powered; a crawler-track or wheeled type tractor intimately combined with a receiving, spreading, and screeding unit attached thereto; or, if approved by the Engineer a heavy duty self-propelled grader, equipped with at least an eight-foot blade. The screed or strike-off assembly shall operate by an approved action which produces specified results and a surface texture of uniform appearance.

Spreading equipment which rides on freshly spread material and produces tracks or partially compacted areas thereon will be acceptable provided no displacement of material or filling of tracks occur, and provided further that the tracks are not of such depth as to be visible after compaction is completed.

The spreading equipment may be provided with a control system automatically controlling the laying of the mix to specified transverse slope and longitudinal grade by means of actuation from an independent line and grade control reference, if the Contractor so elects.

504.03.03C Other Equipment

Equipment shall be provided to apply water by spray method to the CTB mixture during its compaction, the spray attachments being of a type that will produce a uniform and controlled fine spray. Equipment for application of the bituminous curing seal shall provide application by pressure spray method in a uniform and controlled application. Motor graders shall be available for correction of unavoidable segregation at edges of the mix.

504.03.03D Compacting Equipment

Compaction shall be with vibrating type, pneumatic tire type, steel wheel type, or other approved type compactor, as the Contractor may elect; provided however, that compactors with lugs, projections, or other features that would leave ruts, holes, grooves, or uneven surfaces in the CTB after compaction or which would loosen the mixture while operating will not be permitted. Either a pneumatic tire roller or a smooth steel wheel roller shall be provided for the final rolling and compacting of the mixture.

504.03.04 Hauling and Placing

Maintain the surface of the underlying course in a wet condition by sprinkling just in advance of placing. The CTB mixture shall be delivered an deposited without delay. Mixture which has begun to harden and take an initial set prior to placement, or which has been retempered in transit with water, will be rejected and shall be wasted at the sole expense of the Contractor.

The mixture shall be delivered to the spreading machine by direct deposit in the receiving hopper, by placing in windrows in front of the machine, or by other means acceptable to the Engineer. If material is placed in windrows it shall be deposited on the roadbed at a uniform quantity per lineal foot, which quantity shall be sufficient to provide the required compacted thickness without resorting to excess spotting, picking-up, or otherwise shifting or the mixture. The mixture shall be delivered and placed without hauling equipment operating over any uncured material.

The mixture shall be spread and screeded by specified equipment in one or more layers to provide the compacted thickness called for by the Drawings. Placing shall be in strip widths which will hold the number of longitudinal joints to a practicable minimum, normally to not less than 10-foot widths.

The depositing and spreading shall progress continuously without breaks insofar as is practicable. Should stoppage of operations be of such duration as to allow the mixture to take its initial set, the Contractor shall construct a transverse construction joint as hereinafter provided.

The mixture shall be spread and screeded to required thickness and to designated line, grade, and transverse slope without segregation, dragging, or fracture of the components of the mixture.

Motor graders shall be used to correct unavoidable segregation at edges and to reprocess minor areas of deficiency.

504.03.05 Thickness and Number of Layers

If the required compacted depth of CTB exceeds six inches (6"), it shall be constructed in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed six inches (6").

504.03.06 Construction Joints

When it is necessary, due to the termination of the day's run or to shutdown, to discontinue placing the mixture for a period of time which will allow the placed mixture to take its initial set, the Contractor shall construct a temporary transverse construction joint. This joint shall be formed with a wooden block, such as a six-inch thick timber with width equal to or greater that the depth of the course, or with other devices acceptable to the Engineer, extending across the width of the strip and held firmly against the vertical end of the strip of mixture which is to terminate at the joint. The top of the joint form shall be set true to the slope and grade of the CTB and shall be firm under pressure from compacting equipment. When construction of the CTB is resumed, the form shall be removed without damage to the adjacent CTB.

504.03.07 Compaction

Compaction of the CTB mixture with specified compactors shall begin as soon as it has been

spread and shall be continuous until completion. Not more than sixty (60) minutes shall elapse between the start of the mixing and the time of starting compaction of the CTB mixture on the prepared subgrade. Compaction shall begin at edges and shall be controlled to prevent breakdown at the sides of a strip.

Successive passes of the compactor shall be so spaced that no more than 75% of the compactive width of the compactor shall be on an uncompacted area at any time.

During compacting, sprinkling with water by fine spray application shall be done at the time and in the amounts required. Surfaces of uncompacted, partially compacted mixture shall be kept moist at all times until the bituminous seal has been placed thereon.

Compaction on the completed CTB shall be 95 percent of the maximum density indicated by the mix design.

504.03.08 Surface Finish

The CTB surface shall parallel the cross section and grade of the finished surface within 0.04 foot, and when tested with a 10-foot straight edge shall not vary from the testing edge by more than 0.03 foot at any point.

When Portland cement concrete pavement is to be placed on the CTB, the surface of the CTB at any point shall not extend above the grade established by the Engineer. The specified finish shall be attained by the following method.

After compaction of the final lift, the surface of the CTB shall be brought within the specified tolerances by trimming with a subgrade planner, by motor grader equipped with an electronically controlled blade or by grinding. Areas on which trimming or grinding is performed shall be rolled until a smooth surface is attained.

The excess material may be used at other locations in the work area provided said excess material complies with applicable specification requirements.

504.03.09 Bituminous Curing Seal

As soon as possible after each layer of the CTB is constructed; as herein- before specified, and while it is still moist, the surface and exposed edges shall be covered with a bituminous curing seal. The liquefied asphalt shall be applied at a uniform rate between .25 gallon and .35 gallon per square yard by a pressure spray method.

After the curing seal has been applied, it shall cure for a period of 4 days and during this period no vehicle shall be permitted to use the section. In case of damage to the curing seal, after application and during the curing period, the damaged section shall be repaired by the Contractor immediately by resealing at his own expense.

The curing seal on any lift of CTB may be omitted if, within two hours after the start of mixing of the preceding lift of CTB, a succeeding lift of material (CTB, bituminous base or asphalt concrete) is placed over the preceding lift. Vibratory rollers will not be permitted in the compaction of any succeeding lift of CTB, bituminous base, or asphalt concrete during the period of time from two hours to 96 hours after the mixing of any of the underlying lifts of CTB.

504.03.10 Care of Work

During the construction of the CTB, the Contractor shall exercise care to protect the work from damage. Following construction of each strip and each layer of the base and following construction of the entire course of the CTB, the Contractor shall perform such work as specified and as the Engineer may determine to be necessary to prevent raveling and rutting, to prevent segregation of materials, and to maintain the layer or course of the CTB to the specified compaction and surface finish; all until the strip, layer, or course is covered by a following layer or course of material as specified or until all work under the contract is completed.

504.03.11 Modification of Equipment and Methods

On tapers and other areas of irregular shape, limited length, restrictive width or other condition where the Engineer determines that full compliance with the above equipment and construction requirements is not practicable, the specified equipment and construction requirements may be modified, subject to approval by the Engineer.

504.03.12 Timing of Operations, Adequacy of Organization, and Rejection of Mixture

All operations involved in constructing the CTB shall be so timed and coordinated that regardless of daily or seasonal variations in weather, temperature and humidity, such work shall result in a finished CTB conforming in all respects to specified requirements.

In this respect, the Contractor shall provide and have readily available at all times adequate equipment, tools, material, and labor; and shall achieve the hauling, spreading, compacting, and trimming of the CTB mixture within two hours after mixing.

Any CTB mixture not placed and trimmed within this two-hour period shall be subject to rejection, wasting, removal, and replacement as the Engineer determines to be applicable, and all costs involved in such removal, wasting, and replacement shall be borne by the Contractor.

504.03.13 Handling Traffic Over Cement-Treated Base

At locations where traffic must be routed over the cement-treated base, the CTB mixture shall be made with Type III or Type IIIA (high early strength) cement to expedite development of strength at an early date. Any extra costs of using high early strength cement shall be considered as incidental, with payment therefor covered in the pay item "Portland Cement in CTB Mixture."

If the Engineer so directs, traffic over recently constructed CTB shall be controlled as to speed and routing.

504.03.14 Testing

Materials and Mixture

Aggregate and cement will be subject to acceptance as specified under MATERIALS. Plant mixed mixtures will be subject to final acceptance after blending and mixing either at the plant or place of delivery. Acceptance will be based on periodic sample taking.

When specified the Contractor shall furnish certified laboratory tests that show results of the

tests at no expense to the City. The Engineer may do sampling and/or testing of the materials. If evidence of non-compliance with the requirements exist, additional tests may be required to assure that the materials meet the requirements as specified at the sole expense of the Contractor.

504.03.14A In-Place Sample

The Engineer shall be permitted to cut samples or to take cores, or to require the Contractor to cut samples or take cores, from the full depth of the compacted mixture or from the separate layers and courses thereof for testing purposes, and at such locations and at such frequencies as the Engineer determines necessary for proper representation. Sampling shall be at the expense of the Contractor. Where samples have been taken and the samples show deficiencies according to these specifications, the Contractor shall repair the cuts or cores with like material and shall make repairs to the pavement as directed by the Engineer, all at not expense to the City.

504.04 MEASUREMENT

504.04.01 Cement Treated Base

Quantities for CTB will be measured on a square yard basis. The measurement will be based upon the surface length and width, up to the specified length and width, of the CTB measured to the nearest 0.1 foot and the area measured to the nearest square yard.

504.04.02 Bituminous Curing Seal

The asphalt emulsion used for the bituminous curing seal shall be measured on a square yard basis, and shall include only that asphalt emulsion actually incorporated in the seal.

504.04.03 Payment

Payment for the cement treated base and asphalt curing seal shall be based on the price stated in the Contractor's Proposal and shall be understood to comprise full and complete compensation for all labor, equipment, tools, materials, and incidentals necessary for all of the contract work as specified under or covered by this Section.

When neither specified or listed in the Proposal for separate payment, any and all work specified for performance under or covered by this Section will be considered as incidental work for which no separate payment will be made.

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505 ASPHALT CONCRETE PAVEMENT

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505.01 DESCRIPTION

This section covers work necessary for the construction of hot mix asphalt pavements under prepared foundations or base surfaces.
Hot mix asphalt concrete is defined as a mixture of asphalt cement; well graded, high quality aggregate; mineral filler and additives as required; heated and plant mixed into a uniformly coated mass, hot laid on a

prepared foundation and compacted to specified density.

505.02 MATERIALS

505.02.01 General

Asphalt and aggregate shall meet OSHD requirements for Light Duty AC and will be subject to approval preceding mixing. Plant mixed mixtures will be subject to final approval after blending and mixing, either at the plant or at the place of delivery prior to rolling. Approval will be based on periodic sampling and testing of the materials.

505.02.02 Asphalt Cement

Asphalt materials incorporated in the mix shall be PBA-2 grade asphalt that conforms to requirements of Section 205 MATERIALS - TYPES AND USE.

505.02.03 Aggregates

Aggregates shall conform to requirements of Section 205 MATERIALS - TYPES AND USE.

505.02.04 Mineral Filler

Mineral filler shall conform to the requirements of AASHTO M 17.

Collector dust may be used as mineral filler, in whole or in part, provided the dust or the resultant mineral filler mixture conforms to the above requirements.

505.02.05 Additives

Additives and admixtures may be used to prevent stripping or separation of bituminous coatings from aggregates, and to aid in the mixing or use of bituminous mixes or for experimental purposes. Use admixtures and additives of standard recognized products of known value for the intended purpose and obtain approval on the basis of laboratory tests prior to their use. They shall have no deleterious effect on the bituminous material and shall be complete miscible.

505.02.06 Composition and Proportion of Mixtures

The class of asphalt concrete to be used shall be as shown and shall conform to the following requirements:

	DENSE GRADED Percentage of Total Aggregate (by weight)		
Sieve Size Passing	Class "B"	Class "C" (Mod.)	Class "D"
1"	99 - 100	----	----
¾"	92 - 100	99 - 100	----
½"	75 - 94	91 - 100	99 - 100
¼"	50 - 70	58 - 73	85 - 100
#10	21 - 41	24 - 36	37 - 57
#40	6 - 24	8 - 18	13 - 29

#200	2 - 7	3 - 8	4 - 9
Asphalt Cement**	4 - 8	3 - 8	4 - 8

* Including Lime or Cement Filler.
**Percent of total mix (by weight).

The amount of new asphalt cement to be added to the recycled mixture will vary from 3-8%.

Class "B", "C", and "D" asphalt concrete shall meet the following qualifying test requirements:

Test	Test Method	Requirements
Stability, First Compaction	OSHD Standard Test*	35 min. (residential streets) 40 min. (arterial streets)
Voids, First Compaction	OSHD Standard Test*	7% maximum
Voids, Second Compaction	OSHD Standard Test*	1% minimum
Retained Strength	AASHTO T 165-Modified	70% minimum

*Available from Engineer or Materials, ODOT, Salem, Oregon 97310.

505.02.07 Mix Formulas

The Contractor may be required to submit a job-mix formula for review by the Engineer.

The job-mix formula shall indicate the gradation of each of the several aggregate constituents to be used in the mixture and shall establish the exact proportion of each constituent to be used to produce a combined gradation of aggregate within the appropriate limits stated above.

The job-mix formula shall also indicate the ASTM bulk specific gravity of each aggregate constituent, the measured maximum specific gravity of the mix at the optimum asphalt content determined in accordance with ASTM D 2041, all properties as stated in Subsection 505.02.06 of these specifications for at least four different asphalt contents other than optimum, two of which will be below optimum and two of which will be above optimum, the percent of asphalt lost due to absorption by the aggregate, and any other information pertinent to the design of the mix.

505.02.08 Recycled Asphalt Pavement (RAP) Materials Permitted

The Contractor shall have the option of using processed recycled asphalt pavement materials in the production of new asphalt concrete pavement. The RAP materials proposed for use in the recycled mix shall contain hard, sound, and durable aggregates, and asphalt of a composition to provide properties equivalent to asphalt as specified in these specifications when in the mix. Recycled material which is used in the asphalt concrete pavement shall have a maximum size of one-inch prior to entering the cold feed. If there is evidence of the recycled material not breaking down during the heating and mixing of the asphalt concrete mixture, the Engineer may elect to modify the maximum size requirement. Not more than 20 percent, by weight, of recycled materials may be used in the mix.

505.02.09 Tolerances

After the mix formula is submitted, the several constituents shall meet the following tolerances,

but always within the range of proportions specified in Subsection 507.02.06:

Asphalt Concrete Mix Tolerances

Constituent of Mixture	Tolerance (± to Job Mix Formula)
Aggregate passing 1", ¾", ½" sieves -	Within the range of the proportions specified in Subsection 505.02.06:
	Specifications
Aggregate passing ¼" sieve	6.0%
Aggregate passing No. 10 & No. 40 sieve	5.0%
Aggregate passing No. 200 sieve	2.0%
Asphalt cement	0.5%
Temperature of mixture at time it is placed in final position	240 - 300°F

Each day the Engineer shall be permitted to take as many samples as he considers necessary for checking the uniformity of the mixture. When unsatisfactory results or other conditions make it necessary, the Engineer may require a new mix formula.

Should a change in source of material be made, or should conditions arise which the Engineer determines to be justified, the Contractor shall establish a new job-mix formula.

The materials to be used in the work shall be of such nature that a mixture of them, proportioned in accordance with the mix formula, will have a retained strength of no less than 70% when tested in accordance with AASHTO T 165 as modified by OSHD test methods. The Engineer shall be permitted to take as many samples as he considers necessary for checking the uniformity of the mixture.

505.02.10 Feathering

Asphalt concrete for use in feathering at curb or gutter lines, at intersections, at connections with existing pavement, in spot patching, and under similar conditions, shall be a fine mix of asphalt concrete such as Class "D" mix.

505.03 CONSTRUCTION

505.03.01 Prepaving Conference

The Contractor and his supervisory personnel plus any subcontractors and their supervisory personnel who are to be involved in the paving work shall meet with the Project Manager and his representatives for a prepaving conference at a time mutually agreed upon. At this conference, the Contractor shall discuss his methods of accomplishing all phases of the paving work. The plan of the work, order of paving and other details of performance shall meet with the approval of the Engineer.

505.03.02 Preparation of Bases

All pavement bases and foundations constructed under this Contract shall be completed and

finished as prescribed under the applicable specification for its construction.

Manholes, inlets, water valve boxes, and other such structures shall have been completed, cured, and otherwise prepared, as applicable, and made clean and ready for asphalt pavement. Unless otherwise approved, manholes shall be adjusted so that they can be paved over and then later adjusted as shown on the Standard Drawing. Paint vertical surfaces that will come in contact with asphalt pavement with tack coat material to provide a good bond and seal. Cover top surfaces with paper or other material to prevent adherence of asphalt pavement, tack coat, or prime coat.

505.03.03 Reconditioning Old Roadbed

This work consists of reconditioning and preparing previously constructed roadbed subgrades, existing stone bases and surfacings, and existing pavements; none of which were constructed by the Contractor under the pertinent Contract but on which an additional layer or course of material is to be placed.

Existing aggregate subbases, bases, and surfacings shall be bladed, scarified, leveled, and compacted in conformance to lines, grades, and cross sections as established and the density and tolerance requirements of Section 503 AGGREGATE BASES.

Prelevel uneven or broken bituminous, cement concrete, or brick surfaces with asphalt concrete as specified. Spread and compact preleveling asphalt concrete to the density and surface condition as directed.

505.03.04 Tack Coat

Asphalt shall consist of emulsified asphalts (CSS-1 or CSS-1h) or an approved equal.

Spread asphalt by means of pressure-spray equipment which will provide uniformity of application at prescribed rates. Do not apply aggregate cover material to the tack coat. Asphalt shall be applied to the prepared surface at a rate of 0.05 gallons per square yard for clean surfaces and up to 0.12 gallons per square yard for dirty surfaces. The tack coat shall not be applied during wet or cold weather or during darkness and apply only so far in advance as is appropriate to maintain a tacky, sticky condition of the asphalt. Apply tack coat in such a manner as to offer the least interference to traffic and to permit at least one-way traffic without pickup or tracking of asphalt.

505.03.05 Mixing

Mix the asphalt concrete by combining aggregate, asphalt, and additives at an approved central mixing plant equipped with controls to accurately measure and monitor the various components of the mix to produce a uniform homogeneous mixture at the specified temperature.

The discharge temperature of the mix will vary with the type of mixing plant, climatic conditions, and other variables. However, the temperature shall be sufficient to provide thorough mixing and coating and to provide a mass viscosity of the mix on the grade which will permit compaction to required density. Mix temperatures and asphalt in storage shall generally not exceed 325 degrees F.

505.03.06 Placing

Conform to the Drawing of work, order of paving, and other details of performance as approved. Lift thickness shall be as shown on the Drawing or specified.

Transport the asphalt concrete mixture from the mixing plant to the point of use in trucks. Send no loads so late in the day as to prevent the spreading and compacting of the mixture during daylight, unless approved lighting is provided.

Hot mix asphalt concrete shall normally be placed on dry prepared surfaces and when air temperature in the shade is 40 degrees F (minimum) and rising. Place Class "E" wearing surface only when the existing pavement temperature is at least 60 degrees F. Placing during rain or other adverse weather conditions normally will not be permitted, except that mix in transit at the time these adverse conditions may occur may be laid provided it is of proper temperature, the mix has been covered during transit, and is placed on a foundation free from pools or flow of water. The temperature of hot mix at the time it is spread into final position shall be between 240 and 300 degrees F, except Class "E" mix shall be between 200 and 250 degrees F.

Lay the mixture in strips of such width as to hold to a practical minimum the number of longitudinal joints required. The longitudinal joints in any layer of pavement shall be offset from those joints in layers below by not less than 12 inches. Before any paving is started, the Contractor shall submit a Drawing indicating locations of longitudinal joints to the Engineer for his review. Take special care at longitudinal joints to provide positive bond and required density.

Bituminous paving machines shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing layers of bituminous mix material in lane widths applicable to the specified typical sections, and to required thicknesses, lines, grades, and cross sections. Machines used for shoulders and similar construction shall be capable of spreading and finishing to the widths shown.

When the capacity of the paver to properly spread and finish exceeds the rate of delivery of mixture, operate the paver at a reduced and uniform speed to give continuous spreading and finishing.

Take care at all times to prevent segregation in the mixture as evidenced by areas of fine and coarse materials, and correct any such segregation with fresh mixture either spread and worked into the surface or by complete removal and replacement of segregated mixture at no expense to the Owner. AT NO TIME SHALL THE COURSE AGGREGATE SEGREGATED FROM THE MIX FROM HAND SPREADING OR RAKING OF JOINTS BE SCATTERED ACROSS THE PAVED MAT. Such material shall be collected and disposed of.

On areas to be patched with asphalt concrete mixture and on areas of irregular shape or limited size, the spreading and finishing requirements may be modified as approved.

Boils and slicks occurring in the pavement must be immediately removed and replaced with suitable materials, at the sole expense of the Contractor.

505.03.07 Paving Plant and Equipment

All plant and equipment used by the Contractor in the preparation and mixing of asphalt

concrete shall conform to the requirements of Section 403.33, "Standard Specifications for Highway Construction" as published by Oregon State Highway Division.

505.03.08 Weigh Scales

When materials are to be measured for payment by weighing on vehicle scales, the Contractor shall provide the scales and transport the materials to the scales provided.

The vehicle scales furnished shall be accurate within the tolerances required by State law and shall be licensed with the Oregon Department of Agriculture. Scales shall be suitable for the weighing to be done and shall be properly installed and maintained.

At each end of the vehicle scale there shall be a straight approach in the same plane as the platform. The approaches shall be of sufficient length and width to ensure the level positioning of combination vehicles longer than the scale platform during weight determinations. All vehicle brakes shall be released while combination vehicle are being weighed.

Vehicle scales shall be inspected and the accuracy tested every six months by either the State Department of Agriculture or a scale service company. Scales installed at a new site shall be inspected and the accuracy tested before use. Testing by a scale service company shall be done by using a minimum of 10,000 pounds of test weights certified by the State Department of Agriculture.

505.03.09 Hauling Equipment

Vehicles used for hauling asphalt concrete mixtures shall have tight, clean, and smooth beds which have been thinly coated with a minimum amount of paraffin oil, lime solution, soapy water or other approved material to prevent the mixture from adhering to the beds. Diesel oil may be used when requested by the Contractor and approved by the Engineer. Its use will be terminated by the Engineer if it is not being used as specified or is a source of contamination for the asphalt mix.

During each application of an approved coating material, and prior to loading, the vehicle bed shall be drained of all excess coating material by raising the truck bed, opening belly dump gates or operating the conveyer belt as appropriate for the type of equipment being used.

Vehicles which cause excessive segregation, which leak badly, or which delay normal operations, as such are determined by the Engineer, shall not be used.

Contractors hauling vehicles shall be so constructed and equipped with covers to protect against moisture and against heat loss, and shall have a 3/8-inch diameter hole near the middle of the left side wall of the bed to allow access for a thermometer.

505.03.10 Asphalt Concrete Pavers

Pavers shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing layers of asphalt concrete material in widths applicable to the specified typical sections, and to required thicknesses, lines, grades and cross sections.

Extensions added to the paver when used on travel lanes shall have the same augering and screeding equipment as the rest of the paver.

The paver shall be equipped with a receiving and distribution system of sufficient capacity for a uniform spreading operation and capable of placing the mixture uniformly in front of the screed without segregation of materials.

The paver shall be designed to compensate for minor irregularities of the base on which it is supported so that such will not be reflected immediately in the surface of the layer being placed. The weight of the paver shall be supported on tracks or wheels none of which shall contact the mixture being laid. The contact area of the screed or strike-off assembly shall be uniform over the entire width of the strip of mixture being placed.

The screed or strike-off assembly shall produce a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture. The paver shall be equipped with either a manual or electronic line and grade control.

505.03.11 Weather Limitations

Asphalt concrete mixtures shall be placed on dry prepared surfaces when the air temperature in the shade and the surface temperature is not less than those specified in the following table:

SURFACE TEMPERATURE LIMITATIONS

Compacted Thickness of Individual Courses	Travel Lanes/Wearing Course	All Other Courses
Less than 1½ inches	60°F	55°F
1½ inches to 2½ inches	50°F	45°
Over 2½ inches and other	40°F	40°F

Placing of any mixture during rain or other adverse weather conditions normally will not be permitted, except that mix in transit at the time these adverse conditions occur may be laid if of proper temperature, if the mix has been covered during transit, if placed on a foundation free of pools, or flow of water and if all other requirements of these specifications are met. Asphalt concrete mixtures shall not be placed when the underlying layer is frozen, or when, in the opinion of the Engineer, weather conditions either existing or expected will prevent the proper handling, finishing, or compaction of the mixtures.

505.03.12 Compaction

The Contractor will not be permitted to use any equipment which crushes the aggregate to any extent. However, he will be required to obtain the densities required in Subsection 505.03.14.

505.03.13 Compactors

Rollers shall be steel wheel, pneumatic tire, vibratory or a combination of these types as the Contractor may elect. They shall be in good condition and capable of reversing without backlash.

505.03.13A Steel Wheel Rollers

Steel wheel rollers shall have a minimum gross static weight of 8 tons and a minimum static weight on the drive wheel of 250 pounds per inch of width. For finish rolling a 6-ton minimum gross static weight is acceptable and the 250 pounds per inch of width will not be required.

505.03.13B Vibratory Rollers

Vibratory rollers shall be equipped with amplitude and frequency controls and shall be specifically designed for compaction of asphalt concrete mixtures. The rollers shall be capable of frequencies of not less than 2,000 vibrations per minute.

505.03.13C Pneumatic Rollers

The pneumatic-tired rollers shall be self-propelled, tandem, or multiple axle, multiple wheel type with smooth-tread pneumatic tires of equal size staggered on the axles at such spacings and overlaps as will provide uniform compacting pressure for the full compacting width of the roller and shall be capable of exerting ground pressures of at least 800 pounds per square inch of tire contact area. Pneumatic-tired rollers shall be fully skirted to insulate the tires from significant heat loss during compaction.

505.03.14 Density Requirements

The density of asphaltic concrete shall be at least 91% of Rice theoretical maximum density as determined in conformance with AASHTO T 209 as modified by OSHD.

Asphaltic concrete pavements which do not meet substantial compliance requirements for compaction, and are deemed by the Engineer to be not suitable for use, will be rejected. Any rejected material shall be removed. No payment will be made for the rejected material or for removal of the rejected material.

Asphaltic concrete pavements which do not meet substantial compliance requirements for compaction, but are deemed by the Engineer to be suitable for use, may be left in place if the Contractor so elects. A price reduction for such materials will be determined as follows:

The percentage below the required density will be squared and the result rounded off to the nearest whole figure. A percentage deduction equal to the resulting figure will be made to the in place price. Any pavement with a density less than 89% will not be considered suitable.

Samples and tests will be taken as frequently and at such locations as the Engineer elects, and the results will be made known to the Contractor as soon as is practicably possible. However, it shall be the responsibility of the Contractor to obtain specified density at all times, and delay in advising the Contractor of test results shall not act as a waiver of this responsibility. When it is determined that specified density is not being obtained, discontinue all paving operations until corrective measures have been taken.

Any displacement occurring as a result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition to fresh mixture when required. Do not displace the line and grade of edges. Moisten steel roller wheels with water or other approved material to the least extent necessary to prevent pickup of mixture and yet not cause spotting or defacement of the surface of the mixture.

Along curbs and walls, on walks, irregular areas, and other areas not practicably accessible to specified rollers, compact the mixture with small rollers, mechanical tampers, hot hand tampers, or smoothing irons. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Remove and replace any mixture that becomes loose and broken, mixed with dirt, or is defective in any way. Remove and replace any area showing an excess or deficiency of bituminous

cement. Removal and replacement under these provisions shall be at the sole expense of the Contractor.

505.03.15 Transverse Joints

Form transverse joints by cutting back on the previous run to expose the full depth of the layer or course.

Place a course or strip of asphalt concrete as nearly continuous as practicable. Carefully construct transverse joints using vertical faces and thoroughly compacted to provide a smooth riding surface. Apply a coat of bituminous material to contact surfaces just before mixture is placed against previously rolled mixture. The Contractor shall use a 10-foot straight edge to determine the location of the full depth vertical faces.

At bridge ends or at joints with other rigid type structures, existing bases shall be conditioned and compacted, and place asphalt concrete to extra thickness and compact in transverse direction as well as longitudinally.

When the end of a course or strip of asphalt concrete is to be temporarily subject to traffic, the end shall be left on a bevel of approximately 20:1 (horizontal to vertical), being later cut back to a vertical edge.

505.03.16 Construction Joints

Placing of a course or strip of asphalt concrete shall be as nearly continuous as practicable. Transverse joints shall be carefully constructed and thoroughly compacted to provide a smooth riding surface.

The mixture shall be laid in strips of such widths as to hold to a practical minimum the number of longitudinal joints required. Longitudinal joints in the wearing course shall not occur within the area or width of a traffic lane or auxiliary lane. On median lanes and on shoulder areas such joints shall occur only at points of change in the transverse slopes as shown on the plans or designated by the Engineer. The longitudinal joints in one layer shall offset those in the layer immediately below by a minimum of 12 inches. Underlying longitudinal joints shall be within 12 inches of the edge of a lane or within 12 inches of the center of a lane, except in irregular areas, or if otherwise shown on the plans.

When the end of a course or strip of asphalt concrete is to be temporarily subjected to traffic, the end shall be on a bevel of approximately 20:1 (horizontal to vertical), being later cut back to a vertical edge to provide a fresh surface against which subsequently placed asphalt concrete is to abut.

When placing of asphalt concrete pavement in layers in excess of 2-inch nominal thickness is being performed under traffic, work shall be scheduled in a manner such that at the end of each working day, the full width of the area to be paved shall be completed to the same elevation with no longitudinal drop-offs within this width.

When placing of asphalt concrete pavement in layers of 2 inches or less in thickness is being performed under traffic, work shall be scheduled in a manner such that at the end of each working shift, one strip of new travel lane pavement shall not extend ahead of the adjoining strip of travel lane pavement more than the distance normally covered by each shift.

Where abrupt or sloped drop-offs occur within or at the edge of the paved surface, the Contractor

shall construct and maintain a wedge of asphalt concrete at a Slope 10:1 or flatter along the exposed joint.

505.03.17 Thickness and Number of Layers

Asphalt concrete shall be placed in the number of courses and to the total compacted thickness per course called for by the typical cross sections given on the plans.

In case the course of pavement involves the placing of a layer of variable thickness, as for leveling existing irregular surfacings, the course may include or consist of a layer of asphalt concrete of variable compacted thickness, the thickness of which layer shall not exceed the following:

Type of Mix	Maximum Compacted Thickness Layers
"A"	4 Inches
"B"	3 Inches
"C"	2 Inches
"D"	1 Inch

The top surface of each layer of asphalt concrete shall be spread at grade and cross section closely paralleling the specified top surface of the finished pavement.

505.03.18 Pavement Samples

The Engineer shall be permitted to cut samples or to take cores from the full depth of compacted mixture or from the separate layers and courses thereof, for testing purposes, and at such locations and at such frequencies as the Engineer determines necessary for proper representation. Where samples have been taken, and when directed by the Engineer, the Contractor shall furnish new like material for filling the holes with no extra compensation.

505.03.19 Pavement Smoothness

The top surface of the asphalt concrete pavement, when tested with a 12-foot straightedge either parallel to or perpendicular to the centerline furnished and operated by the Contractor, shall not vary by more than 0.02 foot. The Engineer will observe this testing and may require additional testing. The means of correction of a surface that does not meet the smoothness requirements shall have the approval of the Engineer.

When tests show the pavement is not within the above tolerances, the Contractor shall take immediate action to correct equipment or procedures in his paving operation to eliminate the unacceptable pavement roughness.

Any surface irregularities exceeding the above tolerances shall be corrected by the Contractor using a method or methods listed herein and approved by the Engineer.

Corrective Action - Corrective measures by the Contractor requiring one or more of the following actions approved by the Engineer shall be performed on deficient areas:

1. Remove and replace the surface course.
2. Place an overlay of a thickness approved by the Engineer.
3. Grind the pavement surface utilizing diamond blades up to a maximum depth of 0.3 inch and apply an emulsion fog coat as directed by the Engineer.

When utility appurtenances such as manhole covers and valve boxes are located in the traveled way and they are not required to be adjusted or are required to be adjusted before paving, these tolerances will not apply at the utility appurtenance.

All corrective work shall be completed within 10 working days following notification from the Engineer that the pavement does not meet the specified tolerances, unless otherwise directed by the Engineer.

All corrective work, including furnishing of materials, shall be performed at the Contractor's expense and no adjustment in contract time will be made for corrective action work.

505.03.20 Special Protection Under Traffic

In addition to other required provisions for traffic, the following shall apply to pavement construction: no traffic or equipment shall come in contact with the compacted mixture until it has cooled and set sufficiently to prevent marking; edges shall be protected from being broken down; and edge drop-offs one or more inches in height shall be marked with warning devices visible by day and night to the traveling public, and placed at spacings indicated on the plans or as directed by the Engineer.

505.04 MEASUREMENT AND PAYMENT

505.04.01 Measurement

Pay quantities for hot mix asphalt concrete and other bituminous construction under this Section will be measured by one or another of the methods as set forth hereinafter.

505.04.01A Asphalt Concrete on a Single Unit Basis

When pay items in the Proposal so indicate, the quantity of asphalt concrete used in the accepted work as specified will be measured on a ton basis. There will be no separate measurement of bituminous cement or additives contained in the mixture or used otherwise in the work. Measurement will be made on the number of tons of asphalt concrete, as weighed on approved and tested scales. Give trip tickets to the Engineer for his signature as the material is delivered. Each trip ticket shall show date and time of delivery, truck number, driver's name, net weight of material, and will be considered as valid delivery receipts only when signed by the Engineer. No material will be accepted without a trip ticket being available at the time of delivery.

505.04.01B Asphalt Concrete on Square Yard Basis

When the pay items in the Proposal so indicate, asphalt concrete, complete in place, as specified and accepted, will be measured on a square yard basis. Measurement will be made of width and length of each separately constructed strip of pavement, wherein width is the design width or edge-to-edge width of pavement, whichever is the lesser, and length is from end to end of the pavement along the center of the strip. Measurement will be on the surface of the pavement to the nearest 0.1 foot and the square yardage will be to the nearest full square yard.

The Engineer may take core samples of the pavement or use other methods to determine the actual pavement thickness constructed. Extra thickness of pavement as shown or as directed will be measured by conversion on a proportionate volume basis to an equivalent number of square yards of specified standard thickness pavement.

No additional payment over the Contract unit price will be made for pavement having a thickness greater than shown or ordered. When the pavement is found deficient in thickness by more than 0.2 inch, but not more than 0.6 inch, as determined by test cores of reasonable test samplings, payment for pavement will be made at an adjusted price as specified in the Special Provisions.

505.04.02 Payment

Payment will be made for any or all of the following items when listed as pay items in the Proposal for any particular Contract:

	Payment Item	Unit of Measure
1.	Asphalt concrete mixture (specify class)	Per Ton
2.	Asphalt concrete (specify class & thickness)	Per S.Y.

A deduction of 1% of the in place price will be made for each 1% cumulative deviation from the allowable tolerance of each component of the job mix formula required by the specification, except as follows:

Deviations in asphalt cement shall be weighted 8-times, and deviations in 200-minus material shall be weighted 2-times the deviation in other specified aggregate sieve sizes.

All materials furnished where the cumulative deviation equals or exceeds 12% shall be removed and replaced with acceptable material at the sole expense of the Contractor.

When asphalt paving materials with a cumulative deviation of less than 12% are furnished, the Owner shall notify the Contractor, in writing, to remove and replace defective materials at the sole expense of the Contractor or to pay to the Owner liquidated damages in accordance with the above deduction schedule.

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506 PORTLAND CEMENT CONCRETE PAVEMENT

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506.01 DESCRIPTION

This section covers work necessary for construction of Portland cement concrete pavements, with or without reinforcement, on a prepared subgrade or base course, complete.

506.02 MATERIALS

All material shall conform to requirements of Section 205 MATERIALS - TYPES AND USE.

506.03 CONSTRUCTION

506.03.01 General

The plant, equipment, and tools required in the performance of the work must be of the design,

capacity, and in condition to efficiently perform their respective functions of the work. Schedule and coordinate all operations involved in constructing the pavement so that regardless of the daily or seasonal variations in weather, temperature, and humidity under which the work is permitted to proceed, such work will result in a finished pavement conforming in all respects to specified requirements. Provide and have available at all times adequate equipment, tools, materials, and labor to achieve these results and failure to so provide will be cause for discontinuance or rejection of the work upon order of the Engineer. Conform to applicable requirements of concrete construction in Section 701 CONCRETE STRUCTURES.

506.03.02 Preparation of Concrete Mix

Before beginning any concrete work, the Contractor shall, at the Engineer's request, have the concrete mix designed and submit the mix design for approval. The mix design shall be tested by a laboratory approved by the Engineer by preparing trial batches from each of which four standard test cylinders shall be cast, cured and tested as specified for the job concrete. Certified copies of all laboratory reports, stating whether or not the items reported meet specifications, shall be sent directly to the Engineer from the testing laboratory.

Portland cement, fine aggregate, coarse aggregate in required separated sizes, water, air-entraining agents and other admixtures as required, shall be used in the concrete in such proportions as may be determined to be necessary to produce a concrete of suitable workability, plasticity and entrained-air content and of such strength as the conditions to be met may require. The proportions may be changed by the engineer from time to time during the progress of the work, but they shall at no time be such that test cylinders of the resultant concrete, made in accordance with the applicable provisions of AASHTO T-23 and tested as set forth in OSHD TM-719, will show compressive strengths of less than 4,000 pounds per square inch at an age of 28 days.

Changes in proportions, and particularly in the proportion of cement, may be made not only for the purpose of causing the concrete to meet specified 28-day requirements but also to produce concrete of high early strength when concrete of that kind is required. The maximum amount of cement to be used shall be 750 pounds per cubic yard of concrete.

The proportions of water to be used shall be determined by the Engineer, it being the intent of the specification to have the water-cement ratio held as low as is consistent with the production of a workable, uniform and dense concrete. The maximum water-cement ratio shall be six gallons of water per 94 pounds of cement.

Entrained air in the concrete shall be as directed by the Engineer and normally will be from four to six percent by volume. The entrained air shall be obtained by use of air-entraining cement, by air-entraining additives or admixtures, or by combinations thereof as may become necessary and as the Engineer may approve.

The Contractor shall provide and use approved means for the adding of controlled amounts of additives, admixtures and retardants to the mix.

No change in the source or character of any material shall be made without due notice to the Engineer. No material shall be used in the mix until the Engineer has approved such material and has designated the proportions of the materials in the mix based on the use of such approved materials.

506.03.03 Hauling

Hauling of Portland cement concrete mixed at a central plant or in transit will conform to the provisions of Section 701 CONCRETE STRUCTURES.

506.03.04 Forms

Conform to the applicable requirements of Forms in Section 701 CONCRETE STRUCTURES.

506.03.05 Handling and Placing

Conform to requirements for Handling and Placing in Section 701 CONCRETE STRUCTURES.

During the placing of concrete, making provision for the construction of joints and the placing of dowels, tie bars, and other devices as shown. The Contractor is referred to DIVISION SEVEN - CONCRETE STRUCTURES TECHNICAL REQUIREMENTS.

506.03.06 Preparation of Roadway

Before paving operations are commenced, the base constructed under the contract and on which the pavement is to be constructed and shall be in or brought to the completed and finished condition prescribed under the applicable specification for its construction. Old base and foundations constructed under other contracts shall be brought by the Contractor to an acceptable condition as prescribed in these specifications.

In addition to the base under the pavement, an area of sufficient width alongside the pavement base which will support the paving equipment shall be brought to proper grade and compacted so as to support the equipment at proper grade and cross section. The base for the pavement shall be maintained and firm and true to established grade and cross section until the concrete is placed thereon.

Manholes, inlets, and other such structures shall have been completed, adjusted, cured, and otherwise prepared, as applicable, and made clean and ready to have concrete placed in contact therewith. Manhole frames and other independent metal structures in the pavement area shall be painted with suitable asphalt material.

The conditioned base shall be in a compacted and smooth condition when the concrete is placed thereon, and shall be moist. Watering of the base shall be thorough and uniform.

The Engineer shall be permitted to place plates on prepared base and to reference them for later determination of thickness of concrete, and the Contractor shall exercise care to preserve such plates from displacement.

506.03.07 Weather Limitations

Except with written permission from the Engineer, construction of Portland cement concrete pavement shall not be in progress or continued when a descending air temperature in the shade and away from artificial heat reaches 35`F. Unless otherwise permitted, the temperature of the mix shall be not less than 50`F nor more than 80`F at the time of placing. Material containing frost or lumps of hardened material shall not be used.

Concreting operations shall be discontinued upon order due to insufficient natural light, unless

an adequate and approved artificial lighting system is provided and operated.

When concrete is being placed during cold weather and the air temperature may be expected to drop below 35°, a sufficient supply of straw, hay, grass, or other suitable blanketing material shall be provided along the work. Any time the air temperature may be expected to reach the freezing point during the day or night, the material so provided shall be spread over the pavement to a sufficient depth to prevent freezing of the concrete. If required by the Engineer, concrete laid less than 24 hours shall also be covered by approved canvas or similar enclosures and devices capable of protecting the concrete from freezing. Any concrete injured by frost action shall be removed and replaced at the Contractor's expense.

The Contractor shall have available at all times materials for the protection of the edges and surface of the unhardened concrete from the effects of rain or other precipitation. Protective material may consist of sheets of burlap, paper or plastic film. It will be the Contractor's responsibility to protect the pavement from damage, and failure to properly protect unhardened concrete may constitute cause for the removal and replacement of defective pavement at the Contractor's expense.

506.03.08 Slip Form Paving

Place the concrete uniformly in final position by the slip form method in one complete pass in such a manner that a minimum of finishing will be necessary to provide a dense and homogeneous pavement in conformance to true grade and cross section. The machine shall vibrate the concrete for the full width and depth of the pavement being placed. Such vibration shall be accomplished with vibrating tubes or arms working in the concrete. The sliding forms shall be rigidly held together to prevent spreading of the forms. Use forms of sufficient length so that no appreciable slumping of the concrete will occur.

Operate the slip form paver with as nearly continuous forward movement as possible and coordinate all operations of mixing, delivery, and spreading concrete to provide uniform progress. Stopping and starting the paving machine shall be held to an absolute minimum. If, for any reason, it is necessary to stop the forward motion of the paver, stop the vibratory and tamping elements immediately. Apply no tractive force to the machine, except that which is controlled from the machine. The Contractor shall stop his operation immediately if the finished work is not of specified quality. Deficient areas shall be repaired before the concrete starts to set.

Ensure that supports of the slip form paver and other equipment which ride on previously placed pavement are offset over that pavement sufficiently to prevent breakage of the edge thereof and provide such supports with suitable protective means to avoid marring or chipping of the previously placed pavement.

Hand-spreading and distributing shall be with shovels, not rakes, and the concrete shall not be fouled with foreign matter, nor shall joint devices be disturbed during such operations. The Contractor shall furnish hand operated mechanical vibrators of a type and design approved by the Engineer. These vibrators shall be used in the consolidation of the concrete pavement within at least six feet on each side of construction and expansion joints and such other areas as the Engineer may direct.

During the placing of concrete, provision shall be made for the construction of joints and the placing of dowels, tie bars and other devices as called for by the plans or as directed by the Engineer.

Concrete that is not in place within 45 minutes after being mixed (or one hour if mixed at a central plant or in transit) shall be subject to rejection and wasting at the direction of the Engineer. Concrete which has begun to harden or take an initial set prior to placement, or which has been retempered with water will be rejected and shall be wasted by the Contractor in an approved manner and at his own expense.

506.03.09 Tamping and Screeding

Compact the concrete pavement by means of vibrating screeds, mechanical tampers, tamping templates, and such other implements as approved. A vibratory screed or an automatic screeding and tamping machine may be substituted for a tamping template, subject to approval. Operate the equipment in such a manner that a satisfactory compaction of the concrete is produced and the surface of the pavement is uniform, true to grade and cross section.

Immediately after placing concrete upon the subgrade and before initial set has occurred, strike off the concrete and tamp by means of a tamping template, used at right angles to the centerline of the street, until the concrete is thoroughly consolidated to specified grade and crown section and sufficient mortar is brought to the surface for finishing purposes. If the design or location of the base is such as to preclude the possibility of tamping as previously described, such as a variable crown section, curb being constructed monolithic with base, in alleys, or where the grade exceeds 10 percent; employ other approved methods to obtain the prescribed results.

506.03.10 Finishing

After the concrete is placed and compacted, strike it true to line, grade, and cross section as shown and float to a smooth, even texture with an approved long handled wood float having a troweling or smoothing surface from 6 to 12 inches wide, or other approved floating device. Apply the float to the surface of the concrete with its length parallel to the centerline of the street and operate it from bridges, planing off the high places and filling the low places. Lap preceding applications of the float by at least one-half its length. If, after such planing, low places are discovered in the surface of the concrete, add specified grade, cross section, and surface tolerance, with a surface free from laitance, soupy mortar, marks, or irregularities.

Following the float finish and at the proper set, broom finish the surface. Draw the broom transversely across the pavement with not more than one stroke per width of broom. Fill any areas of minor honeycomb or other minor defect in composition of the concrete along the exposed edges with a stiff mortar or cement and fine aggregate applied to the moistened concrete in a workmanlike manner. Areas showing serious defects in composition of the concrete shall be cause for removal of affected pavement and replacement with pavement of specified quality for the full width of strip between longitudinal joints or edges and for a length not less than 10 feet.

Tool the free edges of new pavement and joints with previously placed Portland Cement concrete with an approved edging tool to remove laitance and mortar resulting form finishing operations and to provide a clean rounded edge to the new pavement. Tooling shall not form ridges on the surface of the concrete. Perform tooling of edges at transverse joints and longitudinal joints are directed.

506.03.11 Joints

Conform to applicable requirements of Section 701 CONCRETE STRUCTURES and Special

Conditions.

506.03.12 Tolerances

At the conclusion of the finishing operation the surface of the pavement shall not vary from a true surface, when tested with a 12-foot testing straight-edge, more than 0.02 of a foot in 12 feet.

The finished surface shall not vary more than 0.03 foot from the Drawing elevations at any point.

If the surface smoothness of the pavement after curing is found to exceed the tolerance permitted, grind the high spots until they meet the tolerance. The practicable extend of grinding shall not exceed 0.5 inch, nor create spalling of aggregate nor create deficiencies in pavement thickness. Low spots, if in hardened concrete may be filled with an approved epoxy grout provided such filling is performed in a neat, workmanlike manner and blend inconspicuously with adjoining concrete. All grinding to be at the sole expense of the Contractor.

506.03.13 Curing

506.03.13A Curing of Concrete

Immediately after the final floating, surface finishing, and edging has been completed and while the concrete surface is still moist, cover the entire exposed concrete and cure in accordance with one of the following provisions as specified:

1. Apply membrane-forming compound of the white pigmented type uniformly to damp concrete by pressure-spray methods at a rate which will form an impervious membranes when tested in accordance with AASHTO T 155.

2. Apply white polyethylene film, waterproof paper or burlap polyethylene sheets to damp concrete as soon as it can be placed without marring the surface. Place in intimate contact with the surface, extend over and beyond the sides or edges of the slabs or forms and weight as approved to hold the covering in position as a moisture proof covering. Laps shall be of approved dimensions and design to maintain tightness equivalent to the covering.

3. Apply burlap cloth to damp concrete as soon as it can be placed without marring the surface. Saturate the cloth with water and keep fully wetted during the curing period.

Regardless of which of the above methods the Contractor chooses, keep the curing medium intact and effective for a period of not less than 72 hours after application.

506.03.13B Protection of Concrete

Erect and maintain suitable barriers to protect the concrete from traffic or other detrimental trespass until the pavement is opened to traffic. If necessary, maintain watchmen to ensure that barriers remain effective.

Wherever it is necessary that traffic including Contractor's vehicles and equipment be carried from one side of the pavement to the other, construct and maintain suitable bridges over the pavement.

Prior to allowing equipment or traffic on the new surface, the concrete must have attained the specified compressive strength and shall be free from scarring, abrasion, stones, loose mortar, and other matter apt to be deleterious to the concrete surface. Operate all equipment without damage to the new concrete.

Repair or replace any part of the pavement, as directed, which has been damaged by traffic or from any other cause, prior to its official acceptance, at the sole expense of the Contractor.

506.04 MEASUREMENT AND PAYMENT

506.04.01 Measurement

506.04.01A Portland Cement Concrete Pavement

Measurement of Portland Cement concrete pavement will be made on a square yard basis for the pavement complete in place as specified, and accepted. Measurement will be made of width and length of each separately constructed strip of pavement, wherein the width is the design width or edge-to-edge width of pavement, whichever is the lesser, and the length is from end to end of pavement to the nearest 0.1 foot and the square yardage shall be to the nearest square yard.

Extra thickness of pavement, when shown or specifically directed to be placed, will be measured by conversion on a proportionate volume basis to an equivalent number of square yards of specified standard thickness pavement.

506.04.02 Payment

Payment will be made for any or all of the following items when listed as pay items in the Proposal for any particular contract.

Payment Item	Unit of Measure
1. Continuous Reinforced Concrete Pavement (specify class, thickness, reinforcing steel)	Per S.Y.
2. Reinforced Concrete Pavement (specify class, thickness, reinforcing steel)	Per S.Y.
3. Plain Concrete Pavement (specify class, thickness)	Per S.Y.

Payment for concrete pavement, whether continuously reinforced, reinforced, or plain shall be full compensation for furnishing and placing all materials including water, reinforcement, joint materials, dowels, tie bars, and performing all work specified to complete the item including preparation of the base.

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507 CURBS, GUTTERS, DRIVEWAYS, AND SIDEWALKS

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507.01 DESCRIPTION

This section covers work necessary for the construction of curbs, gutters, combination curb and gutter, combination of curb, gutter and sidewalk, islands, traffic separators, driveways, sidewalks, and pathways hereinafter referred to collectively as structures.

The respective structure names are specific in their use and refer specifically to those names as shown.

507.02 MATERIALS

507.02.01 General

Materials shall conform to requirements of Section 205 MATERIALS - TYPES AND USE and to additional requirements contained herein.

507.02.02 Portland Cement Concrete for Extrusions

Grade the combined aggregates within the following limits:

Sieve Sizes	Total Passing Percent by Weight
½"	100
3/8"	75 - 100
No. 4	50 - 75
No. 16	20 - 40
No. 30	12-23
No. 50	5 - 15
No. 100	0 - 5

507.02.03 Portland Cement Concrete

Portland Cement concrete shall conform to Subsection 205.02.02 except that extruded curbs and/or gutters shall have a maximum slump of 2".

507.02.04 Aggregate

Aggregate materials for base, foundation, courses, leveling courses, or bedding shall conform to 1"-0" gradation in Section 503 AGGREGATE BASES.

507.03 CONSTRUCTION

507.03.01 Preparation of Base

507.03.01A Earthwork

When roadway earthwork is called for in connection with other items of work under the same contract which includes structure construction under this section, all excavation, backfilling, and berm construction for the structures and in the vicinities thereof as required or as shown shall conform to applicable requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL.

507.03.01B Aggregate Foundation or Bedding

Construct sidewalk structures on aggregate foundation course or bedding of selected granular material as specified.

When structures are to be constructed on areas where approved aggregate material is already in place, such materials may be salvaged and reused as bedding.

Foundation courses or beddings involving the furnishing of new materials shall be constructed in conformance to the applicable requirements of Section 503 AGGREGATE BASES.

507.03.01C Base for Portland Cement Concrete

All bases upon which new cement concrete structures are to be constructed shall be firm and free of all deleterious matter. Dampen thoroughly surfaces upon which new cement concrete is to be placed. No payment will be made for water and the work of placing base materials. The cost of preparing bases shall be considered as incidental to the construction of structures.

When new concrete is placed by the mechanical extrusion method, vertical dowel fastening to underlying concrete or asphalt may be eliminated and the bond between new concrete and underlying concrete or asphalt provided with epoxy cement applied in conformance with the manufacturer's recommendations as approved. Spread epoxy at a rate which will provide a thorough coating to the surface with all voids and depressions filled. Place new structure on the epoxy cement within 15 minutes after spreading.

507.03.02 Forms

507.03.02A Forms

Conform to requirements for Forms in Section 701 CONCRETE STRUCTURES.

507.03.03 Equipment

Plant and equipment requirements as described in Section 505 ASPHALT CONCRETE PAVEMENT and Section 506 PORTLAND CEMENT CONCRETE PAVEMENT may be modified as approved, when circumstances warrant. For asphalt sidewalks or islands, spread asphalt concrete by small or special pavers, by spreader boxes, or by blade graders. Compact with small, self-propelled rollers, vibratory compactors, or mechanical tampers. Spread or compact the mixture by hand methods only when approved.

The machine for extruding cement concrete curb or asphalt concrete curb shall be of the self-propelled type equipped with a material hopper, distributing screw, and adjustable curb forming devices capable of placing and compacting cement concrete or asphalt concrete to the lines, grades, and cross section as shown, in an even homogeneous manner. Cement concrete curb shall be free of honeycomb and cracks.

Set top of curb grade by an offset guide line using the survey marks established by the Engineer. The forming tube portion of the extrusion machine shall be readily adjustable vertically during the forward motion of the machine to provide, when necessary, a variable height of curb conforming to the predetermined curb grade. A grade line gauge or pointer shall be attached to the machine in such manner that a continual comparison can be made between the curb being placed and established curb grade as indicated by the offset guide line.

In lieu of the above method for maintaining the curb grade, the extrusion machine may be operated on approved rails or forms set at the proper relative grade.

507.03.04 Placing Material

No asphalt or concrete shall be placed until the surface and forms, where used, have been inspected and approved.

507.03.04A Portland Cement Concrete

Construct Portland Cement concrete structures between specified forms or by an mechanical extrusion method, as the Contractor may elect. If forms are used, maintain a 2- to 4-inch slump, and thoroughly compact and strike off. If the structures are constructed by a mechanical extrusion method, maintain a maximum slump of two inches. Feed cement concrete into the extruding machine at a uniform rate and operate the machine under sufficient restraint in a forward motion to produce a well-compacted mass of concrete.

507.03.05 Finishing

507.03.05A General

Construct all structures within 1/4 inch of true line and within 1/4 inch of established surface grade, cross section and slope, and within 1/4 inch of specified thickness, and all finished surfaces shall be free from humps, sags, or other irregularities. When a straightedge 10 feet long is laid on a finished surface, the surface shall not vary more than 0.02 feet from edge of the straightedge. At no time shall the concrete surface be allowed to pool water.

Where Portland Cement concrete sidewalks or pathways are to be placed around or adjacent to manholes, pipe inlets, or other miscellaneous structures, form around the miscellaneous structure and allow a minimum of 18" of clearance, after the sidewalk is poured and cured, adjust miscellaneous structures to grade and finish placing the sidewalk or pathway.

507.03.05B Portland Cement Concrete

Sidewalks and Other Structures:

Finish surface of concrete to grade and cross section with a bull float, trowel smooth, score if required, then finish with a broom. Use floats of not less than 10 feet in length for straight grade sections and not less than 5 inches in width. Finish concrete adjacent to expansion joints with an edger tool. Light brooming shall be transverse to the line of traffic, and if water is necessary, it shall be lightly applied to the surface immediately in advance of brooming.

The surface of concrete sidewalks shall be marked into rectangles with a scoring tool which will leave the edges rounded. Scoring and dimensions shall be as shown on the appropriate Standard Drawing or as directed. Sidewalks shall have a slope of 1/4 inch per foot from the top of curb to the back of walk unless otherwise shown.

Curbs:

Remove forms after the concrete has taken initial set and while the concrete is still green. Minor defects shall be repaired with mortar containing one part Portland Cement and two parts sand. Plastering will not be permitted on the faces and exposed surfaces. Honeycombed and other structurally defective concrete shall be removed and replaced at no expense to OWNER. While the concrete is still green, finish exposed surfaces as required to provide a uniform texture and smooth surface.

When constructing precast concrete curbs, the proportions of sand, gravel and cement, the type of forms used, and the method of compacting the concrete in the forms shall all be such that as dense, smooth and uniform a surface as is practicable for a concrete masonry unit will be obtained on the finished curb units. The faces that are to be exposed shall be free from chips, cracks, air holes, honeycomb or other imperfections except that if there be no more than 5 percent of the curb units having slight cracks, small chips not larger than 1/2 inch, or air holes not more than 1/2 inch in diameter or depth, the imperfections will not be deemed grounds for rejection.

Furnish and install a minimum of two 3-inch PVC Sch. 40 pipe curb drains to serve each lot. Blockouts shall be of adequate size to accommodate a 3-inch PVC drain pipe. PVC pipe shall conform to ASTM D 2241. Curb drains will be considered incidental work for which no separate payment will be made.

507.03.06 Curing Portland Cement Concrete

After the concrete has been placed and finished in curb structures, as specified, it shall be cured by application of a white pigmented liquid membrane-forming compound applied uniformly to the damp concrete by pressure spray methods, or by keeping the concrete protected and moist for at least 72 hours. The concrete structure shall be kept from contact and strain for at least 7 days.

Curing of concrete in all other structures shall conform to the requirements for Curing in Section 506 PORTLAND CEMENT CONCRETE PAVEMENT.

507.03.07 Joints in Portland Cement Concrete

Contraction Joints in Walks and Incidental Surfacing:

Form transverse contraction joints of the weakened plane or dummy type in the exposed surfaces of cement concrete walks and incidental surfacings at such locations as are required to confine the contraction joint spacing to a maximum of 15 feet. The joints shall be formed to a depth of 1/3 of the thickness of concrete and to a width of about 1/8 inch. Joint edges shall be tooled.

Contraction Joints in Curbs:

Place contraction joints in curbs at intervals not exceeding 15 feet. Contraction joints shall be of the open joint type and shall be provided by inserting a thin, oiled steel sheet vertically in

the fresh concrete to force coarse aggregate away from the joint. The steel sheet shall be inserted 1/2 the depth of the curb. After initial set has occurred in the concrete and prior to removing the front curb form, the steel sheet shall be removed with a sawing motion. Finish top of curb with a steel trowel and finish edges with a steel edging tool. Contraction and expansion joints of curbs should coincide with joints in sidewalks and streets.

Expansion Joints:

Transverse expansion joints for curbs shall be provided opposite abutting expansion joints in abutting Portland cement concrete, over expansion joints in concrete underlying the new concrete, and at each point of tangency in the structure alignment. Additional transverse expansion joints shall be provided at other locations as required to confine the expansion joint spacing to the maximum distance indicated on the plans. The width of joint and thickness of filler shall match those of the joints in abutting or underlying concrete, and elsewhere shall be not less than 1/2 inch. Each expansion joint shall be at right angles to the structure alignment, normal to the structure surface, and shall provide complete separation of new concrete.

Expansion joints for sidewalks and driveways shall be provided between driveways and Portland cement concrete pavements, transversely in walks at a distance of six to eight feet in from curbs which occur at walk ends, transversely in walks opposite expansion joints in adjoining curbs and elsewhere at such locations in the walk that the distance between transverse expansion joints does not exceed 45 feet; around poles, posts, boxes, and other fixtures which protrude through, into or against the structures; and alongside or transverse to the new surfacing at such locations and frequencies as is necessary to provide for expansion of both new and abutting Portland cement concrete.

Width of joint and thickness of filler shall not be less than 1/2 inch, and where the new concrete surfacing abuts other surfacing, shall be not less than 3/4 inch. Generally, transverse expansion joints shall be at right angles to the alignment, vertical to the surface, and shall provide complete separation of new concrete.

Requirements Near Existing Structures:

Cut back existing curbs, walks, driveways and other such structures to permit the new construction and where the new structures are to be constructed against or within 4 inches of the end, edge or side of other structures, the new construction shall include the construction of approved connections therewith, using the same kind of concrete as is used in the new construction. Make the joint between the old and new material with a saw cut.

507.03.08 Dowels, Tie Bars, Reinforcing

Provide metal reinforcing bars and wire fabric reinforcement when and as shown. When shown, provide and place dowels with "slip sleeves" as load transfer mediums. Provide and place dowels, but without "slip sleeves," as fastenings or ties between new concrete and existing underlying concrete when shown. Provide tie bars when shown. Place reinforcing, dowels and tie bars in conformance to the applicable requirements in Section 702 REINFORCEMENT.

507.04 MEASUREMENT AND PAYMENT

507.04.01 Measurement

507.04.01A Curbs

Curb will be measured on a linear foot basis along the face of the curb for the actual length constructed.

507.04.01B Combination Curb and Gutter

Combination curb and gutter will be measured on a linear foot basis along the face of the curb for the actual length constructed.

507.04.01C Curb, Gutter and Sidewalk

For purposes of measurement and payment, the combined curb, gutter and sidewalk will be considered as two component sections.

The first component, sidewalk, shall comprise that portion of the combined section beginning 6 inches behind the face of curb and shall be measured on a square yard basis for the actual square yards of sidewalk constructed.

The second component, curb and gutter, shall comprise the portion of the combined section beginning at the back of curb and through the gutter section, and shall be measured on a linear foot basis for the actual linear feet of curb and gutter constructed.

507.04.01D Precast Concrete Curb

Precast concrete curb will be measured on a linear foot basis along the face of the curb constructed, or on a per each basis for the actual number of precast concrete curb sections constructed.

507.04.01E Concrete Valley Gutter

Concrete valley gutter will be measured on a square yard basis for the actual square yards of gutter constructed.

507.04.01F Traffic Islands

Traffic islands will be measured by component parts of curb, and sidewalks as described above for combined curb, gutter and sidewalk.

507.04.01G Driveways, Sidewalks and Pathways

Measurement of Portland Cement or asphalt concrete driveways, sidewalks or pathways will be made on a square yard basis on the actual surface of the specified thickness concrete or asphalt completed and accepted.

507.04.01H Sawed Joints

Sawed joints will be measured on a linear foot basis for each joint sawed, cleaned, and sealed as specified and directed.

507.04.01I Aggregate Base

Pay quantities of aggregate base material will be measured as set forth in Section 303 AGGREGATE BASES.

507.04.02 Payment

Payment will be made for any or all of the following items when listed as pay items in the Proposal for any particular contract and will include full compensation for all labor, materials, and equipment:

	Payment Item	Unit of Measure
1.	Curb (specify asphalt or concrete)	Per L.F.
2.	Precast Concrete Curb	Per L.F. or EA.
3.	Concrete Curb and Gutter	Per L.F.
4.	Sidewalk	Per S.Y.
5.	Concrete Valley Gutter	Per S.Y.
6.	Driveways and Sidewalks (specify thickness)	Per S.Y.
7.	Sawed Joints	Per L.F.*
8.	Aggregate Base	Per C.Y.*

*When neither specified or shown in the Proposal for separate payment, it shall be considered incidental to the other items of work and no separate payment will be made.

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508 GEOTEXTILE FABRICS

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508.01 GENERAL

This work consists of furnishing and placing geotextile fabrics in on subgrades (0 subgrade geotextile) and beneath an asphalt overlay (pavement overlay geotextile) as shown on the plans or as directed by the Engineer.

508.02 MATERIALS

Geotextile materials shall conform to Subsection 205.02.14.

508.02.01 Vacant

508.02.02 Vacant

508.03 CONSTRUCTION

508.03.01 General

General requirements for placement of geotextile shall be in accordance with Subsection 205.03.01.

508.03.02 Subgrade Geotextile

For roadbed subgrade separation, prepare the subgrade according to Section 501.

Correct geotextile failures, as evidenced by soil pumping or roadbed distortion, by removing any covering material in the affected area and placing a geotextile patch on the exposed geotextile. Cover the patch with the specified cover material and compact before proceeding.

508.03.03 Pavement Overlay Geotextile

(a) GENERAL - Place geotextile and pavement overlay in four basis steps:

- Surface preparation
- Sealant application
- Geotextile placement
- Overlay placement

(b) WEATHER LIMITATIONS - Do not place sealant and geotextile unless the weather limitations of 00745.40 are met, as appropriate, except the minimum air temperature shall be 50°F for paving grade asphalt sealant placement and 60°F for asphalt emulsion sealant placement.

(c) SURFACE PREPARATION - Prepare the pavement surface on which the sealant is to be placed according to specifications and the following:

- Clean and fill cracks exceeding 1/8 inch width with an approved bituminous crack filler.

- Repair minor irregularities or depressions as directed.

- Allow crack filling material to cure before placing geotextile.

- Where the pavement is severely cracked, rutted, deformed, or otherwise distressed, place a leveling course as directed instead of extensive surface preparation

(d) SEALANT APPLICATION - Use a normal paving grade asphalt. A cationic or anionic emulsion may be used as approved. Do not use cutbacks or emulsions which contain solvents.

Uniformly spray the asphalt sealant at normal application temperature by means of a pressure distributor on the prepared dry pavement surface. Apply at the normal rate of 0.20 to 0.30 gallon per square yard or as recommended by the geotextile manufacturer as directed.

If using emulsions, increase the application rate 50 percent or as directed. Some underlying surfaces may require a higher application rate. Within street intersections, on steep grades, or in other zones where vehicle speed changes are commonplace, reduce the normal application rate by 20 percent or as directed.

The target width of sealant application shall be geotextile width plus 6 inches. Apply the sealant only as far in advance of geotextile installation as appropriate to insure a tacky surface at the time of geotextile placement. Place geotextile the same day as the sealant. Do not allow traffic on the sealant. Clean excess asphalt from the road surface.

(e) GEOTEXTILE PLACEMENT - Place the geotextile into the sealant using mechanical or manual laydown equipment capable of providing a smooth installation with a minimum amount of wrinkling or folding before the sealant loses tackiness. When asphalt emulsions are used, allow the asphalt to separate from the water (break) before placing the geotextile.

Slit wrinkles or folds exceeding 1 inch and lay flat. Shingle-lap not more than 6 inches in the direction of the paving. Broom and/or pneumatic roll to maximize geotextile contact with the pavement surface. Additional hand-placed sealant material may be required at laps as determined.

Limit traffic to necessary construction equipment and emergency vehicles on the geotextile before and during paving unless otherwise directed. Turn the paver and other vehicles gradually. Keep turning to a minimum to avoid geotextile movement and damage. Avoid abrupt starts and stops.

(f) OVERLAY PLACEMENT - Place the overlay the same day the geotextile is placed. Remove sealant that bleeds through the geotextile. Do not windrow asphalt concrete material on the geotextile ahead of the paving machines. Do not use an asphalt concrete material pickup machine. In the event of rain, the contractor shall place sand over uncovered fabric to absorb sealant.

508.04 MEASUREMENT AND PAYMENT

Payment for the work in this section shall be in accordance with Subsection 205.04 by the square yard in place. Measurement will be to the nearest square yard. No allowance will be made for material in laps and seams. This payment shall constitute full compensation for all materials and work as specified within.

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509 COLD PLANE PAVEMENT REMOVAL

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509.01 GENERAL

This work shall consist of preparing a foundation for placement of new surfacing by removal of existing surfacing to the depth, width, and cross section shown on the plans.

509.02 WORKMANSHIP

509.02.01 Equipment

The existing surfacing shall be removed with a self-propelled planning machine or grinder. The equipment shall be capable of accurately establishing profile grades within a tolerance of 0.02 foot by reference from either the existing pavement or from independent grade control and shall have a positive means for controlling cross slope elevations. The equipment shall incorporate a totally enclosed cutting drum with replaceable cutting teeth and shall have an effective means for removing excess material from the surface and for preventing dust from escaping into the air. The use of a heating device to soften the pavement will not be permitted.

509.02.02 Pavement Removal

The existing pavement shall be removed to the depth, width, grade, and cross section shown on the plans or as directed by the Engineer to provide a surface profile true to specified grade and transverse slope.

Except where samples are taken to establish a job mix formula, the existing surfacing shall not be removed more than five days prior to construction of the new surfacing, unless otherwise approved by the Engineer.

Wherever samples are obtained from existing surfacing more than five days prior to construction of the new surfacing, the Contractor shall patch the samples areas with asphalt concrete at his own expense.

509.02.03 Surface Tolerance

The new surface resulting from the pavement removal will be tested by the Engineer for trueness to specified grade and transverse slope at selected locations. Testing will be with a 10-foot straightedge. The variation of the surface from the testing edge of the straightedge between any two contact points shall not exceed 0.02 foot.

509.02.04 Disposal of Materials

Materials removed under this specification which are not recycled and used on the project shall become the property of the Contractor at the point of removal and shall be disposed of off the limits of the project in a manner satisfactory to the Engineer.

The Contractor is encouraged to salvage any removed cold planed materials which are not recycled and used on the project for use on future projects.

509.03 MEASUREMENT AND PAYMENT

Materials removed under this specification, regardless of thickness, will be measured for payment on a square yard basis. The pay quantities will be determined by measurement of the actual surface of the area from which the materials have been removed and computed to the nearest 0.1 square yard.

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510 VACANT

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511 ADJUSTMENT OF EXISTING STRUCTURES TO GRADE

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511.01 DESCRIPTION

This section covers the work necessary for adjusting tops of existing structures (e.g., manholes, sumps, catch basins, inlets, valve boxes, meter boxes, monument boxes, and similar structures) to required elevation and/or horizontal alignment complete. See Subsection 403.03.06 for adjustment of new structures to grade.

511.02 MATERIALS

511.02.01 GENERAL

Materials used in adjustment of existing structures may be materials salvaged from the existing installation and brought to a condition approved for reuse by the Engineer.

511.03 CONSTRUCTION

511.03.01 Excavation and Backfill

Excavation shall be unclassified and shall include whatever materials are encountered to the depths as shown.

Saw cut around structures to be adjusted when pavement work has been completed. Do not use a jack hammer for pavement cutting. Replace pavement to previous density and grade. See Standard Detail Drawing No. 513.

Backfill shall be done in accordance with the applicable requirements of Section 204.

511.03.02 Salvage of Frames, Covers, and Grates

Metal frames, covers, grates, and fittings may be salvaged from structures to be adjusted or abandoned, and if of suitable size and condition, as determined by the Engineer, may be reused in the work.

Salvaged components to be reused shall be cleaned of foreign material by solvents, sand blasting, or other methods that will not harm the component but will restore it to a nearly new condition. Salvaged frames, covers, and grates not reused on the project shall become the property of the Owner.

511.03.03 Raising Tops of Masonry Structures

After existing frames, covers, and grates have been removed, expose the top surface on which new mortar or concrete is to be placed and chip away at least 1/2-inch to expose firm concrete. The new surface shall be cleaned by brushing and shall be moistened with water at the time of placing new concrete. New concrete shall then be placed to required grade and cured at least 3 days, after which the frame shall be seated in fresh mortar and brought to the proper grade.

Masonry of bricks or concrete blocks shall be raised with new bricks, blocks, mortar, or combinations thereof or with Portland Cement concrete, as conditions may require. Concrete boxes may be lifted and placed on precast concrete box extensions, on new brick, or on cast-in-place concrete as may be suitable.

Mortar for building up existing masonry shall not be placed to a a depth exceeding 1 inch. Concrete shall not be placed to a depth of less than 4 inches. To conform to these requirements, existing shells or walls of structures to be raised shall be cut down as necessary to provide space for the new construction.

Fabricated metal rings or plates may be furnished and used in adjustment work, provided the metal and its fabrication design is at least equal to specified characteristics of strength and support required of the covers or grates to be placed, that uniform bearing of bearing surfaces is assured, and positive provision is afforded against displacement when in service.

511.03.04 Lowering Tops of Masonry Structures

Where the top of an existing masonry structure is to be lowered, the masonry portion of the structure shall be exposed to required depth, cut off, or removed to an elevation below that established for the bottom of metal frame or cover which is to be reset on masonry and shall then be built up with mortar, concrete, brick, or concrete blocks, or with metal rings or plates to required elevation and top design. Joining of new material to old, minimum thicknesses of new mortar and concrete, limitations, curing, and other details shall be as specified in Section 701.

511.03.05 Adjusting Metal Structures

Metal inlets, valve boxes, meter boxes, monument boxes, or other like structures shall be raised or lowered to grade normally by resetting the entire structure on firm foundation. In the case of raising the structure to a point where it would not enclose or protect its contents, add extensions of like design below the original structure. Contractor may replace the structure with a new structure of adequate design as approved and at the Contractor's sole expense. Salvaged structures not reused on the project shall become the property of the Owner. Metal structures shall meet the surface smoothness requirements of Section 212.03.04D. Conform to applicable Sections of DIVISION THREE - SANITARY SEWER TECHNICAL REQUIREMENTS and DIVISION FOUR - WATER TECHNICAL REQUIREMENTS.

511.04 MEASUREMENT AND PAYMENT

511.04.01 Measurement and Payment Incidental

When no pay item is listed in the Proposal, all work will be considered as incidental to the other pay items and no separate payment will be made.

511.04.02 Measurement as Units in Place

When listed in the Proposal, measurement will be the actual number of manholes, sumps, catch basins, inlets, valve boxes, meter boxes, monument boxes, and other like structures adjusted under this Section, measured as units in place, completed and accepted. Separate measurement will be made of each specific type or of each separate grouping of types of structures for which separate items are shown in the Proposal. Required earthwork, backfill, replacement of base drains, stone bases, pavements, and other miscellaneous work will be considered as incidental to the adjusting work and no separate measurement thereof will be made.

511.04.03 Payment as Units in Place

When listed in the Proposal, the accepted units in place will be paid for at the applicable Contract unit price per each for the particular pay items listed below and shown in the Proposal.

	Pay Item	Unit of Measurement
1.	Adjusting Manholes	Each
2.	Reconstructing Concrete Manholes	Each
3.	Adjusting Inlets	Each
4.	Adjusting Boxes	Each

Items 1 and 2 above refer to manholes, sumps, and like structures designed to permit human

entry and working space therein, and to confine and control the flow of pipe-conveyed liquids; which structures are herein collectively referred to as manholes.

Item 1 above applies to manholes, regardless of the kind of materials of which they are composed and regardless of design, type, or depth, which have had the tops thereof adjusted as specified; except as Item 2 is applicable as hereinafter provided.

Item 2 above refers to monolithic concrete manholes which, in having their tops adjusted as specified, have necessarily had their entire existing cones destroyed and new cones constructed, or had their entire existing top slabs destroyed and new slabs constructed, or precast manholes which have necessarily had adjustments made below the cone.

Item 3 above refers to inlets and catch basins, defined as structures designed to receive surface water through grates and orifices and to discharge said waters under control through pipes and is applicable to such structures regardless of their designs, types, or sizes.

Item 4 refers to valve boxes, meter boxes, monument boxes, and other like structures, which are comprised of a box-like body and removable cover provided for the protection of and access to meters, valves, markers, monuments, shut-offs, and similar items. If a protective coating is required on the new metal used in the work, the coating shall be provided as an incidental item without separate or additional compensation.

END OF DIVISION

DIVISION SIX
STORM DRAINAGE TECHNICAL REQUIREMENTS

****

601 PIPE AND FITTINGS (STORM DRAINS)

****

601.01 DESCRIPTION

This section covers the following work:

1. Gravity and storm sewer pipe
2. Culverts
3. Perforated pipe underdrains
4. Fittings

601.02 MATERIALS

601.02.01 General

Use all storm sewer pipe and fittings of the size, strength, material and joint type specified on the Drawings and/or the Proposal. Use jointing material as hereinafter specified for each pipe material. Each piece of pipe shall be clearly identified as to strength, class and date of manufacture. The manufacturer or fabricator shall furnish appropriate certification, based on manufacturer's routine quality control tests, that the materials in the pipe and fittings meet the requirements specified herein. Strength, permeability, hydrostatic tests and pipe joints will be used as the basis of acceptance as described under Proof Tests herein.

It is not intended that materials listed herein are to be considered equal or generally inter changeable for all applications. The Engineer shall determine the materials suitable for the project and so specify.

Use pipe and fittings of one type of material throughout; no interchanging of pipe and fittings will be allowed.

Do not coat pipes for storm sewers internally or externally with any substance of any type in an attempt to improve its performance when air tested.

601.01.02 Concrete Pipe

601.02.02A Nonreinforced Concrete Pipe

Nonreinforced concrete pipe shall conform to ASTM C 14 Class as shown or specified and the following additional requirements:

1. Cement shall be Type II conforming to ASTM C 150.
2. The minimum Portland Cement content shall be 564 pounds per cubic yard.
3. The water/cement ratio shall not exceed 0.49.
4. The Contractor shall provide the Engineer with a Certificate of Compliance from the

pipe manufacturer that the pipe and concrete mix conform in all respects to these specifications and other nonconflicting requirements of the referenced ASTM Specifications.

601.02.02B Reinforced Concrete Pipe

Reinforced concrete pipe shall conform to ASTM C 76 Class as shown or specified with Wall B design and the following additional requirements:

1. Cement shall be Type II conforming to ASTM C 150.
2. The minimum Portland Cement content shall be 564 pounds per cubic yard.
3. The water/cement ratio shall not exceed 0.49.
4. Elliptical reinforcing is not permitted.
5. The area of the outer circular reinforcing cage shall not be less than 75 percent by the inner cage.
6. The Contractor shall provide the Engineer with a Certificate of Compliance from the pipe manufacturer that the pipe and concrete mix conform in all respects to these specifications and other nonconflicting requirements of the referenced ASTM Specifications.

601.02.02C Perforated Concrete Pipe

Perforated concrete pipe and fittings shall conform to ASTM C 444 and applicable requirements of ASTM C14 and C76 as modified herein, class and end type as specified.

601.02.03 Ductile Iron Pipe

Ductile iron pipe centrifugally cast of 60-42-10 iron shall conform to ANSI A21.51 Class 150 or AWWA C151, with Push-on Joint or Mechanical Joints as specified, conforming to ANSI Specification A21.11/AWWA C111. Ductile iron pipe shall be lined with cement mortar and seal coated in accordance with ANSI Standard A21.4/AWWA C104.

When specified, tube type polyethylene encasement shall conform to ANSI A21.5/AWWA C105.

601.02.04 PVC Non-pressure Pipe and Perforated PVC Pipe

PVC sewer pipe shall conform to ASTM D 3034 SDR 35. Perforated PVC pipe shall conform to ASTM D 1785, Schedule 40. The perforations shall consist of 2 rows of 2-inch slots. The slots shall be transverse to the axis of the pipe. Two rows of slots shall be 120 degrees on centers. Slot size shall be 0.4 inches.

601.02.05 Corrugated Aluminum Alloy Pipe

Corrugated aluminum alloy pipe and coupling bands of the gauges and types as shown or specified shall conform to the material, fabrication, and inspection requirements of AASHTO M 196, Type I or Type II, and AASHTO M 197. Recorrugate the ends of Helical corrugated pipe to receive annular bands at each joint.

601.02.06 Flared End Sections

Precast concrete flared-end sections shall conform to the requirements for Reinforced Concrete Pipe herein specified. The area of steel reinforcement per linear foot of flared-end section shall

be at least equal to the minimum steel requirements for circular reinforcement in circular pipe for the internal diameter of the circular portion of the flared-end section. Submit all details of construction to the Engineer.

Use prefabricated aluminum flared-end sections conforming to AASHTO M 197.

601.02.07 Bituminous Coating

When specified, completely coat the inside and outside surfaces of corrugated pipe with bituminous material conforming to AASHTO M 190 Type A, with a minimum thickness of 0.05 inch at the crest of the corrugations.

601.02.08 Paved Inverts

When specified, bituminously coat the bottom one-half and pave the inside surface of the corrugated metal pipe for 1/4 of its circumference with bituminous material conforming to AASHTO M 190 Type B to provide a flat invert centered in the bottom of the pipe. The pavement, except where the upper edges intersect the corrugations, shall have a minimum thickness of 1/8 inch above the crests of the corrugations. Suitably mark the outside of the pipe on both ends to clearly designate the centerline of the top of the pipe.

601.02.09 Jointing Materials

Only lubricants for jointing materials approved by the manufacturer shall be used.

Furnish in duplicate a certified statement from the manufacturer of the gaskets, setting forth the basic polymer used in the gaskets and results of the tests of the physical properties of the compound. Gaskets shall be shipped in containers with identification of the batch from which the gaskets were fabricated.

601.02.09A Concrete Pipe

Rubber gaskets for bell and spigot pipe shall conform to ASTM C 443. Use captive gasket in groove design for pipe 24-inch diameter and larger. Mortar for tongue and groove pipe shall conform to section 205 MATERIALS.

601.02.09B Cast Iron and Ductile Iron Pipe

Rubber gaskets shall conform to ANSI A21.11/AWWA C111.

601.02.09C PVC Pipe

Rubber gaskets for PVC pipe shall conform to ASTM F 477.

601.02.10 Proof Tests

601.02.10A General

The intent of this requirement is to prequalify a joint system, components of which meet the joint requirements, as to the water tightness capability of that joint system. This proof test shall be understood to apply to all storm drains which are to be tested for water tightness prior to acceptance. Material and test equipment for proof testing shall be provided by the manufacturer. Joints shall meet the requirements of yard testing specified below. The pipe

manufacturer shall submit results of the yard tests made, certified by a testing agency acceptable to the Engineer. In general, each pipe material and joint assembly shall be subject to the following three proof tests at the discretion of the Engineer:

1. **Pipe in Straight Alignment.** No less than three nor more than five pipes selected from stock by the Engineer or the testing agency shall be assembled according to the manufacturer's installation instructions with the ends suitable plugged and restrained against internal pressure. The pipe shall be subjected to 13 PSI hydrostatic pressure for 10 minutes. Free movement of water through the pipe joint or pipe shall be grounds for rejection of the pipe.

2. **Pipe in Maximum Deflected Position.** A test section shall be deflected as described hereinafter for each pipe material. The pipe shall be subjected to 10 PSI hydrostatic pressure for 10 minutes. Free movement of water through the pipe joint or pipe wall shall be grounds for rejection of the pipe.

3. **Joints Under Differential Load.** The test section shall be supported on blocks or otherwise as described hereinafter for each pipe material. There shall be no visible leakage when the stressed joint is subjected to 10 PSI internal hydrostatic pressure for 10 minutes.

601.02.10B Concrete Pipe

For deflected position, create a position 1/2-inch wider than the fully assembled position, on one side of the outside perimeter of each joint.

For differential load test, assemble three pipes according to the manufacturer's instructions in straight alignment with the ends suitably plugged and restrained against internal hydrostatic pressure. The end pipes of the test section shall be supported on blocks or otherwise so that the center pipe is suspended freely between the adjacent pipe and bearing only the joints. The pipe section shall be filled with water and a load of 150 pounds per inch of pipe diameter, in addition to the weight of the pipe, shall be supplied over an arc of not less than 120 degrees along a longitudinal distance of 12 inches immediately adjacent to one of the joints. For pipe 24-inch and larger, the applied load shall be reduced by 1/2 of the weight of water in the suspended pipe.

601.02.10C Cast Iron Pipe and Ductile Iron Pipe

For deflected position, create a position 1/2-inch wider than the fully compressed section on one side of the outside perimeter.

For differential load, support so that one of the pipes is suspended freely between adjacent pipe, bearing only on the joints. Apply a force per the following table along a longitudinal distance of 12 inches, immediately adjacent to one of the joints.

PIPE SIZE	FORCE - POUNDS	PIPE SIZE	FORCE - POUNDS
4 inches	1,000	15 inches	3,700
6 inches	1,500	18 inches	4,400
8 inches	2,000	21 inches	5,000
10 inches	2,500	24 inches	5,500
12 inches	3,000	and over	----

601.02.10D PVC Pipe

PVC pipe joints shall be tested by and meet the requirement of ASTM C 3212 for gravity sewers and ASTM D 3139 for pressure sewers.

601.02.11 Fittings

601.02.11A PVC Pipe

In connecting PVC pipe to manholes, use resilient connectors in conformance with ASTM C923.

601.02.12 Couplings, Bands and Fittings for Corrugated Metal Pipe

Use couplings, bands and fittings conforming to AASHTO M 196.

601.03 CONSTRUCTION

601.03.01 Excavation and Backfill

Conform to the requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL. All excavation shall be unclassified.

601.03.02 Line and Grade for Gravity Storm Sewers

Do not deviate from line or grade, as established by the Engineer, more than 1/2 inch for line and 1/4 inch for grade, provided that such variation does not result in a level or reverse sloping invert. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness. Establish line and grade for pipe by the use of lasers or by transferring the cut from the offset stakes to batter boards at maximum intervals of 50 feet.

601.03.03 Pipe Distribution and Handling

Distribute material on the job no faster than it can be used to good advantage. Unload pipe only by means recommended by the pipe manufacturer. Do not unload pipe of any size by dropping to the ground. Do not distribute more than one week's supply of material in advance of laying, unless approved.

Pipe shall not be unloaded or stored in the public right-of-way or easement unless it has been certified and accepted by the Engineer. Inspect all pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are used. Clean ends of pipe thoroughly. Remove foreign matter ad dirt from inside of pipe and keep clean during and after laying.

Use proper implements, tools, and facilities for the safe and proper protection of the work. Lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. Remove all damaged pipe from the job site. Do not drop or dump pipe into trenches.

601.03.04 Pipe Laying and Jointing of Pipe and Fittings

601.03.04A General

Proceed with pipe laying upgrade with spigot or tongue ends pointing in direction of flow.

Place pipe in such a manner as to ensure a continuous and uniform bearing and support for the full length of the pipe between joints. Take care to properly align the pipe before forced entirely home. Upon completion of pipe laying all pipe joints shall be in the "home" position, which is defined as the position where the least gap (if any) exists, when the pipe components that comprise the join are fitted together as tightly as the approved joint design will permit. Gaps at pipe joints shall not exceed that allowed by the manufacturer's recommendations. For curved sewers the normal gap will be the gap existing when the pipe joints are in the "home" position as described above, for the pipe in the specified deflected position. After installation, prevent movement from any cause including uplift or floating.

Take special care to prevent movement of the pipe after installation when laid within a movable trench shield.

When laying operations are not in progress, protect the open end of the pipe from entry of foreign material and block the pipe to prevent movement or creep of gasketed joints.

Plug or close off pipes which are stubbed out for manhole construction or for connection by others.

Provide all sewer pipes, 36 inches or smaller in diameter, entering or leaving manholes or other structures, with flexible joints within 18 inches of the exterior wall. Pipes larger than 36 inches in diameter shall have this flexible joint within a distance from the exterior wall equal to one-half the inside pipe diameter.

When cutting and/or machining the pipe is necessary, use only tools and methods recommended by pipe manufacturer.

When shown or approved to deflect pipe from a straight line, either in the vertical or horizontal plan, or when long-radius curves are shown, the amount of deflection shall not exceed that specified or approved by the Engineer. The pipe manufacturer's recommendation will serve as a guide, but the decision of the Engineer shall be final.

601.03.04B Concrete Pipe

Use rubber ring gasket joints unless mortar joints are specifically specified. When mortared joints are used, the entire joint for the full circumference of the pipe shall be completely filled with mortar. The surfaces of the pipe joint shall be brushed clean prior to mortaring. Fill the exterior of the joint with mortar and in the case of bell and spigot joints, fill to an angle of 45 degrees.

601.03.04C Corrugated Metal Pipe

Repair all damaged areas of the protective coating with material equal to the original and permit to dry or solidify before backfilling.

601.03.05 Perforated Pipe Underdrains

601.03.05A Trench Excavation and Backfill

Conform to applicable requirements in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. All excavation shall be unclassified.

601.03.05B Pipe Bedding

Provide a minimum 4-inch bedding of 1 1/2" - 3/4" rock as specified in Subsection 701.02.02C under perforated drain pipe, or as shown. Hand grade the bedding to proper grade ahead of pipe laying. Provide a firm, unyielding support along the entire pipe length.

601.03.05C Backfill at the Pipe Zone

Backfill the pipe zone with 1 1/2" - 3/4" rock as specified in Section 701.02.02C hand placed simultaneously on both sides of the pipe for the full trench width.

601.03.05D Backfill Above the Pipe Zone

Use 1 1/2" - 3/4" rock as specified in Subsection 701.02.02C for backfill above the pipe zone, unless otherwise specified.

601.03.05E Laying and Jointing Perforated Pipe

Securely fasten together perforated pipe with couplings, fittings, or bands as specified by the manufacturer for the type of the pipe used. Close upgrade ends of all subsurface drain pipe with approved plugs to prevent entry of soil materials. Install cleanouts in accordance with manufacturer's recommendation.

Begin pipe laying normally at the outlet end of the pipe line. The lower segment of pipe shall be in contact with the shaped bedding throughout its full length. Bell or groove ends of rigid pipe and outside circumferential laps of flexible pipe shall be placed facing the upgrade end.

Lay all perforated pipe, except perforated PVC pipe, with perforations facing down, unless otherwise specified or directed. Place perforated PVC Drain Pipe with slots facing up.

Inspect all pipe prior to lowering into the trench and, if necessary, clean off any material tending to plug the perforations of the pipe. Carefully lower all pipe and fittings into the trench to avoid any contamination of the filter bedding material.

601.03.06 Flared End Sections

Construct flared end sections in accordance with the details and dimensions shown, except that minor variations may be accepted to permit the use of the manufacturer's standard prefabricated sections and methods of fabrication. Conform excavation, bedding and backfill to applicable requirements herein for the adjacent pipe or drain to be joined.

601.03.07 Pipe Coupling Adapters

Use flexible mechanical compression joint coupling with No. 305 stainless steel bands manufactured by Joints, Inc., Fernco Joint Sealer or equal.

601.03.08 Concrete Closure Collars

Only where specified on Drawings, construct concrete closure collars in conformance with the details provided. Wash pipe to remove all loose material and soil from the surface on which the concrete will be placed. Wet nonmetallic pipe thoroughly prior to placing the collars.

Construct forms with materials that will ensure that no concrete shall enter the line. Make entire collar in one placement, and do not place collars in water. After the collars are placed and have taken their initial set, cure by covering with well-moistened earth. Do not backfill the trench until the concrete has sufficient strength.

601.03.09 Culverts

Remove and replace culverts in conformance to all applicable requirements of this section and Section 204 EXCAVATION, EMBANKMENT, BEDDING, AND BACKFILL.

601.03.10 Testing Storm Drains

601.03.10A General

1. Leakage or infiltration tests for storm drains will not be required unless called for on Drawings or in the Special Specifications.

2. The City may, at no additional expense to the Contractor, make a televised inspection of the storm drain pipe. Any defects in material or workmanship shall be satisfactorily corrected prior to final acceptance of the work.

3. When the quality of materials used or workmanship performed during the construction of storm drains is in doubt for any reason, the Engineer may require the storm drain and all applicable appurtenances to be tested. When so ordered, the storm drain shall be required to pass the same air test as specified for sanitary sewers in Subsection 301.03.10 Testing.

601.03.10B Cleaning Prior to Testing and Acceptance

Prior to final testing, acceptance and final manhole-to-manhole inspection of the storm sewer system by the Engineer, ball, flush and clean all parts of the system. Remove all accumulated construction debris, rocks, gravel, sand silt, and other foreign material from the storm sewer system at or near the closest downstream manhole. If necessary, use mechanical rodding or bucketing equipment.

Upon the Engineer's final manhole-to-manhole inspection of the storm sewer system, if any foreign matter is still present in the system, reflush and clean the sections and portions of the liens as required.

601.03.10C Repairs

Repair or replace, in a manner satisfactory to the Engineer, any section of pipe not meeting the test requirements, or which has leakage.

Infiltration of ground water in an amount greater than herein specified, following a successful air test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the pipeline has occurred. Correct such failures occurring within the warranty period in a manner satisfactory to the Engineer at the Contractor's sole expense.

The Contractor, in contracting to do this work, agrees that the leakage allowances as indicated herein are fair and practical.

601.03.11 Deflection Test for PVC Pipe

Perform a deflection test for all storm drains and culverts constructed of PVC pipe after the trench backfill and compaction has been completed. The test shall be conducted by pulling an approved solid pointed mandrel or variable deflection measuring gauge through the completed pipeline a minimum of 30 days after compaction is completed. The diameter of the mandrel shall be 95 percent of the internal pipe diameter. Conduct testing on a manhole-to-manhole basis and only after the line has been completely flushed clean with water. Locate and repair any sections failing to pass the test and retest the section, at the Contractor's sole expense.

601.03.12 Television Inspection of Storm Drains

Upon completion of all storm drain construction, repairs, cleaning, and required tests, notify the Engineer that all lines are ready for televiewing inspection.

Subsequent to being notified, the Owner shall commence examination of lines or may waive the television inspection. Findings will be recorded. Correct all deficiencies at the Contractor's sole expense.

Upon correction of deficiencies revealed by televiewing, notify the Engineer; the same steps listed above may be repeated until all work is acceptable.

The City of Newberg may, at its own option, perform a deflection test at the same time it performs its television inspection.

601.04 MEASUREMENT AND PAYMENT

601.04.01 Storm Drain Pipe

Measurement and payment for storm drain pipe, including culverts and pipe stubouts from manholes, will be made on a linear foot basis for the various classes, types and sizes of pipe listed in the Proposal and as actually installed. All pipe will be measured horizontally from center-to-center of manholes or to the ends of the pipe, whichever is applicable. No deductions will be made for fittings or for structures.

Payment shall constitute full compensation for the pipe in place, including trench excavation, furnishing, placing and compacting pipe bedding and pipe zone material, native backfill material, testing, and plugs.

601.04.02 Perforated Pipe Underdrains

Measurement and payment for perforated drain pipe will be made on a lineal foot basis for the type and size of pipe installed as shown on the plan sheets. Length will be measured as total length of pipe installed, including fittings measured along the pipe centerline. Payment shall constitute full compensation for trench excavation, special filter material for pipe bedding and trench backfill, and all other work specified to complete the installation of the perforated drain pipe complete in place.

601.04.03 Flared End Sections

Measurement and payment for flared end sections will be made on a unit price basis for each type and size actually installed as shown in the Proposal. Payment shall include full compensation for the flared end section complete in place including concrete cutoff walls and

toe plates, when required.

601.04.04 Concrete Closure Collars

Measurement and payment for concrete closure collars will be made at the unit price each as shown in the Proposal and actually constructed. Payment shall include full compensation for all materials, equipment and labor necessary to complete the work. If not listed in the Proposal, then they will be considered incidental to the other work.

601.04.05 Field Fabricated Connections

Measurement and payment for field fabricated connections will be made at the unit price each for the type and size as shown in Proposal. Payment shall include full compensation for all materials, equipment and labor necessary to complete the work. If not shown in the Proposal, then they will be incidental to the other work.

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602 MANHOLES, INLETS AND CONCRETE STRUCTURES

****

602.01 DESCRIPTION

This section covers the work necessary for the construction of the following items:

1. Manholes
2. Sumps
3. Inlets and Catch Basins
4. Anchor Walls
5. Special Concrete Structures
6. Concrete Encasement

602.02 MATERIALS

602.02.01 Base Rock

One inch minus base rock, conforming to the requirements for aggregate base material in Section 204.02.06 SELECT BACKFILL MATERIAL.

602.02.02 Forms

Forms for exposed surfaces shall be steel or plywood. Others shall be matched boards, plywood or other approved material. Form all vertical surfaces. Trench walls, large rock or earth shall not be used as form material.

602.02.03 Concrete and Reinforced Steel

Concrete and reinforcing steel shall conform to Section 205 MATERIALS - TYPES AND USE.

602.02.04 Cement Mortar

When specified for use, cement mortar shall conform to Section 205. Consistency of mortar shall be such that it will readily adhere to the pipe if using the standard tongue-and-groove type joint. Mortar mixed for longer than 30 minutes shall not be used.

602.02.05 Manholes

602.02.05A Standard Precast Manhole Sections

Furnish sections as specified conforming to the details on the Standard Drawings and to ASTM C 478. Cones shall have same wall thickness and reinforcement as manhole section. Provide eccentric cones with precast grooves for all manholes over six feet in depth. Flat slab tops with precast grooves reinforced to withstand AASHTO H20 loadings shall be provided for manholes six feet deep from crown of pipe and less. Top and bottom of all sections shall be parallel.

Prior to the delivery of any size of precast manhole section on the job site, yard permeability tests will be conducted at the point of manufacture. The precast sections to be tested will be selected at random from the stockpiled material which is to be supplied for the job. All test specimens will be mat tested, and shall meet the permeability test requirements of ASTM C 14 and ASTM C 497.

602.02.05B Precast Concrete Bases

All manholes, except as otherwise specified or approved by the Engineer, shall be constructed using precast, reinforced concrete bases in all traveled areas. Construction of precast bases shall conform to the requirements of ASTM C478. The base riser section shall be integral with the base slab.

602.02.05C Poured in Place Manhole Bases

The Contractor may use poured in place manhole bases in nontraveled areas. Concrete shall conform to Section 205 MATERIALS - TYPES AND USE.

602.02.05D Manhole Grade Rings

Concrete grade rings for extensions shall be a maximum of 6 inches high.

602.02.05E Jointing Materials

Preformed plastic gaskets conforming to the requirements of AASHTO M-198 or joints using confined O-ring with rubber gaskets conforming to ASTM C443 shall be used.

602.02.06 Pipe and Fittings

Conform to requirements of Section 601 PIPE AND FITTINGS (STORM DRAINS).

602.02.07 Precast Inlets and Catch Basins

Precast base and extension units shall conform to ASTM C913 and shall be used in the construction of all precast inlets and catch basins. Concrete risers for extensions shall be a minimum of 4 inches in height and shall be the same quality as the main section.

602.02.08 Manhole and Cleanout Frames and Covers

602.02.08A General

All castings shall be true to size, weight and tolerances shown on the Standard Drawings. Delivered weight shall be ± 5 percent of the specified weight. The bearing seat shall not rock when checked by the test jig. The foundry shall supply all test gauges and shall not subcontract any of the work other than testing procedure, patterns, and machining and cartage. The casting shall not be made by the open mold method and shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted. All castings shall be shot or sandblasted, and the application of paint or other coating will not be permitted. All manhole frames and covers located outside of the right-of-way shall be tamper-proof.

602.02.08B Materials

Conform to ASTM A-48, Class 30B, with the following revisions:

Tensile Strength	30,000 PSI
Traverse Strength (1.2" dia. bar - 18" centers) Load - Pounds	1,600 - 3,000
Deflection - Inches	0.22 - 0.34
Brinell Hardness (as cast)	173 - 200

The Foundry shall certify as to the tensile and traverse properties and the Brinell Hardness. The Owner reserves the right to require a Rough Transverse bar (size of bar 1.2" dia. by 20" long) and/or a tensile bar as per ASTM A 48 for each 20 castings or heat when less than 20 castings are made.

602.02.08C Inspection

Notify the Owner at least 24 hours in advance of casting the units or bars. At least 24 hours notice shall also be given prior to final gauging and inspection. When directed, the following strength test shall be made on the manhole cover. The cover, while resting it its frame, shall sustain a concentrated load of 40,000 lbs. applied at its center through a 2 1/2-inch plug. The Engineer may, at any time, require up to 5 percent of the job and/or order and in no case less than one (1) cover to be tested in this manner. In case of failure during the test, additional covers shall be furnished until the tests prove satisfactory. Covers that do not pass this test shall not be used.

602.02.08D Cap Screws

Cap screws and washers for tamperproof and watertight manhole covers shall be stainless steel with 60,000 PSI minimum tensile strength conforming to ASTM A 453.

602.02.09 Standard Frames and Grates for Inlets and Catch Basins

Frames and grates for catch basins and storm drain inlets shall be fabricated of steel conforming to ASTM A 7, A 36, A 373 in accordance with the details shown on the Standard Drawings. All connections shall be welded. Welding shall conform to requirements of current code for welding in building construction of the American Welding Society. Frames and

gratings shall be tested one within the other, and there shall be no more than 1/16-inch rock. When checked by a test jig, the bearing seat of either component shall have no more than 1/16-inch rock. Test jibs shall be furnished by the manufacturer.

602.02.10 Steps for Precast Manholes

Manhole steps will comply with Section 302 MANHOLES AND CONCRETE STRUCTURES.

602.02.11 Storm Sumps

The precast sections will comply with Section 602.02.05. The frame and cover will comply with Section 602.02.08 and will be tamper-proof when the sump is located outside the right-of-way. The steps will comply with Subsection 602.02.10. Drain rock will be clean round imported material and the size will be 2"-4". The filter fabric will be Mirafi 140 or equal.

602.03 CONSTRUCTION

602.03.01 General

602.03.01A Excavation and Backfill

Conform to applicable provisions in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Backfill around manholes, inlets, catch basins, and other appurtenances shall be of the same quality as the trench backfill immediately adjacent. All excavation shall be unclassified.

602.03.01B Base Rock

Place crushed aggregate base rock and thoroughly compact with a mechanical vibrating or power tamper.

602.03.01C Foundation Stabilization

If material in bottom of excavation is unsuitable for supporting manholes and other sewer appurtenances, excavate below subgrade as directed and backfill to required grade with rock conforming to Foundation Stabilization in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL.

602.03.02 Manholes

All manholes, except as otherwise specified, shall be constructed using precast, reinforced concrete base sections, riser sections, and other precast appurtenances conforming to ASTM C478. Base riser sections shall be integral with the base slabs.

Preformed plastic gaskets shall be installed in strict accordance with the manufacturer's recommendation. Only pipe primer furnished by the gasket manufacturer will be approved. When using preformed plastic gaskets, manhole sections with chips or cracks in the joint surfaces shall not be used. Completed manholes shall be rigid and all manholes for sanitary sewers shall pass the hydrostatic test. Construct manhole inverts in conformance with the Standard Drawings with smooth transitions to ensure an unobstructed flow through manhole. Cover exposed edges of pipe completely with mortar. Trowel all mortar surfaces smooth.

Holes for installing pipe into precast manhole sections shall be cast in place or saw cut.

Channels shall conform accurately to sewer grade. Channel shall be formed to accept a three (3) foot long by six (6) inch TV. camera. Construct cast in place channel and shelf, in field, in one operation. Finish concrete shelf between channels with a brush.

602.03.03 Pipe Stubouts From Manholes

Install stubouts from manholes at locations as shown or directed. Grout or install pipes into manhole walls or manhole base so as to provide watertight seal around pipes. Provide manhole with resilient connector for PVC pipe. Saw cut opening in manhole walls with concrete saw. Pipe connections to the cone section of a manhole are strictly prohibited.

602.03.04 Manhole Grade Rings

In general, manhole grade rings will be used on all manholes in streets or roads or other locations where a subsequent change in existing grade may take place. Extensions will be limited to a maximum height of 12 inches.

Install appropriate combination of grade rings to a height that will accommodate the finish manhole surface elevation as shown on the Drawings. Lay grade rings in mortar with sides plumb and tops level. Seal joints with mortar to provide a watertight seal. Grade ring extensions shall be watertight.

602.03.05 Adjustment of Manholes to Grade

Frame and cover shall be left a minimum of 3 inches below finish grade and when the first lift of A.C. is placed. Sawcut around the manhole or cleanout and adjust the frame and cover to match street grade and fill excavation with concrete to a depth of 6 inches. The frame shall bear directly on the concrete. Place final lift of A.C. See Standard Drawing for manhole or cleanout adjustment.

602.03.06 Special Concrete Structures

Conform to the details as shown.

602.03.07 Placing Precast Units

If material in bottom of trench is unsuitable for supporting unit, excavate as directed and backfill to required grade with foundation stabilization material in conformance with Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Set units to grade at locations shown or directed.

602.03.08 Installation of Inlets and Catch Basins

Install inlets and catch basins at the locations shown on the Plans or where directed by the Engineer.

Construct inlets and catch basins as shown on the Standard Drawings. All inlets and catch basins constructed with precast units shall conform to ASTM C913. The top section, including curb, gutter, and frame, shall be cast-in-place. The Contractor may use poured in place inlets and catch basins in accordance with the Standard Detail Drawings. Concrete shall conform to Section 205 MATERIALS - TYPES AND USE.

Set frames and grates at elevations shown or as directed. Frames shall be cast in concrete.

Bearing surfaces shall be clean and provide uniform contact. Anchor bolts and other fastenings shall be firmly embedded in concrete.

Any surrounding structures (e.g., pavement, curbs, gutters, sidewalks, driveways) and landscaping damaged during installation of inlets or catch basins shall be restored in accordance with these Standard Specifications at the Contractor's sole expense.

602.03.09 Inlet and Catch Basin Extensions

Install extensions to height as required. Use the largest size (in height) pre-cast extension risers available from the manufacturer that will allow for conformance with the specified finished grade. Stacking small pre-cast extensions where a larger extension could be used is prohibited. Lay risers in mortar with sides plumb and tops to grade. Joints shall be sealed with mortar, with interior and exterior troweled smooth. Prevent mortar from drying out and cure by applying an approved curing compound or other approved method. Extensions shall be watertight.

602.03.10 Cleaning

Upon completion, clean each structure of all silt, debris and foreign matter.

602.03.11 Steps for Precast Manholes

Steps shall comply with that specified in the Sanitary Sewer Section of the Standard Technical Specifications - Division Three.

602.04 MEASUREMENT AND PAYMENT

602.04.01 Manholes

Measurement and payment for manholes will be made on a unit price basis for each type shown in the Proposal for Manholes 8 feet deep, plus the unit price per foot shown in the Proposal for extra depth of manholes over 8 feet. No deduction will be made for depths less than 8 feet. Measurement of manhole depth will be from the top of the manhole frame and cover to the manhole invert at the center of the manhole to the nearest 1/10 foot. Payment shall include full compensation for all materials, labor, steps and equipment required to construct manhole in-place.

602.04.02 Pipe Stubouts From Manholes

Measurement and payment for pipe stubouts from manholes shall be made at the unit price per length of pipe installed.

602.04.03 Tamperproof and Watertight Manhole Frame and Covers

Measurement and payment for tamperproof and watertight manhole frame and covers will be made on a unit price basis for each type installed. Since payment for furnishing and installing standard frame and covers is already included in the bid price for manholes, this unit price will include only the additional compensation for providing the watertight frame and cover complete in place.

If no item is called out in the Proposal then tamperproof and watertight manholes frames and covers will be supplied at the same price as for standard frame and cover, i.e., no extra

compensation.

602.04.04 Concrete Encasement

Measurement and payment for concrete encasement will be made on a linear foot basis as shown in the Proposal for the size pipe to be encased. Length shall be measured along the centerline of the pipe. Payment shall include full compensation for all materials, equipment and labor required to construct the work complete in place.

602.04.05 Special Concrete Structures

Measurement and payment for special concrete structures will be made on a lump sum each basis. Payment shall constitute full compensation for materials, equipment and labor required to construct the work complete in place.

602.04.06 Catch Basins and Inlets

Measurement and payment for catch basins and inlets will be made on a unit price basis per each catch basin or inlet for the number and type actually constructed. Payment shall include full compensation for all materials, equipment and labor required to construct the work complete in place including the replacement of any surrounding structures damaged during construction.

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603 WORK ON EXISTING STORM DRAINS DRAINAGE STRUCTURES

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603.01 DESCRIPTION

This section covers the work necessary to join new work to existing, the abandoning of storm drains and structures and adjusting existing utility structures to finished grades.

603.02 MATERIALS

Conform to requirements of Section 205 MATERIALS - TYPES AND USE and to the requirements for related work referred to herein.

603.03 CONSTRUCTION

603.03.01 Excavation and Backfill

Conform to requirements of Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. All excavation shall be unclassified.

603.03.02 Manholes Over Existing Storm Sewers

Advise Engineer of system for diverting flow and obtain authorization before starting. The Contractor shall be totally responsible for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

Construct manholes over existing operating lines at locations shown. Perform necessary excavation and construct new manholes in conformance with applicable requirements of Section 302 MANHOLES AND CONCRETE STRUCTURES.

Construct manholes as shown on the Detail Drawings or Standard Drawings. Densify the concrete base by vibrating or working as approved and screed to provide a level, uniform bearing for precast sections.

Place the first precast section of manhole in concrete base before concrete has set and deposit sufficient mortar on the base to assure a watertight seal between the base and the manhole wall. First section shall be properly located and plumb. Stacking additional precast manhole sections shall be prohibited until the concrete has cured a sufficient amount to support the additional weight in moist conditions.

After pouring concrete base, remove the top section of the existing pipe to the full width of pipe and diameter of the manhole. Cover exposed edges of pipe completely with mortar. Trowel all mortar surfaces smooth.

Prevent broken material or debris from entering sewer flow. Maintain flow through existing lines at all times. Protect new concrete and mortar for a period of 7 days after placing.

603.03.03 Connection to Existing Manholes, Inlets and Concrete Structures

Provide all diversion facilities and perform all work necessary to maintain flow in existing lines during connection. Break out existing base or saw cut opening in wall with concrete saw. Grout in new pipe to provide watertight seal, and when applicable, smooth flow into and through existing manhole as specified in Subsection 603.03.09 RECONSTRUCT MANHOLE BASE.

603.03.04 Removal of Existing Pipes, Manholes and Appurtenances

Existing pipelines, manholes and appurtenances which lie in the line of and are to be replaced by the new construction shall be removed from the site and disposed of as provided for in Section 203 CLEARING AND GRUBBING.

603.03.05 Filling Abandoned Manholes, Inlets and Catch Basins

Existing manholes shown to be abandoned shall be filled with granular material as specified in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL. Compact to at least 90 percent maximum density as determined by ASTM D1557. Remove manhole frame and cover and plug all pipes with permanent plugs as specified herein. Break or perforate the bottom to prevent the entrapment of water.

603.03.06 Existing Manhole Frames and Covers

Manhole frames and covers removed by the Contractor which will not be reused on the project shall become the property of the Contractor.

603.03.07 Permanent Plugs

Clean interior contact surfaces of all pipes to be cut off or abandoned. Construct concrete plug in end of all pipe 18 inches or less in diameter. Minimum length of concrete plugs shall be 8 inches. For pipe 21 inches and larger, the plugs may be constructed of common brick or concrete block. Plaster the exposed face of block or brick plugs with mortar. All plugs shall be watertight

and capable of withstanding all internal and external pressures without leakage.

603.03.08 Adjust Existing Structures to Grade

Existing manholes, inlets, catch basins and similar structures shall be brought to the specified finished grade by methods of construction as required in Section 511 ADJUSTMENT OF EXISTING STRUCTURES TO GRADE.

603.03.09 Reconstruct Manhole Base

Conform to applicable requirements of Section 302 MANHOLES AND CONCRETE STRUCTURES. Exercise caution in chipping out existing concrete base so as to prevent cracking of manhole walls. Prevent all material from entering the flow. Pour new base to a minimum of six inches below the lowest projection of the pipe. Construct new channels to the elevations shown. Conform to details for channel construction in the Standard Drawings. Repair any cracks which occur as a result of work operations with new grout to form a watertight seal.

603.03.10 Connect Pipe to Existing Inlets

Conform to applicable requirements of Section 302 MANHOLES AND CONCRETE STRUCTURES. Saw cut opening in inlet with a concrete saw and grout in a watertight seal between the new pipe and inlet wall. Plaster mortar smooth inside pipe opening. Alignment, slope of pipe, and other construction details shall be as specified.

603.04 MEASUREMENT AND PAYMENT

603.04.01 Manholes Over Existing Storm Drains

Measurement and payment for manholes over existing storm drains will be made at the unit price for each. Payment will include compensation for excavation and backfill, constructing manhole over existing line, final adjustment to grade, maintaining flow and forming new flow channel.

603.04.02 Removal of Existing Pipes, Manholes and Appurtenances

Payment for removal and disposal of existing pipes, manholes and appurtenances will be considered as incidental to the work and included in the bid item for excavation and backfill as specified in Section 204 EXCAVATION, EMBANKMENT, BEDDING AND BACKFILL.

603.04.03 Connection to Existing Manholes

Measurement and payment for connection to existing manholes will be made on a unit price each basis.

603.04.04 Filling Abandoned Manholes, Inlets and Catch Basins

Measurement and payment to filling abandoned manholes will be made on a unit price each basis.

603.04.05 Adjust Existing Structures to Grade

Measurement and payment for adjusting existing manholes, catch basins, inlets, and similar structures will be made on a unit price each basis for the type shown in the Proposal.

603.04.06 Reconstruct Manhole Base

Measurement and payment for reconstructing manhole base will be made on a unit price each basis.

603.04.07 Connect Pipe to Existing Catch Basin

Measurement and payment for connecting new pipe to existing catch basins will be made on a unit price each basis.

END OF DIVISION

DIVISION SEVEN
CONCRETE STRUCTURES TECHNICAL REQUIREMENTS

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701 CONCRETE STRUCTURES

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701.01 DESCRIPTION

This section covers Portland Cement concrete, plain or reinforced, precast or cast-in-place, in bridges, box culverts, retaining walls, catch basins, abutments, piers, footings, foundations, and similar structures.

701.02 MATERIALS

701.02.01 Portland Cement

Conform to Section 205 MATERIALS - TYPES AND USE.

701.02.02 Aggregates

701.02.02A General

Use aggregates which conform to requirements of Section 205 MATERIALS - TYPES AND USE, and the additional requirements contained herein.

If Contractor desires to furnish aggregates which deviate from gradations contained herein, obtain written authorization from Engineer prior to incorporation of any materials in any part of the work.

701.02.02B Fine Aggregate

Fine aggregate must be graded from coarse to fine within the following limits:

All fine aggregate shall meet the requirements of ASTM C33.

GRADING REQUIREMENTS
FINE AGGREGATE - PORTLAND CEMENT CONCRETE

Sieve Size Passing	Percentages (by weight)
3/8"	100
No. 4	90 - 100
No. 16	45 - 75
No. 30	25 - 55
No. 50	5 - 30
No. 100	0 - 8

Use fine aggregate which has a sand equivalent of not less than 68, and which develops in

the mortar strength test taken at seven days, a compressive strength of at least 95 percent of mortar using Ottowa sand.

Sand for mortar shall conform to the requirements of AASHTO M45; testing shall conform to the OSHO standard test for mortar strength.

701.02.02C Coarse Aggregate

Coarse aggregate must conform to the specified maximum size, and when each maximum size is separated into designated sizes, the separated designated sizes shall be as follows:

Maximum Size of Aggregates	Separated Sizes
2 inch	(2" - 1"), (1" - No. 4)
1½ inch	(1½" - ¾"), (¾" - No. 4)
1 inch	(1" - No. 4)
¾ inch	(¾" - No. 4)

Do not allow oversized and undersized materials to exceed a combined 15 percent of any separated size, nor allow any pieces to have any dimension greater than twice the maximum square screen size for the specified grading.

Grading of each of the specified separated sizes of coarse aggregate shall conform with the following:

GRADING REQUIREMENTS
COARSE AGGREGATE - PORTLAND CEMENT CONCRETE

Separated Sizes
Percentages (by weight)

Sieve Size Passing	2" - 1"	1½" - ¾"	1" - No. 4	¾" - No. 4
2½"	100			
2"	90 - 100	100		
1½"	35 - 70	90 - 100	100	
1"	0 - 15	30 - 65	90 - 100	100
¾"		0 - 15	50 - 80	90 - 100
3/8"			15 - 40	20 - 50
No. 4			1 - 10	0 - 10

When a tolerance range is set forth in the above grading requirements, it shall be understood that the midpoint of the tolerance range is the target value and the product shall conform as closely as realistically possible to this target value. The purpose of the tolerance range is only to permit occasional minor variations from the target value that are, for practical reasons, unavoidable.

When coarse aggregate is to be separated into two sizes as set forth hereinabove, control grading of material in each separated size within the applicable range of percentages given in grading requirements for coarse aggregate hereinabove so that the quantity of each

separated size measured into the batch shall be not less than 35 percent nor more than 65 percent of total quantity of coarse aggregate measured into the batch.

701.02.03 Water

Conform to Section 205 MATERIALS - TYPES AND USE.

701.02.04 Admixtures

701.02.04A Air-Entraining Admixtures

Air-entraining admixtures shall conform to AASHTO M 154 (ASTM C260) using one or another of several tests as directed by the Engineer. Chloride content of admixture must not exceed 0.5 percent by weight.

701.02.04B Water-Reducing, Retarding, and Accelerating Admixtures

Water reducing, retarding, and accelerating admixtures shall conform to AASHTO M 194 (ASTM C494) using one or more of several tests as Engineer may direct. Chloride content of admixture must not exceed 0.5 percent by weight.

701.02.05 Curing Materials

Use curing material(s) conforming to one or more of the following requirements or as specified:

White Burlap-Polyethylene sheets for Curing Concrete	AASHTO M 171
Waterproof Paper for Curing Concrete	AASHTO M 171
Liquid Membrane-Forming Compounds for Curing Concrete* (white pigmented)	AASHTO M 148
White Polyethylene (Film) for Curing Concrete	AASHTO M 171
Burlap Cloth (Jute or Kenaf)	AASHTO M 182

*Not permitted on bridges, reservoirs, and box culverts.

701.02.06 Joint Materials

701.02.06A Preformed Expansion Joint Fillers

Use preformed expansion joint fillers for concrete conforming to AASHTO M 153 or AASHTO M 213 except that those furnished under AASHTO M 213 shall be tested in conformance to ASTM D 1751. Fillers conforming to AASHTO M213, except that the binder, if other than bituminous material, may also be used provided that they otherwise meet these Specifications and provide further that they have been demonstrated to be rot and vermin proof for a period of at least 5 years.

701.02.06B Preformed Elastomeric Joint Seals

Utilize preformed elastomeric joint seals conforming to AASHTO M 220.

701.02.06C Poured Filler

Utilize poured filler for concrete joints conforming to AASHTO M 173.

701.03 CONSTRUCTION

701.03.01 General

When purchasing concrete from others during performance of the Contract, be fully responsible for such concrete conforming to all requirements contained herein.

701.03.02 Mix Design

701.03.02A Classes of Concrete

Classes of concrete shall designate design field strength of concrete in 28 days (PSI) followed by maximum size of aggregate to be used in the concrete, i.e., Class 3300-1-1/2 shall include a compressive strength of 3300 PSI in 28 days with 1-1/2 inch maximum size aggregate used in that concrete.

Use the class of concrete as specified or shown for each component part of the project, and if not so specified or shown, use Class 3300-1-1/2 concrete.

In all precast-prestressed concrete members, in the stems of post- tensioned box girders, and in all other members where the spacing of reinforce- ment is less than 2 inches, use 1-inch maximum size aggregate, unless specified otherwise.

701.03.02B Classification and Proportioning of Concrete Mixtures

Before beginning any concrete work the Contractor shall submit a concrete mix design to the Engineer.

During progress of the work, if concrete strength and quality as determined by cylinders and tests taken by Engineer fail to attain the requirements specified, suspend all concrete work and make necessary adjustments to obtain required results.

A mix using different proportions or aggregate sizes of any of concrete materials in the mix, may be requested to satisfy a particular production schedule or for other reasons. Any requested and authorized alteration to proportions of any of the concrete materials in the mix shall be made at the Contractor's sole expense.

The Contractor shall design the mix to meet the following requirements unless otherwise specified:

1. Entrained air range 3 percent to 6 percent (percent by volume). AASHTO T 152.
2. Slump range - 2 inches to 4 inches. AASHTO T 119.
3. When using 3/4-inch maximum size aggregate, the fine aggregate shall be between 40 percent and 48 percent of the total aggregate used.
4. When using 1-1/2-inch maximum size aggregate, the fine aggregate shall be between 35 percent and 45 percent of the total aggregate used.
5. When specified, use a water reducing admixture in conformance with manufacturer's recommendations.

Tests for strength shall be made in accordance with the following:

Molding Concrete Specimens in the Field AASHTO T 23

Compressive Strength of Molded Cylinders AASHTO T 22

Curing of cylinders shall conform to AASHTO T 23 except as modified herein.

701.03.03 Consistency

In general, use a mixture which contains the minimum amount of water consistent with required workability. Consistency of concrete shall be gauged by ability of equipment to properly place it without segregating or honeycombing, and not by the difficulty in mixing or transporting.

701.03.04 Measurement of Materials

Provide facilities for weighing and accurately measure all materials by weight, except water, when batching concrete; weigh fine and coarse aggregates separately. Take representative samples and determine moisture content for each kind of aggregate. Store or handle aggregates so that their water content remains constant during any day's run. Equipment for weighing materials shall provide convenient and positive means of determining quantities in the batch of concrete, and means shall be provided for addition or removal of small quantities of materials to obtain exact weight per batch. Device for measuring water shall show accurately the quantity in gallons and be so designed that the water supply will be automatically cut off while water is being discharged into the mixer. Water shall be assumed to weigh 8.34 pounds per gallon.

701.03.05 Mixing

701.03.05A General

Machine mix all concrete. Ready-mix concrete may be used if it meets all specified requirements herein.

701.03.05B Mixing at the Site

Mix concrete thoroughly in a batch mixer of a size and type which will ensure a uniform distribution of materials throughout the mass.

Equip mixer with adequate water storage and a device for accurately measuring and automatically controlling amount of water used in each batch. Preferably provide mechanical means for recording the number of revolutions for each batch and automatically preventing discharge of mixer until materials have been mixed the specified minimum time.

Remove entire contents of the mixer from the drum before materials for a succeeding batch are placed therein. Deposit materials composing a batch simultaneously in the mixer. Do not use any mixer having a rated capacity of less than 1-sack batch. Do not charge a mixer in excess of its rated capacity.

Mix all concrete for a period of not less than 1-1/2 minutes after all materials, including water, are in the mixer. During the period of mixing, operate at a design speed of not less than 14 nor more than 20 revolutions per minute.

The first batch of concrete materials placed in the mixer shall contain a sufficient excess of cement, sand, and water to coat the inside of the drum without reducing the required

mortar content of the mix. Upon cessation of mixing for a considerable period, clean the mixer thoroughly.

The above specification contemplates the use of conventional revolving drum type mixers. Other types may be used with written permission of the Engineer.

701.03.05C Truck Mixing

Unless otherwise authorized by the Engineer, use only revolving drum type truck mixers that are watertight and so constructed that concrete can be mixed to ensure a uniform distribution of materials throughout the mass.

Accurately measure all solid materials for concrete in accordance with Subsection 701.03.04 and charge into the drum at the proportioning plant. Except as subsequently provided, equip the truck mixer with a tank for carrying mixing water. Place only the prescribed amount of water in the tank unless the tank is equipped with a device by which quantity of water added can be readily verified. Mixing water may be added directly to the batch in which case a tank will not be required. Truck mixers may be required to be provided with means by which the mixing time can be readily verified by the Engineer.

Do not allow any batch in a truck mixer to exceed the maximum rated capacity of mixer as stated by the manufacturer and stamped in metal on the mixer. Continue truck mixing for not less than 70 revolutions nor more than 100 revolutions of the drum at the rate of rotation designated by the manufacturer and stamped in metal on the mixer. Commence mixing after all ingredients, including water, are in the drum. Additional mixing, if any, shall be of the rate of rotation as designated by the manufacturer as agitating speed. Begin mixing within 30 minutes after cement has been added to either the water or the aggregate. When cement is charged into a mixer drum containing water or surface-wet aggregate and when the temperature is above 90 degrees F, or when high-early strength Portland Cement is used, reduce this limit to 15 minutes.

701.03.05D Partial Mixing at Central Plant

When a stationary mixer is used for partial mixing of concrete (shrink-mixing), mixing time in stationary mixer may be no more than is required to intermingle the ingredients. After transfer to a truck mixer, further mixing at a designated mixing speed will be required only as necessary to meet the requirements for uniformity of concrete as specified for truck mixing.

701.03.05E Plant Mix

Conform mixing at a central plant to requirements for mixing at the site.

701.03.05F Time of Hauling and Placing Mixed Concrete

Completely discharge and place in the forms all concrete transported to the project in a truck mixer or truck agitator within ninety (90) minutes after the introduction of mixing water to cement and aggregate, or cement to aggregate, or before 250 revolutions of the truck drum or blades, whichever comes first.

Reduce this time during conditions which contribute to accelerated setting of concrete, or when temperature of concrete is 85 degrees F, or above.

Add no water to concrete during hauling or before discharge, unless ordered by the Engineer. Engineer will not approve any water addition which increases the slump by more than 1 inch or exceeds the design water-cement ratio.

701.03.05G Delivery

Utilize a plant capacity and transportation equipment which are adequate to ensure continuous delivery of concrete during concreting operations and which will provide for proper handling, placing, and finishing of the concrete. Use a rate of delivery such that the interval between batches does not exceed 20 minutes. Methods of delivery and handling concrete shall allow placing with a minimum of rehandling and without damage to the structure or concrete. Time interval may be reduced when deck concrete is being placed. Control delivery of concrete for decks so that deck pour will progress at a rate of not less than 20 feet per hour unless some other rate of pour is specified.

701.03.05H Retempering

Mix concrete only in such quantities as are required for immediate use and do not use any which has developed initial set. Concrete which has partially hardened shall not be retempered or remixed.

701.03.06 Falsework

For structures requiring poured-in-place concrete superstructures, working drawings and calculations for falsework prepared by an engineer registered to practice in the State of Oregon may be required to be submitted for review. For a guideline on designing formwork and falsework, the contractor is referred to ACI Standard, "Recommended Practices for Concrete Formwork" (ACI 347-XX).

Design and construct all falsework to support the total applied loads with a deflection/span ratio not to exceed 1/500 in any falsework span. Employ screw jacks or hardwood wedges to take up any settlement in formwork either before or during the placing of concrete. Set falsework for post- tensioned structures to carry full dead load and any additional vertical or horizontal loads caused by the prestressing operation.

Contractor is directed to the fact that post-tensioned structures are not self-supporting until post-tensioning is complete and Contractor shall consider this fact in the design, maintenance, and protection of falsework.

701.03.07 Forms

Forms shall be constructed for all concrete work. Adjacent surfacing such as asphaltic concrete shall not be used as a form for placing concrete. Make all forms mortar-tight, set them so finished concrete will conform to the proper dimensions and contours, and make them sufficiently rigid to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations. Construct and maintain forms to prevent warping and opening of joints.

Design forms to withstand the effects of vibration of concrete as it is placed.

Support deck forms for concrete box girder spans by girder stems. Posts or other supports for deck forms will not be permitted to come in contact with the bottom slab of the box girder.

Make wood forms for concrete surfaces not subject to backfill of dressed lumber of uniform thickness with a form liner or an approved type. Wood forms for interior cells of box girders may be made with or without a form liner. Shiplap or S4S boards are acceptable provided forms are mortar-tight. Plywood will be acceptable as a form liner if sufficiently supported. Ensure that all form work for exposed concrete surfaces is smooth with the grain running in the same direction to give a good finished appearance. Construct metal ties or anchorages within forms to permit their removal to a depth of at least 1 inch from face without injury to the concrete. Where wire ties are permitted, all wires, upon removal of forms, shall be cut back at least 1/4-inch from the face of the concrete with chisels or nippers; for green concrete, nippers are necessary. Design all fittings for metal ties so that upon their removal, cavities which are left will be of the smallest possible size. Fill cavities with cement mortar and leave surface sound, smooth, even, and uniform in color.

Fillet forms at all sharp corners and bevel or draft in the case of all projections, such as girders and copings, to ensure easy removal. For narrow walls and columns, where the bottom of the form is inaccessible, leave the lower form boards loose so that they may be removed for cleaning out extraneous material immediately before placing of the concrete.

Keep the forms in place for periods, which shall be determined as hereinafter specified. When the forms appear to be unsatisfactory in any way, either before or during the placing of concrete, work shall be stopped until defects have been corrected.

Maintain shape, strength, rigidity, watertightness, and surface smoothness of re-used forms at all times. Do not re-use warped or bulged lumber, and do not re-use any forms which are unsatisfactory in any respect. Thoroughly clean re-used forms of all dirt, mortar, and foreign matter.

Treat all forms with form oil or wax or saturate with water immediately before placing concrete. Do not use material which will adhere to or discolor the concrete.

701.03.08 Removal of Falsework and Forms

Assume full responsibility for all damage resulting from premature removal of forms. Do not place earth backfill against walls below grade, and do not remove forms and shoring from structural slabs or beams until concrete has reached an actual field strength equal to 75 percent of the specified 28-day design field strength. Actual field strength shall be determined from field cured test cylinders which shall be cured under conditions equivalent to the most unfavorable conditions for the portions of concrete which the cylinders represent.

Do not use methods of form removal likely to cause over-stressing of the concrete. Remove supports in such a manner as to permit concrete to uniformly and gradually take the stresses due to its own weight.

Remove all form work from cells of concrete box girders to which access is provided, and all form work except that necessary to support deck slab, from the remaining cells of the box girder.

701.03.09 Weather Limitations

701.03.09A General

Assume full responsibility for the concrete work during any unusual weather conditions, including, but not limited, to hot and cold weather. Any work not in conformance to the

Drawings and Specifications may be rejected by the Engineer and replaced or repaired at the Contractor's expense.

701.03.09B Hot Weather

Take special precautions for hot weather in placing, finishing, and curing concrete when the ambient temperature reaches 85 degrees F or higher or whenever relative humidity, wind velocity, or exposure to the sun at lower air temperatures are expected to cause hot weather conditions for the concrete. Specify cool materials for the mix, add additional water to the forms, subgrades and other areas to be in contact with concrete but allow no standing water when concrete is placed; schedule work carefully to place and finish concrete as rapidly as possible, reduce evaporation from the concrete with windbreaks, covers, and fog nozzles, and begin curing as soon as possible.

701.03.09C Cold Weather

Do not place concrete when ambient temperature is below 35 degrees F without written permission of the Engineer. Enclose structure in such a way that concrete and air within the enclosure can be kept above 50 degrees F for a period of seven days after placing the concrete. When enclosures are used to maintain specified temperatures, furnish a 24-hour temperature recording thermometer to record all temperature within the enclosure.

Supply heating apparatus such as stoves, salamanders, or steam equipment and the necessary fuel. When dry heat is used, provide means of maintaining atmospheric moisture. Heat all aggregates and mixing water to a temperature of at least 70 degrees F, but not more than 150 degrees F; aggregates may be heated by either steam or dry heat.

Where practicable, forms insulated with at least 2-inch thick blankets, made of fiberglass, rock wool, balsam wood, or similar commercial material capable of maintaining the surface of the concrete at no less than 50 degrees F may be used in lieu of other protection of concrete involving housing and heating. When forms are insulated, protect exposed horizontal surfaces with a similar layer of the insulating materials securely fastened in place. If insulated forms do not maintain proper temperature at the surface of the concrete, use auxiliary protection and heat. The Contractor may also use plastic and straw to protect the concrete. The Contractor will keep the straw confined to the surfaces being protected and clean up all materials as soon as the concrete no longer requires the protection. No staining of the concrete will be accepted due to the use of straw as a method of protection.

701.03.10 Handling and Placing

701.03.10A General

In preparation for placing of concrete, remove all sawdust, chips, and other construction debris and extraneous matter from interior of forms. Remove struts, stays, and braces, serving temporarily to hold forms in correct shape and alignment prior to placing of the concrete, when the concrete has reached a position rendering their service unnecessary. Remove these temporary members entirely from the forms and do not leave them buried in the concrete.

Do not use concrete which does not reach its final position in forms within time stipulated in Subsection 209.03.05F.

Place concrete so as to avoid segregation of material and displacement of reinforcement. Do not use long troughs, chutes, and pipes for conveying concrete from mixer to forms.

For open troughs and chutes, use steel or steel lined material. Where steep slopes are required, equip chutes with baffles or make in short lengths that reverse direction of movement. Keep all chutes, troughs, and pipes clean and free from coatings of hardened concrete by thoroughly flushing with water after each run; discharge water used for flushing clear of structure and do not discharge into any sewer or culvert or appurtenances thereto.

When placing operations would involve dropping concrete more than 3 feet, deposit through an "elephant trunk." Aluminum pipe will not be allowed.

After initial set of concrete, do not jar forms nor place strain on the ends of the reinforcing bars which project.

Thoroughly compact concrete during and immediately after depositing.

Provide compaction by mechanical vibration subject to the following provisions:

1. Use internal vibration or other methods provided herein.

2. Use vibrators of a sufficient type and design, capable of transmitting vibration to concrete at frequencies of not less than 4,500 impulses per minute.

3. Provide intensity of vibration such as to visibly affect the mass of the concrete of 1-inch slump over a radius of at least 18 inches.
4. Provide a sufficient number of vibrators to properly compact each batch, immediately after it is placed in forms.

5. Manipulate vibrators so as to thoroughly work concrete around reinforcement and embedded fixtures and into corners and angles of forms.

6. Apply vibration at the point of deposit and in the area of freshly deposited concrete. Insert vibrators and withdraw from concrete slowly. Use vibration of sufficient duration and intensity to thoroughly compact concrete but do not continue so as to cause segregation. Do not continue vibration at any one point to the extent that localized areas of grout are formed.

7. Make application of vibrators at points uniformly spaced and not farther apart than twice the radius over which vibration is visibly effective.

8. Do not apply vibration directly or through reinforcement to sections or layers of concrete which have hardened to the degree that concrete ceases to be plastic under vibration. Do not use vibration to make concrete flow in forms over distances so great as to cause segregation, nor to transport concrete in forms.

9. Supplement vibration by such spading as is necessary to ensure smooth surfaces and dense concrete, along form surfaces and in corners and locations impossible to reach with vibrators.

Place concrete in horizontal layers not more than 12 inches thick except as hereinafter provided. When less than a complete layer is placed in one operation, terminate in a

vertical bulkhead. Place each layer and compact before the preceding layer has taken initial set to avoid surfaces of separation between the layers. Compact each layer so as to avoid formation of a surface of separation with a preceding layer.

When placing of concrete is temporarily discontinued, and after concrete has become firm enough to retain its form, clean off laitance and other objectionable material to a sufficient depth to expose sound concrete. Smooth top surface of the concrete adjacent to forms with a trowel. Where a "feather edge" might be produced at a construction joint, as in the sloped top surface of a wing wall, use inset form work to produce a blocked out portion in the preceding layer which produces an edge thickness of not less than 6 inches in succeeding layer. Do not discontinue work within 18 inches of the top of any face, unless provision has been made for a coping, in which case, a construction joint shall be made at the under side of the coping.

701.03.10B Pumping

Placement of concrete by pumping will be permitted provided clean equipment is used which is of sufficient size and capacity to satisfactorily handle the concrete mix specified. For discharge line of pump, use steel or rubber pipe. Provide additional cement or additives required to obtain a pumpable mix at the sole expense of the Contractor.

Furnish evidence of backup means of placing structural concrete in the event of failure of equipment during placement.

701.03.11 Construction Joints

701.03.11A General

Use construction joints only where shown or designated on the Drawings, unless otherwise specified. Taper wooden key forms and pre-soak or treat to prevent swelling. When placing operation is interrupted for any reason, place construction joints and provide with keys to resist shear and dowels to develop bond.

701.03.11B Bonding

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 in a manner that will not leave loosened particles or aggregate or damaged concrete at the surface. It shall be thoroughly cleaned of foreign matter and laitance and saturated with water. At the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including vertical and inclined surfaces, shall first be thoroughly covered with a coating or mortar or neat cement grout against which the new concrete shall be placed before the grout has attained its initial set.

The placing of concrete shall be continuous from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished true to line and elevation.

701.03.12 Expansion and Fixed Joints

Construct all joints according to details shown.

701.03.12A Open Joints

Place open joint in locations shown. Construct by insertion and subsequent removal of a template without chipping or breaking corners of the concrete. Do not extend reinforcement across an open joint unless so shown.

701.03.12B Filled Joints

Construct poured expansion joints similar to open joints. When premolded types are specified, drive nails at about 1 foot on centers through filler to provide anchors into concrete when it is placed. Place premolded joint filler in forms in proper rigid position before concrete is poured. Install premolded joint filler in all walks to provide expansion and contraction joints at maximum 18-foot intervals and at all changes in direction, at intersections and at each side of driveway entrances.

701.03.12C Steel Joints

Shape plates, angles or other structural shapes accurately at the shop to conform to the section of concrete. Fabricate and paint to conform to requirements of these Specifications. Take care to insure that surface in finished plane is true and free of warping. Employ positive methods in placing joints to keep them in correct position during placement of concrete. Opening at expansion joints at normal temperature shall be as shown. Avoid impairment of clearance of any manner.

701.03.12D Preformed Elastomeric Joint Seals

Use compression joint seals in the longest practicable lengths for longitudinal joints. In transverse joints, one factory splice will be permitted in joint seals where required length of material in any one joint exceeds manufacturers' standard stock lengths. Make such splices true and smooth on outside surfaces with no offsets of abutting sections and with complete bond on all abutting surfaces. Make joints clean and dry and free of spalls and irregularities which would impair a tight seal in service. Place seals in the joint under compression, as recommended by manufacturer, using a lubricant-adhesive as a covering film applied to both sides of the seal just prior to its installation.

For lubricant-adhesive material, use a compound of same base polymer as the joint seal with which it is used, blended with a suitable volatile solvent. Lubricant-adhesive shall be compatible with joint seal and concrete and be relatively unaffected by normal moisture in the concrete. It shall maintain a suitable consistency at the temperature at which joint seal is installed.

Set seal as shown and make sure it contacts walls of joint throughout its length. Longitudinal elongation of an installed seal by 3 percent or more of its original length will be cause for its removal and reinstallation.

Remove all lubricant-adhesive which comes upon the exposed top of an installed seal before it dries, and remove all seals which show twist, curl, nicks or other malformation, as installed. Seal all ends of preformed elastomeric joint seals with watertight plug prior to installation of joint seal. Use a foam rubber plug or other acceptable closed cell cellular material which is compressible to 15 percent of its uncompressed thickness. Plug shall be a minimum of 2 inches in length and be secured in elastomeric joint seal with an adhesive which will insure a watertight plug.

701.03.13 Surface Finishing

701.03.13A General

After forms have been removed, carefully point all depressions resulting from removal of form ties or from other causes with mortar conforming to Section 205. Maintain thorough saturation of concrete surface during pointing and patching. Type of finish to be used shall be as specified or as shown.

701.03.13B Slab Finishes

1. **General.** Refrain from excessive use of "Jitterbugs" or other special tools designed for the purpose of forcing coarse aggregate away from slab surface. dusting of surfaces with dry materials will not be permitted. Compact slabs and floors thoroughly by vibration. Round off edges of slabs and tops of walls with a 1/2-inch radius steel edging tool, unless specified otherwise.

2. **Monolithic Finish.** Finish by screeding and floating with straight-edge to bring surfaces to the required finish elevation shown. While concrete is still green, but sufficiently hardened to bear a person's weight without deep imprint, wood float to a true, even plane with no coarse aggregate visible. Apply sufficient pressure on wood floats to bring moisture to surface. After surface moisture has disappeared, steel trowel concrete to produce a smooth, impervious surface, free from trowel marks. Give an additional troweling to surface for the purpose of burnishing. Final troweling shall produce a ringing sound from the trowel. Do not use dry cement or additional water in troweling. Do not use excessive troweling.

3. **Rough Slab Finish.** Finish slabs to receive fill and mortar setting beds by screeding with straightedges to bring surface to required finish plane. Remove all laitance and leave surface clean. Subject to approval, an acceptable aggregate revealing material may be used and laitance washed off when concrete has set.

4. **Wood Float Finish.** Finish by screeding with straightedges to bring surface to required line as shown. While concrete is still green, but hardened sufficiently to bear cement finisher's weight, work flat surface to a true and uniform plane with no coarse aggregate visible.

5. **Broomed Floor Finish.** Finish concrete as specified for monolithic floor finish above, except omit final troweling and finish surface by drawing a fine-hair broom lightly across surface. Do all brooming in same direction and parallel to expansion joints, or in cases of inclined slabs, perpendicular to slope, except for reservoir roof slab, broom surface in radial direction.

6. **Power Machine Finish.** In lieu of hand finishing, a power machine may be used for finishing concrete floors and slabs in conformance with directions of machine manufacturer.

701.03.14 Curing

Cure concrete surfaces by covering with material conforming to Subsection 506.03.13A Curing of Concrete. Place covering as soon as concrete has hardened sufficiently to support covering without damage. Use a covering which is best suited to existing conditions. If such coverings are not required, keep surfaces moist by flushing or sprinkling. Arrange sprinkling

system so outside of all forms can be kept damp for a period of 7 days after placing of concrete so that no moisture is taken away from concrete by forms. Coordinate curing and finishing when both requirements are to be met at same time.

Protect slab concrete exposed to conditions causing premature drying during placing operations by providing wind breaks, fog spray or by other necessary methods.

701.04 MEASUREMENT AND PAYMENT

701.04.01 Concrete

Concrete will be measured on a lump sum basis, square yard surface basis, or on a cubic yard basis for payment as shown in the Proposal. In all cases the part or parts of work to be measured on each basis shall be as shown and as specified.

When reinforcing steel, metal expansion plates, or miscellaneous metal items are not specified or shown as a separate pay item in the Proposal, payment for said item is considered to be incidental to the related item of work and no separate payment will be made.

701.04.01A Lump Sum Basis

Measurement and payment will be made on a lump sum basis as shown in the Proposal.

701.04.01B Square Yard Surface Basis

Measurement and payment will be made on a square yard surface basis for each class of concrete as shown in the Proposal.

701.04.01C Cubic Yard Basis

Measurement and payment will be made on a cubic yard basis for each class of concrete as shown in the Proposal.

701.04.01D Square Foot Surface Basis

Measurement and payment will be made on a square foot surface basis for each class of concrete as shown in the Proposal.

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702 REINFORCEMENT

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702.01 DESCRIPTION

This section covers work necessary for reinforcing steel, welded wire fabric, dowels, and accessories, for concrete structures, complete.

702.02 MATERIALS

702.02.01 Bar Reinforcement

Use steel deformed bars conforming to ASTM A 615, Grade 40, unless otherwise shown, except that longitudinal bars in continuously reinforced concrete pavement and high strength bar reinforcement shall be Grade 60.

702.02.02 Dowels

For concrete pavement, slab or wall load transfer devices at joints and other elements, use dowels conforming to ASTM A 306, Grade 70 unless otherwise specified. Coat with plastic or other approved material for bond prevention where specified.

702.02.03 Bar Mats

For bar and rod mats, use the clipped type, conforming to ASTM A 184.

702.02.04 Spiral Reinforcement

Use plain wire for spiral reinforcement conforming to ASTM A 82, except that f_y shall be the stress corresponding to a strain of 0.35 percent if design yield strength exceeds 60,000 PSI.

702.02.05 Welded Wire Fabric

Welded wire fabric shall conform to ASTM A 185.

702.02.06 Ties and Supports

Use ties of 16-gauge, black, soft-annealed wire and bar supports for the intended uses. Bar supports in beams and slabs exposed to view after stripping must be galvanized or plastic coated. Use concrete supports for reinforcing in concrete placed on grade. Galvanizing shall conform to ASTM A 152 Class D. Plastic shall not chemically react with concrete, shall be impervious and have a minimum thickness of 3/32 inches at point of contact with form.

702.02.07 Certification and Identification

Furnish certification that reinforcing bars identified and delivered to project site are as specified. For identification and tagging, include copies of heat numbers, chemical compositions and physical tests performed on that heat.

702.03 CONSTRUCTION

702.03.01 Shop Drawings

Prior to fabrication and before ordering material, submit all order lists and bending diagrams for review. Such review by Engineer in no way relieves Contractor of responsibility for correctness of lists and bending diagrams. Any expense incident to the revision of material furnished in accordance with such lists and bending diagrams in compliance with Drawings, shall be borne solely by the Contractor. See Subsection 104.03 for shop drawing requirements.

702.03.02 Fabrication

Fabricate, ship, tag, and mark bar reinforcement in conformance with Manual of Standard Practice for Reinforced Concrete Construction of the Western Concrete Reinforcing Steel Institute.

Bend all bars cold.

702.03.03 Delivery and Storage

Deliver steel reinforcement with suitable hauling and handling equipment. Protect at all times from injury. Keep free from dirt, detrimental rust or scale, paint, oil or other foreign substance.

702.03.04 Placing

Place all steel reinforcement accurately in positions shown on Drawings and hold firmly during placing and setting of concrete. For bars in top mats of footings and deck slabs, tie at all intersections. For all other bars, tie at all intersections except where spacing is less than one foot in each direction, tie alternate intersections.

Maintain distance from forms by means of stays, blocks, ties, hangers, or other supports. For blocks for holding reinforcement from contact with the forms, use precast mortar of sufficient shape and dimensions and with same compressive strength as concrete in which they are placed. For metal chairs in contact with exterior surface of concrete, fabricate from stainless steel conforming to ASTM A 493, Type 430. Turn legs of chairs up a minimum of 1/8 inch. Separate layers of bars by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks will not be permitted. Reinforcement in any member shall be placed and then inspected by Engineer before placing of concrete begins. Concrete placed in violation of this provision may be rejected and removal required.

If fabric reinforcement is shipped in rolls, straighten it into flat sheets before placing it. For fabric reinforcement, extend fabric to within 2 inches of edges of slab, and lap splices at least 1-1/2 courses of fabric with a minimum of 6 inches. Tie laps and splices in fabric securely at ends and at least every 24 inches.

702.03.05 Splicing

Furnish all reinforcement in the full lengths indicated on plans. Splicing of bars, except when shown on plans, will not be permitted without written approval of Engineer. Stagger splices as far as possible.

For No. 11 bars and smaller, lap splice as shown on plans. In lapped splices, place bars in contact and wire together in such a manner as to maintain not less than the minimum clearance to the surface of concrete as shown on plans.

Lap splicing of No. 14 and No. 18 bars will not be permitted. Splice these sizes in conformance with the following:

(a) Splice shall develop at least the specified minimum ultimate strength of reinforcing bars in compress and in tension. Where bars of different sizes or strengths are connected, the governing strength shall be the strength of the smaller or weaker bar.

(b) Make splices by a mechanical butt splicing method utilizing a ferrous filler metal and an enclosing steel sleeve. Completed splices will be subject to testing at the sole expense of the Contractor.

702.04 MEASUREMENT AND PAYMENT

702.04.01 Incidental Basis

When not specified or shown as a separate pay item in the Proposal, payment for reinforcement is considered to be incidental to related item of concrete work and no separate payment will be made.

Reinforcement in precast or prestressed beams, slabs, piles and other items, where reinforcement is specified and included in the Contract price for other pay items, will not be included in the pay item for reinforcement.

702.04.02 Lump Sum Basis

Measurement and payment for reinforcement will be made on a lump sum basis as shown in Proposal.

END OF DIVISION

SECTION 16000
GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

a. This section includes furnishing all labor, materials, services, tools and other equipment necessary for the construction, installation, connection and testing of all electrical work for this project as shown on the drawings or specified herein. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

1.2 INTENT OF DRAWINGS AND SPECIFICATIONS

a. Riser and other diagrams are schematic only and shall not be used for obtaining quantities.

b. The electrical drawings do not show complete details of the site conditions. The Contractor shall check actual conditions.

1.3 SUBMITTALS

a. Submittals shall be in accordance with the requirements of these Contract Documents and shall include the following:

1) Submittals shall include information and literature as required for all equipment and materials provided under this and related sections.

2) Shop Drawings: Shop drawings shall include the following along with any special requirements listed in the individual Specification Sections:

a) Installation instructions and drawings
b) Wiring schematics with termination point identification
c) Motor information
d) Materials of construction
e) Manufacturer's name and model
f) Manufacturer's catalog data
g) Supplementary structural framing for electrical equipment including design loads, member size, and location. When supplementary framing is indicated, verify that dimensions are suitable for the equipment furnished. Provide additional strength

when equipment furnished is heavier than that specified.

3) Manufacturers' Literature: Literature indicating the compliance of the products with the Specifications shall be included with all submittals. This shall include catalogs and other descriptive bulletins. Relevant portions of the literature shall be clearly identified by highlighting or underlining.

4) Test Logs: The Contractor shall submit test logs as outlined below and as specified in subsequent electrical sections and drawings.

a) A log of the complete results of tests for shorts and grounds for each circuit. All circuits and tests shall be clearly identified.

b) A log of complete results of insulation resistance measurements of each circuit. All circuits and tests shall be clearly identified.

5) Operation and Maintenance information for all equipment furnished and/or installed.

b. The Contractor shall indicate on the submittals all variances from the Specifications.

c. Record Drawings.

a) At the completion of construction, the Contractor shall provide one set of marked "as-built" drawings to the Engineer showing the location of buried conduits and all changes or deviations from the original drawings.

1.4 COORDINATION OF WORK

a. The Contractor shall plan his work in coordination with the other trades and with the power and telephone utility authorities.

b. The Contractor shall field verify all dimensions of equipment to be installed or provided by others so that correct clearances and connections may be made between the work installed by the Contractor and equipment installed or provided by others.

c. The Contractor shall arrange all conduit runs so that they do not interfere with piping, structural members, etc.

d. All working measurements shall be taken from the sites, checked with those shown on the drawings, and if they conflict, reported to the Engineer at once, and before proceeding with the work. Should the Contractor fail to comply with this procedure, he shall alter his work at his own expense as directed by the Engineer.

e. No extra payments will be allowed where obstructions in the work of other trades, or work under this contract requires offsets to conduit runs.

f. The Contractor is responsible for all alterations in the work to accommodate equipment differing in dimensions or other characteristics from that shown or specified.

g. The contractor shall provide all temporary power necessary for existing site equipment and for all construction needs.

1.5 SUPERVISION

a. The Contractor shall maintain adequate supervision of the work and shall have a responsible person in charge at the site during all times that work under this contract is in progress, or when necessary for coordination with other work.

1.6 CODES

a. Work shall conform to the National Electrical Code (NEC), State codes, and other applicable codes, even though not specifically mentioned for each item. These shall be regarded as the minimum standard of quality for materials and workmanship.

1.7 WORKMANSHIP

a. All work shall be performed by personnel skilled in the particular trade. Workmanship shall conform to the standards of the NEC.

b. The Engineer shall be the sole judge as to whether or not the finished work is satisfactory; and if in his judgment any material or equipment has not been properly installed or finished, the Contractor shall replace the material or equipment whenever required, and reinstall it in a manner entirely satisfactory to the Engineer without any increase in cost to the Owner.

1.8 PERMITS, FEES, AND SERVICE CHARGES

a. The Contractor shall obtain all permits and pay all fees.

1.9 CONTRACTOR'S RECORD DRAWINGS

a. The Contractor shall maintain a neatly marked set of record drawings showing the locations of all buried conduits. In addition, the locations of panels, field mounted instruments and panels, terminal boxes, junction boxes, and other materials included in this contract shall be shown. Drawings shall be kept current with the work as it progresses and shall be subject to inspection by the Engineer at any time.

PART 2 - PRODUCTS

2.1 MATERIALS

a. See subsequent electrical sections and the drawings for specified materials.

2.2 PORTABLE OR DETACHABLE PARTS

a. The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adapters, blocking chips, and inserts until completion of his work.

b. These parts shall be delivered to the Engineer and an itemized receipt obtained. This receipt, together with 2 copies of the final inspection certificate, shall be attached to the Contractor's request for final payment.

c. All equipment shall be demonstrated to operate in accordance with the requirements of this specification and the manufacturer's recommendations.

PART 3 - EXECUTION

3.1 TEMPORARY HEATING, LIGHTING, AND POWER

a. The Contractor shall provide all heating, lighting, and power required to construct and protect the work until the work is placed in service by the Owner for beneficial use of the Owner. Temporary heaters shall be provided as required to keep the work area and all new electrical components dry.

b. The source for temporary power shall be from the electric utility or Owner approved Contractor supplied auxiliary power units. The installation for electric power shall meet the requirements of local authorities and of OSHA.

c. The Contractor shall obtain all permits and pay all costs for connecting temporary power service at no expense to the Owner.

3.2 SUPPORT BACKING

a. Provide any necessary backing required to properly support all fixtures and equipment installed under this contract.

3.2 CUTTING, PATCHING, AND FRAMING

a. The Contractor shall determine in advance the locations and sizes of all sleeves, chases, and openings necessary for the proper installation of his work.

b. Whenever practical, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be held to a minimum. All required holes in concrete construction shall be made with a core drill and patched with non-metallic non-shrink grout.

c. Cutting, fitting, repairing, and finishing of carpentry work, metal work, or concrete work, and the like, which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to be cut in floors must be drilled without breaking out around the holes.

3.2 TESTS

a. The Contractor shall furnish all labor, material, instruments, and tools to make all connections for testing of the electrical and instrumentation installation. All equipment shall be demonstrated as operating properly prior to the acceptance of the work. All protective devices shall be operative during testing of equipment. The tests shall be made under the supervision of the Engineer. All deficiencies or unsatisfactory conditions as determined by the Engineer or inspecting authorities shall be corrected by the Contractor in a satisfactory manner at his own expense.

b. After visual inspection of joints and connections, and the application of tape and other insulating materials, all sections of the entire wiring system shall be thoroughly tested for shorts and grounds. A log of results for each circuit shall be kept by the Contractor and presented to the Engineer.

c. A phase rotation check shall be made to demonstrate that all power receptacles, service feeders, main power feeders, and auxiliary power generators have the same A-B-C phase rotation and ground relationships.

d. Equipment shall be tested by operating all electric motors, relays, controls, switches, heaters, etc., sufficiently to demonstrate proper installation and electrical connections. Control and emergency conditions shall be artificially simulated where necessary for complete system or subsystem.

e. Insulation resistance measurements of each circuit shall be made with loads connected and contactors, if any, blocked closed to give complete circuits. Insulation resistance of complete circuit shall be measured from the circuit breaker load terminals with the breaker open. A log of complete results shall be prepared by the Contractor and presented to the Engineer. Values of resistance shall be 10 megaohms or greater.

PART 4: SPECIAL PROVISION

4.1 MEASUREMENT AND PAYMENT

a. When listed in the proposal, all "GENERAL PROVISIONS" costs will be considered incidental work for which no separate payment will be made.

b. Payment for all electrical work specified under this and related sections to be made at the lump sum prices named in the Proposal and as outlined below, complete and acceptable to the Engineer.

1) Payment for all work require to construct and install the power service and associated structures to be made at the lump sum price name in the Proposal for "Power Service, Complete".

2) Payment for all electrical work, exclusive of the power service and the Automatic Transfer Switch, as shown on the drawings, and as specified under this and related sections and as required to complete the Pump Control Panel and associated structures to be made at the lump sum price named in the Proposal for "Electrical and Controls, Complete".

3) Payment for all work required to complete the furnishing and installation of the auxiliary power generator and associated structures, including the Automatic Transfer Switch and sub-base fuel tank and piping, to be made at the lump sum price named in the Proposal for "Auxiliary Power Generator, Complete".

4) All other electrical work will be considered incidental work for which no separate payment will be made.

c. All electrical work, electrical inspections, and related punchlist items, including submission and acceptance of O&M Manuals, shall be completed prior to final payment for work under this or related sections and/or release of retainage for the entire project.

d. Payment indicated to include compete compensation for all labor, equipment, materials, and incidentals involved in work specified under this section. No additional compensation to be allowed.

SECTION 16100
BASIC MATERIALS AND METHODS

PART 1: GENERAL

1.1 SCOPE

a. This section includes furnishing all labor, materials, and equipment required for electrical work shown on the drawings and as further described in these specifications. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

1.2 INTENT OF DRAWINGS AND SPECIFICATIONS

a. The drawings are partly diagrammatic and do not necessarily show the physical arrangements of the conduit and equipment, unless specifically dimensioned. Diagrams are schematic only and shall not be used for obtaining quantities of lineal runs of conduit.

1.3 EXCAVATION AND BACKFILL

a. Perform all necessary excavation for buried conduits and conductors.

b. No backfilling shall be done until all direct burial cables, conduits, and penetrations to be covered have been inspected and approved.

1.4 POWER SERVICE

a. Responsibility of the Contractor:

1) The Contractor shall furnish and install an electrical service to the site as shown on the drawings or as required by the utility company to provide service.

2) The Contractor shall provide conduit, vaults, and transformer pads as required by the utility company for installation of utility owned facilities.

b. Responsibility of the electrical utility company:

1) Utility company - Portland General Electric.

2) Utility will provide a socket-type meter and make connection to the

service conductors, furnish and install secondary transformer, and extend primary lines where necessary.

1.5 TELEPHONE SERVICE

a. Responsibility of the Contractor:

1) The Contractor shall provide and install conduit as indicated on the drawings per phone company requirements for installation of two dedicated phone line.

b. Responsibility of the telephone company:

1) Utility company - GTE Northwest

2) The telephone company will extend service to the telephone pull box provided.

1.6 ELECTRICAL AND CONTROLS COORDINATION

a. If the current requirement of any motor or piece of equipment is increased to such an extent that the wiring, conduit, and/or starter for that motor or equipment must be increased from that shown on the electrical drawings, the Contractor shall furnish and install the larger items. The increased wiring, conduit, and/or starter cost shall be provided at no additional cost to the Owner.

b. Unless otherwise specified or shown on the drawings, all motors shall be wired for 3 phase power as required.

PART 2 PRODUCTS

2.1 QUALITY OF MATERIALS

a. All contract materials shall be new, of proven quality, without imperfections and blemishes. All material not specifically detailed in this specification required to accomplish the completion of this contract shall be of compatible quality to the items specified and be approved by the Engineer. All materials shall be products of manufacturers regularly engaged in production of such equipment and shall be of the manufacturer's latest design.

b. Where two (2) or more units of the same classes of equipment are required, these units shall be of the same manufacturer. All material and equipment shall be per

NEMA, ANSI, IEEE, or ICEA Standards as applicable, except as modified by these specifications. All material shall be UL labeled as applicable.

2.2 RACEWAYS

a. All raceways shall be UL approved for the application.

b. Rigid steel conduit: Provide zinc-coated rigid steel conduit conforming to Federal Specification WW-C-581.

c. Rigid intermediate steel conduit (IMC): Provide rigid intermediate steel conduit conforming to UL 1242 and Federal Specification WW-C-581.

d. Electrical metallic tubing: Provide steel electrical metallic tubing conforming to Federal Specification WW-C-563.

e. Flexible metallic conduit:

1) Provide liquid tight flexible conduit, zinc-coated steel core, extruded gray PVC cover, UL approved, Sealtite type "UA" or Liquatite type "LA", or approved equivalent.

2) Where permitted by local inspection authority, sizes larger than 3-inch shall be Sealtite type "EF", or Liquitite type "LT", or approved equivalent.

f. Rigid PVC Conduit: Provide rigid polyvinyl chloride (PVC) conduit, schedule 40, UL listed for concrete encased, direct burial underground, and exposed use. Rigid PVC conduit, including couplings, elbows, and nipples, shall conform to the requirements of the latest edition of Federal Specification WW-C-1094, and NEC.

2.3 CONDUIT FITTINGS

a. Provide conduit fittings as follows unless otherwise noted or detailed. Catalog numbers shown are RACO//Appleton Electric Company unless otherwise noted. Similar products of other manufacturers are equally acceptable.

1) EMT, Compression Fittings 2913-18, 2924-28//Series 86T and 95T.

2) EMT, Indenter Fittings 1982-94//Series 98T and 97T.

3) Rigid Conduit Insulating Series 1400//Series BBU

Bushings

4)	Rigid Conduit Set Screw Fittings	3010-3022, 3102-3116//Series SRNTC and SNTCC
5)	Flexible Metallic Conduit Fittings	Pylets (Pyle-National)//Unilets
6)	Expansion Joints	Adalet Type STR//OZ Type AX or TX.
7)	Conduit Wall Entrance Sealing Fitting	OZ Type FSK-GALV

2.4 WIREWAY

a. Provide steel lay-in general purpose wireway without knockouts, with hinged cover secured by screws. Screw fastenings shall guard against wire penetration. Cross-section dimensions shall be as shown. Provide all required fittings and hangers for a complete installation. Finish shall be gray enamel over a corrosion-resistant coating. Provide NEMA 1, UL listed wireway unless otherwise noted.

2.5 OUTLET BOXES

a. Provide outlet boxes as follows unless otherwise noted or detailed. Catalog numbers shown are Appleton Electric Company. Similar products of other manufacturers are equally acceptable.

1) Lighting Outlet Boxes

a)	Concealed:	No. 40-3/4
b)	Concrete:	OCR Series
c)	Exposed:	FS/FD Series
d)	Exterior & damp locations:	As required by fixture

2) Switch, Receptacle, Telephone, & Junction Boxes:

a)	Flush	No. 4S-3/4 w/extension ring
b)	Flush, limited space locations	No. 225

c) Exposed: FS/FD Series

d) Extension and damp locations: FS/FD Series with cast cover and gasket

3) Provide extension rings as required and increase the above specified minimum box sizes to conform with allowable fill permitted by Code.

b. For boxes installed in concrete or flush in walls or ceilings below finished grade, provide cast FS/FD series boxes.

2.6 PULL BOXES

a. Provide code gauge galvanized sheet steel pull boxes as shown on the drawings. Provide removable screw cover on the largest access side of the box unless otherwise detailed. Where cast boxes are indicated or specified, provide conduit entrances with threaded hubs. Provide stainless steel screws at all exterior and damp locations. Where pull boxes are required but not shown, provide pull boxes as specified above, sized per NEC requirements.

2.7 WIRING DEVICES

a. Provide wiring devices indicated. Catalog numbers shown are Bryant/Pass and Seymour unless otherwise noted. Equal devices by other manufacturers may be substituted. All devices shall be submitted for approval. Provide all similar devices of same manufacturer unless indicated otherwise.

b. Switches: Provide flush switches, AC-type, rated 20 amp or higher suitable for the type load to be controlled.

1) Single-pole 4802-GRY/20AC1GRY

2) Double-pole 4803-GRY/20AC1GRY

c. Receptacles: Provide grounding-type receptacles as follows:

1) Duplex 5262-GRY/6200 GRY

2) Ground Fault Interrupter:

a) Where indicated, provide receptacles with ground fault interrupter.

Unit shall be furnished with internal, solid state, ground fault current sensing and tripping.

b) The receptacles shall include built-in "TEST" and "RESET" switches and "TRIPPED" indicator and shall be rated 20-amp, 120-volt.

c) The "GFI" receptacle shall be the "feed-thru" type and shall protect all receptacles on the same circuit.

d) The receptacles shall be UL approved and shall be as manufactured by Pass and Seymour, 3M, Square D, or equivalent.

2.8 PLATES

a. Provide plates for all wiring devices. Where devices are installed in exposed fittings or boxes, use Appleton, Pyle-National, Crouse-Hinds, or equal, "FSK" covers. Where weatherproof devices are specified in exterior or damp locations, use cast malleable covers with gasket and stainless steel screws.

2.9 CONDUCTORS

a. This specification covers all conductors not specified in other sections. All conductors and cable shall conform to UL, Federal Specification J-C-30, or ICEA as applicable. Provide new cable manufactured within one year of installation.

b. 600 Volt Power, Lighting and Control cable:

1) Provide copper conductors unless otherwise specified, conforming to Federal Specification J-C-30.

2) For cable type TW or THW, provide insulation conforming to Federal Specification J-C-30.

3) For types THHN or THWN, provide insulation conforming to UL-83. For type RHW and RHH, provide insulation conforming to ICEA S-19081.

4) For type XHHW, provide insulation conforming to ICEA S-66-524.

5) Provide neoprene jacket on RHW-RR type cables in accordance with ICEA S-19-81 specifications.

6) Provide control cable with 600 volt TW type insulation for all multi-conductor, Class 1 remote control and signal wiring unless otherwise specified. Provide overall jacket complying with ICEA S-61-402. Color code control cable in accordance with ICEA S-61-402, Table 5-1.

7) Provide twisted shielded paired instrumentation cable suitable for direct burial with stranded copper conductors, paired with aluminum/synthetic polymer shielded and copper drain wire. Cable to be rated 600 V type TC for use on Class 1 remote control and signaling circuits.

c. Minimum conductor size: Provide No. 12 AWG minimum branch circuit wire size. Provide No. 14 AWG control circuits unless otherwise specified or required by over-current protection. Provide smaller conductor sizes for specific application where shown on the drawings.

PART 3 EXECUTION

3.1 CONDUIT INSTALLATION

a. Conduit Buried in Earth: Install raceways to provide not less than 30 inches cover to finished grade. Pitch to drain away from building, (there shall be no trapped runs). Grade trenches and place pipe bedding material to provide uniform trench bottom for raceway support. Buried raceway shall be Schedule 40 PVC, unless otherwise shown or specified. Buried raceway shall not be smaller than 1-inch.

b. Provide rigid steel conduit for raceways embedded in structural reinforced concrete; below floor slabs-on-grade; exposed to the weather; in hazardous areas; for exposed installations where subject to damage; in damp, wet, or corrosive locations; for sizes 1-1/4 inch and larger; and at all locations not otherwise specified.

1) Provide steel electric metallic tubing or rigid conduit at the Contractor's option in furred spaces and above dropped ceilings. Provide rigid intermediate steel or rigid steel conduit at the Contractor's option in exposed interior locations, in masonry walls above grade, and in cement fill on roofs.

2) Provide flexible metallic conduit connections at all motors and transformers plus other equipment connections subject to vibration. Utilize suitable fittings, keep route neat, at nominal right angles, and in conformance with equipment lines.

c. Exposed conduit shall be run in straight lines parallel to column lines, walls, or beams. Where conduit is grouped, the bends and fittings shall be installed to present an orderly appearance. Unnecessary bending or crossing shall be avoided.

d. Supports for exposed conduit runs shall be furnished and installed within 3 feet of each box. Supports shall be secured by means of expansion inserts in concrete or masonry.

e. Conduit and fittings shall be properly protected during the construction period against mechanical injury from any cause. Conduit which extends out of floors, walls, or slabs shall be boxed or otherwise protected and ends shall be capped with metal pipe plugs.

f. Rigid conduit joints and connections shall be made thoroughly watertight and rustproof by means of thread compound which will not insulate the joint. Each threaded joint shall be thoroughly cleaned to remove all the cutting oil before the compound is applied. Running threads will not be allowed. Erickson couplings may be used in dry and exposed locations provided that they are installed with fixed threaded connection at the top of vertical runs.

g. Size: Use raceways no smaller than 3/4 inch except that 1/2 inch or larger may be used for switch legs, and control circuit wiring specified to be No. 14 or smaller wire. Underground conductors shall be pulled from manhole to manhole on equipment.

3.2 WIRE AND CABLE INSTALLATION

a. Conduit shall be thoroughly cleaned of all foreign material just prior to pulling the wire or cable. Lubricants shall be compounds specifically prepared for cable pulling and shall not contain petroleum or other products which will affect cable insulation. Lubrications shall be UL approved.

b. Splicing of conductors No.8 AWG or smaller shall be by pre-insulated spring-pressure connectors, such as "Scotchlok" Types Y, R and B, Ideal "Wingnut" or equal. All uninsulated splices, joints, and free ends of conductors shall be covered with rubber and friction tape or high-dielectric strength, plastic tape.

c. Terminal strips in panels shall be identified throughout the equipment utilizing unique numbering systems.

d. Wires terminating on terminal strips shall be tagged with the designation of the terminal strip and the number of the terminal to which they are connected. Wires

shall be numbered with Brady nylon wire markers at all accessible locations.

e. Wiring diagrams shall show the terminal strips, terminals, and their identifying designations.

f. Installation: Keep all conductors within the allowable tension limits during installation. Lubricants for wire pulling, if used, shall be approved for the insulation and raceway material. Observe cable manufacturer's and industry standard cable bending radius recommendations.

g. Color Code:

1) All secondary service, feeder, and branch circuit conductors shall be color coded to meet all NEC requirements.

2) All No. 12 and No. 10 branch circuit conductors shall have solid color compound or solid color coating. All neutral sizes shall have solid color compound or solid color coating.

3) No. 8 AWG and larger phase conductors shall have either:

a) Solid color compound or solid color coating.

b) Stripes, bands, or hashmarks or colors specified above.

c) Colored pressure-sensitive plastic tape. Tape shall be applied in half overlapping turns for a minimum of 3 inches for all terminal points, and in all junction boxes, pull boxes, troughs, manholes, and handholes. Tape shall be ¾ inch wide with colors as specified above. The last two laps of tape shall be applied with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable stating size and insulation type.

h. Wire Pulling:

1) Provide suitable installation equipment to prevent cutting or abrasion of conduits during pulling of feeder.

2) Ropes used for pulling feeders shall be made of suitable non-metallic material.

3) Attach pulling lines for feeders by means of either woven basket grips or

pulling eyes attached directly to the conductors, as approved by the Engineering.

4) All cables in a single conduit shall be pulled in together.

5) The cable jacket and/or conduit walls shall be completely lubricated when cable is pulled into conduit. The lubricant shall be applied immediately before or during a pull. Minimum quantities of lubricant are as follows:

a) One (1) quart of lubricant per 100 feet of 1-inch conduit

b) Two (2) quarts of lubricant per 100 feet of 2-inch conduit.

c) Three (3) quarts of lubricant per 100 feet of 3-inch conduit.

d) One (1) gallon of lubricant per 100 feet of 4-inch conduit.

e) This quantity shall be increased as needed for difficult pulling situations (high temperatures, multiple bends, poorly placed conduit, etc.)

i. 600 Volt Conductors:

1) Provide one of the conductor types indicated for the function and location listed below unless otherwise indicated on the drawings or approved by the Engineer. Provide ground and neutral wires identical to circuit wires.

Location	Insulation Type	
	THW,THWN	RHH, THHN, XHHW
Lighting Circuits, Interior		
• General	X	X
• Special fixture requirements	X	X
• Within 3-inches of ballast		X
Receptacle and Single-phase	X	
Motor Circuits		
• Interior	X	
Polyphase Motor Circuits	X	
Motor Controls	X	
Power Outlets	X	
Feeders		X
Underground in Raceway	X	

2) Observe code restrictions with respect to wet and dry locations. At the Contractor's option, conductors with insulation systems rated for high operating temperatures may be substituted for lower temperature rated conductors. However, no reduction in conductor size will be permitted from that indicated on the drawings. When using small diameter wire, do not reduce conduit size below that required for Type THW as shown in NEC Table 3A.

3.3 EQUIPMENT INSTALLATION

a. Boxes and cabinets shall be installed on the surface level and plumb and affixed to the surface with expansion inserts in concrete and machine screws to tapped holes in metal surfaces. Unless otherwise shown or specified, all floor mounted equipment shall be provided with mounting curbs and parallel, cast-in-place continuous slot channel erection system concrete inserts as specified under Section 16400 - Service and Distribution, contained herein.

b. Interconnections between equipment shall be made per manufacturer's wiring diagrams. All wiring shall be clearly labeled and external connections in control panel and remote cabinet brought out to terminal blocks. All equipment connected to telephone lines shall be protected against voltage transients.

3.4 EQUIPMENT BASES

a. Provide equipment bases for all floor-mounted electrical equipment. Unless otherwise indicated, bases shall be poured-in-place concrete, nominally four inches high, and be one inch larger on all exposed edges than the equipment to be mounted. On all equipment bases in interior locations, unless otherwise noted, provided two or more parallel, cast-in-place continuous-slot channel erection system concrete inserts for equipment mounting. Bolt equipment to channels. Provide additional surface-mounted channels where required to match and lineup with existing equipment. Provide concrete pads and mounting provisions for all exterior equipment as indicated on the drawings or specified in other portions of the specifications.

PART 4: SPECIAL PROVISION

4.1 MEASUREMENT AND PAYMENT

a. Payment for all work specified under this section to be made as outlined under Part 4 of Section 16000, General Provisions.

b. Payment indicated to include complete compensation for all labor, equipment, materials, and incidentals involved in work specified under this section. No additional compensation to be allowed.

SECTION 16200
STANDBY GENERATOR

PART 1. GENERAL

1.1 SCOPE

a. The work consists of furnishing an electric generating set as specified herein and shown on the drawings. The set shall consist of 250 KW engine-driven alternator rated 480/277 volt, 3-phase, 4 wire, 60 Hz, and sized to provide standby power for the loads a shown on the drawings and as specified under Part b of this section. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

b. Loads shall be staged as summarized below:

1) Lead pump(s), Air compressor, lights, building loads.

2) Lag pump(s)

c. The electric generator will be used to provide standby power for the pumps and building loads at all times.

1.2 GENERAL REQUIREMENTS

a. Materials and Workmanship:

1. Materials and parts comprising the generating set specified herein shall be new, unused, or current manufacture and of the highest grade, free from all defects.

2. Workmanship shall be the highest grade, in accordance with modern practice.

b. Equipment furnished and workmanship shall be guaranteed for one (1) year from date of acceptance of the Certification of Substantial Completion.

c. Bidders shall specify nearest location of permanent parts depot from which replacement parts may be obtained in necessary quantities at any time, day or night. Service facilities and personnel shall be equally available.

d. As part of the submittal procedure, the Contractor shall furnish the following data in one complete package to the Owner's Representative.

1. Scale drawings, dimensioned, of the generating set proposed, assembled with all accessories shown in place.

2. Scale drawings, dimensioned, of the automatic transfer switch proposed, assembled with all accessories shown in place.

3. Interconnecting wiring diagrams and schematic drawings with specification sheets describing all electrical characteristics of the units.

4. Drawings and/or literature completely describing all auxiliary equipment to be furnished for both the generator set and the automatic transfer switch.

5. Generator set mechanical data in tabular form including make of engine, number of cylinders, bore in inches, stroke in inches, total piston displacement in cubic inches, number and type of bearings, fuel and lubrication oil consumption, catalog data for governor, rating and catalog data for jacket water heater, exciter type and drive, and horsepower at rated load.

PART 2. PRODUCTS

2.1 ENGINE-GENERATOR SET

a. To maintain maintenance compatibility with other existing sites, the engine-generator shall be manufactured by Onan. No other manufacturer shall be accepted.

b. This system shall include one engine-generator set rated 250 kW minimum, 313 kVA at 0.8 power factor, 60 Hz, 3 phase, 4 wire, 480/277 volts on a continuous standby basis. The generator set shall be mounted on a steel base with integral vibration isolators suitable for mounting on a level surface. The engine shall be stationary, radiator cooled, diesel for use with number 2 diesel fuel.

c. Engine equipment shall include the following:

1. Remote two wire negative ground starting system. Positive shift, gear engaging starter with two independent methods provided to disconnect the starting circuit upon engine starting. The starting system shall be twenty-four (24) VDC.

2. Positive displacement, mechanical, full pressure lubrication pump, oil filters, oil level indicator, and oil drain valve with hose extension.

3. Primary and secondary fuel filters with replaceable elements, electric fuel transfer pump, automatic fuel shut-off, replaceable dry element air cleaner, all mounted on engine.

4. Gear driven mechanical governor with adjustable speed regulation of 5% from no load to rated load, automatic overspeed shutdown.

5. Low coolant level and high engine temperature shut-downs.

6. Water temperature gauge, oil pressure gauge, battery charging ammeter.

7. Engine mounted water jacket heater. Means of disconnect provided when engine is running.

d. Because sound attenuation is of utmost concern, the engine-generator set shall have a sound output level of not more than 70 dBA under full load, measured at 23 feet (7 meters).

2.2 ENGINE COOLING SYSTEM

a. Shall be radiator cooled with belt driven pusher fan, coolant pump, thermostat, coolant and corrosion resistant filters.

b. Coolant system shall be filled with antifreeze/water solution to protect engine from -35° to 120°F.

2.3 EXHAUST SYSTEM

a. Critical grade silencer. Sized as recommended by engine manufacturer.

b. Stainless steel flexible exhaust connection.

c. Raincap.

d. Contractor to provide and install condensate trap, fittings, miscellaneous piping and materials for complete installation.

2.4 FUEL SYSTEM

a. 220 gallon (minimum) sub-base tank, double walled, with "rupture detection" switch.

b. Fuel level indicator.

c. Fuel solenoid valve.

d. Flexible fuel lines for connection to engine.

e. Extend full fill pipe to exterior of generator set housing.

2.5 GENERATOR

a. Generator shall be single bearing, self aligning, four pole, synchronous type, revolving field, with amortisseur windings, direct drive centrifugal blower for proper cooling, asynchronous solid state voltage regulator, with brushless rotating rectifier exciter system. No brushes allowed. Generator shall be direct connected to the engine flywheel housing, driven through a flexible coupling to ensure proper alignment. Gear driven generators are not acceptable. Class F insulation.

b. Three phase, broad range, twelve lead reconnectable generator.

c. Frequency regulation shall not exceed 3 Hz from no load to rated load. Voltage regulator shall be solid-state design and shall function by controlling the exciter magnetic field between stator and rotor to provide no load to full load regulation within $\pm$ 1.0% of rated voltage during steady-state conditions. The generator set and regulator must sustain at least 90% of no load voltage for ten seconds with 250% of rated load at near zero power factor connected to its terminals. A Rheostat shall provide a minimum of $\pm$ 5.0% voltage adjustment from rated value.

d. The alternator, exciter, and voltage regulator shall be designed and manufactured by the generator set manufacturer so that the characteristics shall be matched to the torque curve of the prime mover. This design shall allow the prime mover to utilize its fullest power producing capacity (without exceeding it or over compensating) at speeds lower than rated, to provide the fastest possible system recovery from transient speed dips. System shall provide automatic voltage capacity, to prevent engine stalling and saturation of magnetic components.

e. Exciter shall be three phase, full-wave, rectified, with heavy-duty silicon diodes mounted on the common rotor shaft and sized for maximum motor starting capability. Systems using three-wire solid state control elements (such as transistors or SCR's) rotating on the rotor shall not be acceptable.

2.6 ENGINE-GENERATOR CONTROL

a. Provide a lighted, unit mounted, control console, shock mounted, wired and tested by the generator manufacturer. Terminals shall be identified as to their function, or

purpose. Control terminals in the generator control panel and automatic transfer switch shall be identical for ease of connection by the Contractor.

b. Control console shall include the following:

1. Engine controls and gauges.

2. Three position selector switch (Run-Stop-Remote).

3. Contacts for engine start and stop.

4. Engine monitor (solid state) with fault lights and external alarm terminals for overcrank, overspeed, high coolant temperature, low oil pressure, low engine coolant temperature, low fuel, switch off, run, and two customer selected faults. Engine shutdown provided for overcrank, overspeed, high coolant temperature, low coolant level, and low oil pressure shutdown. Pre-alarms shall be provided for high coolant temperature and low oil pressure. Contacts shall be provided for remote annunciation of the above.

5. Provide an adjustable solid state cycle cranker which shall disconnect the starting control after sixty seconds and a maximum of three cranking attempts.

6. Asynchronous solid state voltage regulator with voltage adjusting rheostat.

7. Manual reset field circuit breaker.

8. Running time meter, AC voltmeter (dual range - indicating all voltages), AC ammeter (dual range), voltmeter/ammeter phase selector switch with OFF position and frequency meters. AC meters shall be 3-1/2 inch, 2% accuracy.

2.7 AUXILIARY EQUIPMENT

a. Heavy duty lead acid batteries with battery rack, as recommended by the engine manufacturer.

2.8 AUTOMATIC TRANSFER SWITCH

a. Furnish and install where indicated automatic transfer switch with ratings, features/accessories, enclosures, etc. indicated on the drawings or noted herein. To maintain maintenance compatibility, automatic transfer switch shall be provided by engine-generator manufacturer.

b. The transfer switch equipment as specified herein shall be 100% equipment rated for continuous duty at the ratings shown on the plans and shall conform to the applicable requirements for UL 1008 for emergency total system load. All transfer switch equipment supplied shall bear the UL label.

c. All main power contacts shall be rated for multiple fault interruptions per UL 489, and/or UL 1087. Main contacts shall have independent "break-before-make" transfer action which shall positively prevent dangerous "source-to-source" connections. Main contacts shall also have a mechanical interlock to prevent simultaneous closing of "normal" and "emergency" contacts and interconnection of "normal" and "emergency" sources through the control wiring.

d. Automatic transfer switches specified herein shall consist of completely enclosed contact assemblies and a separately mounted control logic panel. The contact assemblies shall be operated by a non-fused unidirectional gear motor or stored energy operators and be energized only momentarily during transfer providing inherently double-throw switching action. Control power for all automatic transfer operations shall be derived from the line side of the source to which the load is being transferred.

e. Upon loss of phase-to-phase voltage of the normal power source on any phase to 70% of nominal, and after a time delay of 0-5 seconds (adjustable to meet conditions present) to override momentary dips and/or outages, starting of the emergency/standby power source shall be initiated. Transfer to the emergency standby power source shall take place 2-60 seconds (adjustable) after attainment of 90% of rated voltage and frequency of that source.

f. When the normal power source has been restored to 90% of rated voltage and after a time delay adjustable from 0-30 minutes (to insure the integrity of the normal power source), the load shall be retransferred to the normal source.

g. A time delay, adjustable 0-10 minutes, shall delay shutdown of the emergency/standby power source after retransfer to allow the generator to run unloaded for cool-down, after which the generator shall be automatically shut down.

h. If the emergency/standby power source should fail while carrying the load, transfer to the normal power source shall be made instantaneously upon restoration of the normal source to satisfactory conditions.

i. The following features/accessories shall be provided:

1. Auto/test switch to provide test operation of the automatic transfer switch by simulating a loss of the normal power source.

2. Pilot lights to indicate to which source the load is connected.

3. Pilot lights to indicate that an integral overcurrent protective device has tripped.

4. Plant exerciser timer providing automatic test operation of the emergency/standby power source at pre-selected intervals at least once per week, including a selector switch to select exercise with or without load or a bypass of the exercise period. The clock timer shall be provided with a digital readout and include a lithium battery backup to assure continuity of power to the clock timer for a minimum of 72 hours during an outage.

5. Generator Battery Float Charger, 10-Amp, fully automatic. Charger shall be designed to float at a constant voltage when permanently connected to batteries, with no gassing or overcharging. Charger shall be current limiting. Charger shall have an equalize-charge feature with manually-set timer for raising the output voltage to periodically charge the batteries. Other features shall include DC voltmeter, DC ammeter, ON/OFF switch, terminal blocks for input and output leads, and indicating lights and form C relay contacts for: loss of AC power, low battery voltage, and high battery voltage.

j. Installation of all transfer switch equipment specified herein shall be in accordance with all applicable codes, standards, and practices. Installation of all transfer switch equipment specified herein shall be in accordance with the recommendations of the manufacturer.

2.9 WEATHER PROTECTIVE HOUSING

a. The generator set shall be enclosed in a weather protective housing constructed of heavy gauge reinforced sheet steel. The housing shall be attached to the generator mounting base and radiator cowling.

b. The housing shall provide easy access to the generator set by two removable panels on each side. A rear hinged door with key locking handle shall be provided for easy access to the control panel.

c. The exhaust system specified shall mount horizontally in, or on top of, the housing with heat shields and brackets.

d. Housing shall be of sound attenuating type, producing a maximum noise level of 70 dBA, while generator is under full load, at a distance of 23 feet (7 meters). Critical grade silencer shall be mounted inside housing.

2.10 MAIN CIRCUIT BREAKER

a. Provide a main circuit breaker which will disconnect the generator from the supply circuit. Mount circuit breaker in generator mounted control panel.

2.11 ACCESSORIES

a. All accessories needed for the proper operation of the engine-generator shall be furnished permanently mounted on the unit. These shall include, but are not necessarily limited to, exhaust piping and connections, starting batteries, battery cables, battery rack, fuel tank and lines, and generator main circuit breaker.

2.12 POWER CONNECTION

a. Unit shall be connected as shown.

PART 3. EXECUTION

3.1 FACTORY TESTING

a. The manufacturer shall provide 4 certified copies of a 4-hour full-load test with recordings of voltage, frequency, amperage, engine temperature, lube oil pressure and load transfer results to the Owner's Representative.

3.2 FIELD TESTS

a. The units shall be field tested with all standby loads picked up and operated for a minimum period of 6 hours. Six copies of the test results shall be provided to the Owner's Representative.

3.3 OPERATION AND MAINTENANCE INSTRUCTIONS

a. The Contractor shall furnish 6 copies of operating and maintenance instructions covering the engine generator and such auxiliary equipment as may require published operating instructions or periodic maintenance.

3.4 SPARE PARTS

a. Provide the following spare parts:

Three sets fuel oil filter elements and gaskets.
Three lubricating oil filter elements and gaskets.

One air cleaner filter element.
Two sets packing for each auxiliary pump.
Two sets V-belts for pump drives.

3.5 INSPECTION, START-UP, AND TRAINING

a. The contractor shall furnish a representative of the manufacturer to perform inspection, start-up, and training services. The manufacturer's representative shall be experienced in the operation and maintenance of the equipment.

b. The representative shall check the installation and supervise initial start-up of the equipment. He shall certify that the installation is correct and that the equipment has operated satisfactorily.

c. After the installation and operation of the equipment has been certified, the manufacturer's representative shall train the Owner's personnel for one 8 hour day in the proper operation and maintenance of the equipment.

d. In addition to the initial training, the manufacturer shall provide one 8 hour day of training at the time requested by the Owner within the one year maintenance and guarantee period. This service would be in addition to any warranty work.

PART 4: SPECIAL PROVISION

4.1 MEASUREMENT AND PAYMENT

a. Unless otherwise specified, all payment for all work specified under this section to be made as outlined under Part 4 of Section 16000, General Provisions.

b. Payment indicated to include complete compensation for all labor, equipment, materials, and incidentals involved in work specified under this section. No additional compensation to be allowed.

SECTION 16400
SERVICE AND DISTRIBUTION

PART 1: GENERAL

1.1 SCOPE:

a. The work consists of providing the complete service and distribution system shown on the drawings and specified herein. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

1.2 SUBMITTALS:

a. Submittals shall be in accordance with the requirements of these Contract Documents and shall include the following:

1) Shop drawings of the following for approval of the Engineer:

a) Panelboards
b) Transformers

2) Operation and maintenance information for all equipment furnished and/or installed.

1.3 POWER SERVICE

a. Responsibility for installation of the power service and related facilities shall be a outlined in Section 16100 - Basic Materials and Methods

PART 2 - PRODUCTS

2.1 PANELBOARDS

a. General: Provide panelboards in conformance with the following specification for installation as shown on the drawings.

b. Panelboards: Panelboards shall be dead-front, flush mounted or surface mounted with subbreakers, main lugs, double lugs, or main breakers as shown on drawings. Lugs shall be sized for feeders and shall conform to the specification for splicing and termination. Buses shall be copper, full panel length. Buses shall be identified. Minimum bus rating shall not be smaller than the setting of the feeder

protective device. Provide ground bus in all panelboards.

1) Circuit Breakers - Provide molded case bolt-on circuit breakers with thermal magnetic trip units, and a common trip bar for two or three-pole breakers, connected internally to each pole so that the tripping on one pole will automatically trip all poles of each breaker. Handle bales or clips will not be acceptable. Provide breakers of the trip-free and trip-indicating type, with quick-make, quick-break contacts. Provide single, two or three pole breaker interchangeability.

2) Special Features - Provide split-bus, subfeed lugs, subfeed protective device, and contactors as indicated on the drawings or specified in this or other sections of these specifications.

3) Tandem, Duplex or Half Sized Circuit Breakers - Do not use this type of equipment.

4) Lighting and Appliance Panelboards (240 V Class) - Minimum breaker interrupting rating shall be 10,000 amps, symmetrical. Provide breakers and panel of higher interrupting rating where indicated on the drawings. Provide minimum box dimensions per NEC.

2.2 FUSES, 600-VOLT AND LESS

a. Provide fuses as manufactured by Bussman Manufacturing Company/Chase-Shawmut Company and outlined below, or approved equivalent.

1) Control Circuit Protection - Fuses protecting control circuits shall be Bussman "Fusetron," Chase-Shawmut "Trionic" or approved equivalent, dual-element type having an interrupting rating of 100,000 amps RMS unless otherwise noted.

2) General Fuse Requirements - The following general requirements shall apply to all fuses:

a) Fuses shall be coordinated with each other and with circuit breakers in the circuit.

b) Make adjustments in the specified fuse sizes and provide substitute fuses as required to achieve reliable trouble-free operation of all fused circuits.

c) Provide a fuse in each fuse holder.

d) Provide a label inside each cover or adjacent to each fuse holder indicating specific type of fuse required for replacement.

e) Provide six (6) spare fuses for each low-voltage current rating used on the project except no spare fuses will be required for integral current-limiting fuse circuit breaker units.

2.3 GROUNDING SYSTEM

a. This grounding specification is applicable to this and all other sections of the work. Provide all grounding systems and make connections mechanically secure and electrically continuous. Ground all line voltage electrical systems completely and effectively as required by code and as specified herein.

b. Ground all raceway systems and equipment enclosures. Where not otherwise indicated, grounding conductor size shall conform to the most stringent of the governing codes, except that in no instance shall the grounding conductors be smaller than #12 AWG.

1) Ground the service and transformers in an approved manner.

2) Provide grounding where indicated on the drawings. All ground mat conductors shall be bare soft drawn copper, sized as noted. Bury all conductors approximately 12-inches below grade.

3) Grounding conductor connections shall be bolted except at inaccessible ground rods, buried ground conductors, and reinforcing steel grounding conductor connections, where connections shall be brazed. Consideration will be given to bolted connections in lieu of brazed connections, subject to the Engineer's approval. Exothermic welded connections may be substituted for brazed connections subject to the Engineer's approval and demonstration on the project with actual test connections that the connections will be successfully made.

4) Ground conductors, unless otherwise noted, shall be insulated and shall be run in conduit.

5) Continuity of equipment ground shall be maintained throughout the entire raceway, cabinet, and equipment enclosure system. Ground bushings and jumpers shall be used wherever normal conduit termination does not

insure continuity. Where nonmetallic conduit is used for distribution or where direct burial cables are employed, install a green insulated equipment ground conductor with each circuit.

6) Metal parts of lighting fixtures not otherwise grounded by bolted fastenings shall be bonded to conduit system with green ground wire. Receptacles shall be grounded to outlet boxes with green ground wire and machine screw.

7) Motors and equipment shall be bonded to the equipment grounding system by a continuous green insulated equipment ground conductor run with each circuit through approved flexible conduit connections as permitted by code. Where flexible conduit size exceeds the code approved limits, provide a separate green grounding conductor inside each flexible conduit, bonded to the inside of the connection box and to the nearest accessible supply end conduit junction box.

8) Where concrete pad is provided for utility-furnished transformers, suitable grounding systems shall be provided under this section, including driven ground rods. Details on the drawings are to establish the general scope of work, but installation shall conform with the serving utility company requirements.

2.4 DRY TYPE TRANSFORMERS

a. General: Provide all power transformer equipment as shown on the drawings in conformance with the following specification. All transformers shall be built in accordance with the latest revised IEEE, ANSI, and NEMA standards.

b. Temperature Rating: On all transformers, case temperature shall not exceed 30°C rise above an ambient temperature of 40°C. Terminal compartment shall be located to ensure termination of cable leads in temperature levels not to exceed 60°C. Transformers shall be designed for full load operation at a maximum temperature rise of 115°C.

c. Enclosure: For general application, enclosures shall be drip-proof and rodent-proof. Ventilating openings shall be louvered; screening will not be acceptable. Design shall incorporate a built-in vibration dampening system. Finish shall be ANSI 60. Conform to the limited access requirements where applicable.

d. Taps: Furnish four taps, two above and two below rated voltage, each 2½ percent, for ratings above five (5) kVA.

e. Tests: Provide routine tests as listed and described in ANSI specification No. C57.12.00, latest edition.

1) Sound level tests shall be performed on the complete transformer assembly in accordance with the latest NEMA standards. Transformer 0-75 kVA shall conform to NEMA standards.

PART 3 - EXECUTION

3.1 EQUIPMENT BASES

a. Provide equipment bases for all floor-mounted electrical equipment. Unless otherwise indicated, bases shall be poured-in-place concrete, nominally four inches high, and be one inch larger on all exposed edges than the equipment to be mounted. On all equipment bases in interior locations, unless otherwise noted, provide two or more parallel, cast-in-place continuous-slot channel erection system concrete inserts for equipment mounting. Bolt equipment to channels. Provide additional surface-mounted channels where required to match and lineup with existing equipment. Provide concrete pads and mounting provisions for all exterior equipment as indicated on the drawings or specified in other portions of the specifications.

3.2 SUPPORTS

a. Provide hangers or other devices such as pads, channels, struts, joists, anchors, etc., necessary for the support of electrical equipment. Provide the design, fabrication, and erection of supplementary structural framing electrical equipment. Show on shop drawing supplementary framing including design loads, member size, and location. When supplementary framing is indicated, verify that dimensions are suitable for the equipment furnished. Provide additional strength when equipment furnished is heavier than that specified.

3.3 DAMP AND WET LOCATION

a. Provide 1/4-inch air space behind all electrical equipment mounted in damp and wet locations and on concrete walls below grade. Use corrosion-resistant washers, bolts, and anchors.

PART 4: SPECIAL PROVISION

4.1 MEASUREMENT AND PAYMENT

a. Payment for all work specified under this section to be made as outlined under Part 4 of Section 16000, General Provisions.

b. Payment indicated to include complete compensation for all labor, equipment, materials and incidentals involved in work specified under this section. No addition compensation to be allowed.

SECTION 16500
LIGHTING

PART 1: GENERAL

1.1 SCOPE

a. The work consists of providing a complete lighting system as specified herein and shown on the drawings. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

1.2 SUBMITTALS

a. Submittals shall be in accordance with the requirements of these Contract Documents and shall include the following:

1) Fixture construction details
2) Photometric data
3) Ballast type
4) Operation and maintenance information for all equipment furnished and/or installed

1.3 QUALITY ASSURANCE

a. The Contractor shall test all lighting installations and demonstrate satisfactory operation of switching controls upon completion of the installation. The Contractor shall replace all defective light fixtures, lamps, ballasts, and/or occupancy sensors prior to occupancy by the Owner. All fixtures shall be cleaned and visible labels removed.

PART 2 - PRODUCTS

2.1 FIXTURES

a. Refer to the fixture schedule or lighting plans on the drawings for type designations, description, and required lamps. The Contractor shall be responsible for the complete equipment of all fixture types called for. All standard fixtures shall be approved by UL and shall have UL inspecting labels attached thereto. Fixtures shall be grounded in accordance with NEC.

2.2 LAMPS

a. The Contractor shall furnish and install all lamps required in all fixtures of the size shown on the drawings. Fluorescent tubes shall be "super-saver" or approved equivalent.

b. Furnish two (2) spare lamps of each type.

2.3 ACCESSORIES

a. Fixtures shall be furnished complete with all lenses, trims, hangers, nipples and extensions necessary for a complete installation. All light diffusing media shall be free of scratches or cracks. In general, diffusers shall be of acrylic material unless otherwise noted.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Supports

1) Fluorescent fixtures 48 inches or longer shall not be supported from outlet box ears.

2) All supports for fixtures shall be furnished. All stem lengths shall be adjusted to meet conditions. Mounting heights to bottom of fixtures are given as accurately as possible and shall be adjusted to conform to job conditions.

3) Clean all fixture lenses prior to final acceptance.

b. Grounding: Lighting system shall be securely grounded. For rigid conduit, a threaded hub or double locknut and bushing connection shall be considered adequate. For systems employing flexible conduit feeds, a green insulated No 12 AWG solid wire shall be run with the phase conductors, and bonded to the box and fixture at each end of the flexible conduit. The ground connection shall be accomplished by means of cadmium plated round head machine screws, lock washer, and nut.

c. Coordination: The Contractor shall provide adequate fixture attachment to ceiling members in accordance with the NEC. The Contractor shall inspect the mechanical plans and the actual site to verify that no interferences occur with diffusers, grilles, duct work, or piping.

PART 4: SPECIAL PROVISIONS

4.1 MEASUREMENT AND PAYMENT

a. When not listed in the proposal, all "LIGHTING" costs will be considered incidental work for with no separate payment will be made.

SECTION 16900
MOTORS AND CONTROLS

PART 1: GENERAL

1.1 SCOPE

a. Work consists of all motors and control shown on the drawings and specified herein and in other divisions of the specifications. In general, all motors shall be furnished with the driven equipment. The requirements of all other sections of the specifications are equally applicable to the work to be performed under this section. Motors and controls are specified in this and other divisions of the specifications. In the event of conflicts, the more restrictive specifications shall apply.

1.2 SUBMITTALS

a. Submittals shall be in accordance with the requirements of these Contract Documents and shall include the following:

1) Complete set of manufacturer's descriptive literature for each piece of equipment or component to be provided.

2) Shop drawings of the following for approval of the Engineer.

a) Motor controllers

b) Pilot control devices

c) Prewired systems including motor control panels:

(1) General descriptive literature of the manufacturer's standard equipment.

(2) Complete panel layout including construction details.

(3) Complete bill for materials.

(4) Schematic and ladder diagrams of internal control wiring of each unit and connections and functioning of outside control devices required in the particular installation.

(5) Complete composite diagram showing wiring of power and control, interconnections between sections, terminal markings, and wire size.

d) Complete schedule of nameplate legends.

1.3 ELECTRICAL AND CONTROLS COORDINATION

a. If the current requirement of any motor or piece of equipment is increased to such an extent that the wiring, conduit, and/or starter for that motor or equipment must be increased from that shown on the electrical drawings, the Contractor shall furnish and install the larger items. The increased wiring, conduit, and/or starter cost shall be provided at no additional cost to the Owner.

b. All electrical, instrumentation, and control equipment and panels furnished under this section shall conform to appropriate sections of these Specifications. Equipment and panels shall be NEMA 12 unless otherwise specified or designated on the drawings.

PART 2: PRODUCTS

2.1 SERVICE CONDITIONS

a. All equipment shall be designed and built for industrial service and be capable of operating successfully under the following applicable conditions.

1. 40 degrees C maximum ambient temperature.

2. Voltage variations to $\pm$10% of nameplate rating.

3. Frequency variations to $\pm$5% of nameplate rating.

4. Combined voltage and frequency variations to $\pm$10% total, as long as frequency does not exceed $\pm$5%.

5. 3,300 foot maximum altitude.

2.2 MOTOR CONTROL CENTERS (MCC)

a. The 480-volt motor control center for this project shall be arranged as diagrammed in the contract drawings. Provide circuit breakers, motor starters, fused switches, and control components as indicated on the one-line diagrams,

schedules, and control schematics. Units shall be free-standing, 90 inches high, 20 inches deep, and individual sections 20 inches wide, unless otherwise shown. The enclosure shall be NEMA 12 with individual units front-mounted. Sections shall be bolted together to form a rigid assembly. Minimum requirements for construction shall be the latest published NEMA standards. Wiring shall be NEMA Class I, Type B. All devices shall have an interrupting capacity of 42,000 amperes RMS symmetrical minimum.

b. Main lug compartments: A front accessible, main lug compartment shall be provided complete with suitable main lugs to accommodate incoming cables. The compartment shall be located conveniently near the point where cables enter the cabinet. The compartment shall be covered by a hinged door for convenient access and be equipped with an engraved laminated plastic nameplate for identification purposes. The door shall be held closed with captive-type screws to discourage unauthorized opening. Provide three-phase and ground lug terminations.

c. Horizontal wireways: Adequate conduit entrance space and wire entry room shall be provided at both the top and bottom of each section. Covers over these wireways shall be equipped with captive-type screws to prevent loss of hardware during installation. These wireways shall be isolated from the bus bars.

d. Vertical wireways: A vertical wire trough located on the right-hand side of each standard section and having a cross sectional area of not less than 19 square inches shall extend from the top horizontal wire trough to the bottom horizontal wire trough for the purpose of routing user's motor and control wires to the control units. This wire trough shall be isolated from the bus bars to guard against accidental contact. A separately hinged door, having captive-type screws, shall cover the vertical wire trough for safe and easy access to wiring without disturbing control units. Wire ties shall be furnished in the vertical wire trough to group and securely hold wires in place for a neat, orderly installation.

e. Bus bars: Main horizontal bus bars rated as noted on the one line diagram shall be provided near the top of the control center and extended its entire length, except when cut and supplied with splice bars to divide the control center for ease in handling. Bussing shall be braced for 42,000 amperes. Provide a properly sized equipment grounding bus secured to each vertical structure and extend the total length of the motor control center assembly.

1. Vertical bus bars shall be rated not less than 300 amperes.

2. Horizontal and vertical bus bars shall be electrolytically tin-plated.

Connections between horizontal and vertical busses shall be jointed by bolts, conical spring washers for constant pressure joints, and self clinching nuts to allow joint maintenance using one wrench from the front only.

3. High-strength glass, reinforced alkyd insulators shall be used as bus supports and as unit plug-on insulators. Bus insulators shall have generous surface clearances in the vertical plane to shed dust and maintain dielectric integrity. Bus and plug-on insulators shall be red to indicate the proximity of energized bus parts.

f. Bus barriers: Insulated horizontal and vertical bus barriers shall be furnished to reduce the hazard of accidental contact. These barriers shall have a red color to indicate proximity to energized busses. Vertical bus barriers shall have interlocking front and back pieces to give added protection on all sides and shall segregate the phases from each other to reduce the chance of accidental "flash over". Small, separate openings in the vertical bus barriers shall permit unit plug-on contacts to pass through and engage the vertical bus bars. Bottom bus covers shall be provided below the vertical bus to protect the ends of this bus from contact with fish tapes or other items entering the bottom of the enclosure. Unused plug-on openings shall have plastic snap-in closing plates for added safety.

g. Unit plug-on: For convenient unit connection to energized bus bars, unit plug-on contacts shall be provided on full voltage starters and branch circuit breaker units 255 ampere frame and smaller. The plug-on connection shall be a high quality, 2-point connection for each phase designed to tighten during heavy current surge. The plug-on fingers shall be silver-plated to yield a low resistance connection. Contact fingers become floating and self-aligning to allow solid seating onto the vertical bus bars.

h. Unit doors: Each unit shall have a door securely mounted with rugged hinges, which allow the door to swing open a minimum of 112 degrees for ease of maintenance. Unit doors shall be fastened to the stationary structure so they can be closed to cover the unit space when the units have been temporarily removed. Unit doors shall be held closed with captive-type knurled thumb screws which engage self-aligning cage nuts. These screws shall provide at least two threads for engagement to help hold unit doors closed under fault conditions. Removable door panels held with captive-type screws shall be provided on starter unit doors for mounting pushbuttons, selector switches, or pilot lights. Blank door panels capable of accepting future push-button devices, shall be furnished when push-button devices are not originally specified for starter units. Starter units shall

have an external, low profile overload reset button.

i. Unit support pan: Each plug-on unit shall be supported and guided by a "tilt and lift-out" removable pan so that unit rearrangement is easily accomplished. For each unit installation and rearrangement, transfer of this unit support pan from one location to another shall be accomplished without the use of tools after the unit and door have been removed.

j. Unit saddles: Each plug-on unit shall have a sheet steel saddle designed to physically isolate the unit from the bus compartment and adjacent units. Saddles shall be equipped with captive, self-aligning mounting screws, which hold the unit securely in place during shipment and maintain the unit and structure at the same potential. Hand holds shall be provided on each plug-on unit to facilitate unit removal. For added safety during installation and maintenance, the saddle shall be equipped with a provision to permit it to be padlocked in the section in a position such that contact fingers are disengaged from the bus bars.

k. Disconnect operators: A rugged, flange-mounted operator handle shall be supplied for each switch or breaker. The operator handle shall have a conventional up/down motion with the down position as OFF. For added safety, it shall be possible to lock this handle in the OFF position with shackle padlocks.

1. The operator handle shall be interlocked with the unit door so that the disconnect cannot be switched to the ON position unless the unit door is closed. It shall be possible to defeat this interlock by a deliberate act of an electrician should he desire to observe the operation of the operator handle assembly. This interlock shall also prevent opening the unit door unless the disconnect is in the OFF position. A defeater for this action shall also be provided in the event an electrician must gain access to the unit without interrupting the service.

l. Where shown, provide adjustable frequency drive (AFD) motor controllers as specified.

m. Where shown, provide solid state soft start motor controllers as specified.

n. Circuit breakers: Molded case circuit breakers shall be furnished for combination starters and branch circuit-breaker units in accordance with the motor control center diagrams. All circuit breakers shall be current limiting, high interrupting capacity type. Circuit breakers applied to polyphase motor circuits, where the breaker is installed in a separate enclosure from the motor starter, shall be the same as specified for "Panelboards". Where the breaker is installed in the same

enclosure as the motor starter and associated overload protection devices, provide breakers with "magnetic only" trip. The magnetic trip unit shall be adjustable, and the breaker shall have a continuous rating suitable for the load served. "Magnetic only" circuit breakers shall not be separately mounted.

1. Continuous ratings and trip settings, where indicated on the drawings, are based on estimated motor requirements with typical starting currents. The continuous ratings indicated are the minimum permissible. Trip settings indicated are for estimating purposes only and shall be changed by the Contractor to suit the manufacturer's recommendations before initial equipment start-up. Coordinate the indicated ratings and settings to conform to the requirements of the actual motors served under this contract and conform with equipment, motor, and control manufacturer's recommendations. The final installation shall provide the closest possible protection without unnecessary tripping. After final setting, mark the established setting position with red paint.

o. Identification: A control center identification nameplate describing section catalog numbers and characteristics shall be fastened on the vertical wire-trough door of every section. Each control center unit shall have its own identification nameplate, giving unit catalog number fastened to the units saddle near the upper left-hand corner. These nameplates shall also have suitable references to factory records for efficient communication with suppliers. Each control center unit shall also have an engraved, laminated plastic nameplate fastened to the outside of the unit door.

p. Wiring: The control center shall be wired in accordance with NEMA class and type previously specified.

1. Quick-separating, pull-apart terminals shall be mounted on lift-out brackets in the units.

q. Control components shall be provided and installed in motor control centers as shown on the drawings.

1. Push-buttons and selector switches shall be heavy-duty, oiltight. Contact ratings shall be as specified by NEMA A600.

2. Pilot lights shall be heavy-duty, oiltight, transformer style with color caps as shown on the drawings. R = Red, G= Green, A = Amber, W = White, B = Blue. The pilot lights shall be of the push to test type.

3. Control relays shall be of the heavy-duty solenoid type, calibrated contact ratings as specified by NEMA A600.

4. Time delay relays shall be of the pneumatic or solid state type with time calibrated adjustment knobs. Physical arrangement shall be similar to that of control relays.

r. Finish: All painted parts shall undergo a phosphatizing prepainting treatment for rust resistance and good paint bond. All painting shall be with enamel which shall be baked for a durable, hard finish. Removable push button plates, flange-mounted operator handles and trim plates, and top horizontal wire-trough cover plates shall be painted a contrasting color.

1. Color to be selected by the Engineer from manufacturer's standard colors.

s. Motor control centers shall be manufactured by General Electric, Cutler-Hammer/Westinghouse, Allen-Bradley, Furnas Electric, Square D. Co., or equal.

2.3 SOLID STATE SOFT STARTERS

a. Motor Starters: Provide soft start motor starters as detailed below.

1. The soft start shall be a solid-state reduced voltage starter (controller). The controller will be used to provide ramp starting and stopping of three-phase AC induction motors or resistive loads.

2. The soft start shall be rated for minimum 20 HP at 480 Volts Line-to-Line at 60 Hz at A Street Pump Station, and shall be rated for minimum 20 HP at 240 Volts Line-to-Line at 60 Hz. All soft starts shall be three phase.

b. The soft start shall provide pump control starting mode.

c. The soft start shall be designed to meet the applicable requirements of EN, IEC, UL, CSA, NEMA, IEEE, and VDE. These standards shall include:

1. Creep distances and clearances 600V (UL/CSA) and 500V (IEC),
2. Power terminal markings per EN 50005 and EN 60947,
3. Dielectric withstand per UL508 and IEC947,
4. Noise and radio frequency (RF) immunity per NEMA ICS 1-109, and Surge withstand per IEEE587 and IEC 801-5.

d. The soft start control terminals shall be easily accessible, and located on the top front of the device. The terminals shall be UL rated for 300 Volts, 10 Amps maximum and accept a maximum of two #18-#14 AWG wires.

e. The soft start digital parameter adjustment shall be provided through a built-in keypad. Analog potentiometer adjustments are not acceptable. Keypad shall be identical to VFD keypad for ease of operator use and equipment interchangeability.

f. A built-in alphanumeric, backlit LCD display shall be provided for controller set-up, diagnostics, status, and monitoring. The display shall be two-line, 16-character minimum.

g. A minimum of three auxiliary contacts shall be provided for customer use. Contacts shall be connected to terminal blocks in the control panel for telemetry use. These shall be programmable as follows:

1. Two form C SPDT: normal (instantaneous) or up-to-speed, and
2. One SPST: normal or fault; N.O. or N.C.

h. The control module shall provide digital microprocessor control and supervision of all controller operation, including SCR pulse firing control. The SCR firing circuitry shall incorporate an RC snubber network to prevent false SCR firing. The control module's power supply shall be self-tuning to accept control power input from 100 to 240 VAC, 50/60 Hz. The logic circuitry shall incorporate a latch circuit for three-wire control.

i. The soft start shall have the following user adjustments:

1. The acceleration ramp time shall be adjustable from 0 to 30 seconds.
2. The initial torque setting shall be adjustable from 0 to 90% of locked rotor torque.
3. Current limit starting shall be adjustable from 50 to 600% of the motor's full load current.

j. The controller shall provide the following monitoring functions indicated through the built-in LCD display and the communications port:

1. Phase-to-Phase supply voltage,
2. Three-phase line current,
3. Watts in KW,
4. KWH,
5. Elapsed time,
6. Power Factor, and

7. Motor thermal capacity usage.
8. Note: The system is designed around Allen Bradley SMC Dialog Plus soft start. However, if another manufacturer's soft start is used, the soft start manufacturer shall provide all PLC cards required for interface to PLC. PLC shall be able to at a minimum receive the above parameters, pump overload, Soft Start Trouble, Soft Start Fail, and transmit to soft start the following parameters: pump start and pump stop, and emergency stop.

k. The following protection shall be provided with the soft start:

1. Power loss (with phase indication; pre-start)
2. Line fault (with phase indication; pre-start) advising:
3. Shorted SCR
4. Missing load connection
5. Line fault (running protection) advising:
6. Power loss
7. Shorted SCR
8. Missing load connection
9. Open gate (with phase indication)
10. Controller overtemperature
11. Voltage unbalance
12. Phase reversal
13. Undervoltage
14. Overvoltage
15. Stall
16. Jam
17. Overload
18. Underload
19. Excessive starts/hour

l. The soft start shall provide overload protection: The soft start shall meet applicable standards as a motor thermal protective device. Three-phase current sensing shall be used. Overload trip classes of 10, 15, 20, and 30 shall be provided and user-programmable. Electronic thermal memory shall be provided for enhanced motor protection.

m. The soft start shall inhibit starting or shut down SCR pulse firing when a fault condition is detected. Fault diagnostics shall be indicated in descriptive text on the built-in LCD display. An auxiliary contact that is programmable for fault indication shall be provided for customer use.

n. Pump control shall be implemented to provide closed-loop control of a motor to match the specific torque requirements of centrifugal pumps for both starting and

stopping. This shall aid in eliminating the phenomena commonly referred to as "water hammer." Methods utilizing soft start with soft stop are not acceptable. Closed-loop control shall be achieved without using external sensors or feedback devices. Pump stop shall be initiated with a dedicated pump stop input. A coast-to-rest stop shall still be possible with a separate stop input. The pump stop time shall be user-adjustable from 0 to 120 seconds.

o. Back-to-back SCR pairs shall be the only power-switching semiconductor means acceptable. SCRs shall have a minimum repetitive peak inverse voltage rating of 1400V. The soft start shall have a minimum thermal capacity rating of 600% of the controller's current rating for 10 seconds.

p. The soft start shall deliver its rated current in ambient temperatures ranging from 0 degrees C to 50 degrees C. The soft start shall deliver its rated current in relative humidity of 5 to 95%, non-condensing. The soft start shall withstand a 30G shock for 11ms in any plane without malfunction, and 2.5G vibration for one hour in any plane without malfunction. The soft start shall be suitable for operation without derating up to altitudes of 2,000 meters.

q. Motor starter shall be SMC Dialog Plus with Pump Start Option as manufactured by Allen-Bradley or equal as approved by the Engineer.

2.4 PREWIRED SYSTEMS

a. Prewired systems shall be complete in all respects and shall provide all required functions. All components of the system shall conform in all respects to all portions of the specification. It is desired to take the fullest possible advantage of the manufacturer's standard methods and therefore, the drawings indicated general functions without details and the specifications generally call for the system to be the "manufacturer's standard." Such specifications and drawings do not relieve the manufacturer from the requirement to alter his "standard" components and methods and usual scope of work in order to provide the completeness, quality, quantity, function, and interchangeability with the function specified herein and shown on the drawings. Prewiring of systems shall be complete including all required interconnections, integral wiring, and inter-unit conduit and wiring, ready for the indicated external connections. It is the Contractor's responsibility to review the extent of electrical work and connections shown on the electrical drawings and to provide compatible prewired systems for a complete, coordinated, and proper functioning system.

PART 3: EXECUTION

3.1 GENERAL

a. Install equipment and materials in a neat and workmanlike manner and align, level, and adjust for satisfactory operation. Install equipment so that all parts are easily accessible for inspection, operation, maintenance, and repair.

3.2 WIRING

a. Arrange wiring in cabinets, panels and motor control centers 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 motor control centers or other control cabinets by directory card listing, terminal block number, and function or by means of tags securely fastened to the conductors.

b. All electrical wiring shall be identified at each end with imprinted mylar adhesive back wire markers. Show terminal numbers on as-built wiring diagrams.

c. Provide racks and pads to properly support and to provide a rigid installation for all electrical equipment.

PART 4: SPECIAL PROVISION

4.1 MEASUREMENT AND PAYMENT

a. Payment for all work specified under this section to be made as outlined under Part 4 of Section 16000, General Provisions.

b. Payment indicated to include complete compensation for all labor, equipment, materials, and incidentals involved in work specified under this section. No additional compensation to be allowed.

SECTION 16903
INSTRUMENTATION AND CONTROL SYSTEM

PART 1: GENERAL

1.1 SCOPE

a. This section covers all work necessary for furnishing, installing, adjusting, testing, documenting, and starting up the Instrumentation and Control (I&C) System. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

b. Major constituents for this system include, but are not limited to, all materials, equipment, and work required to implement a complete and operating system of instrumentation and controls. The system shall include primary elements for process variable measurements, analog display and control elements, and discrete display and control elements.

c. The system will interconnect and integrate components furnished under other sections of this contract to provide a complete, operational system.

1.2 RESPONSIBILITY FOR COMPLETE SYSTEM

a. The Contractor shall be ultimately responsible and shall provide for the supply, installation certification, adjustment, and start-up of a complete coordinated system which shall reliably perform the specified functions.

b. The Contractor shall coordinate his work to ensure that:

1) All components provided under this section are properly installed.

2) The proper type, size, and number of control wires with their conduits are provided and installed.

3) Proper electric power circuits are provided for all components and systems.

1.3 STANDARDS

a. NEC - National Electrical Code, NFPA No. 70.

b. ISA - Instrument Society of America.

c. ICS-NEMA (National Electrical Manufacturer's Associate) Industrial Control and Systems including:

1) ICS-1 General Standards for Industrial Control and System.

2) ICS-2 Standards for Industrial Control Devices, Controllers and Assemblies.

3) ICS-3 Industrial Systems.

4) ICS-4 Terminal Blocks for Industrial Control Equipment and Systems.

5) ICS-6 Enclosures for Industrial Controls and Systems.

1.4 SUBMITTAL DATA

a. Submittals shall be in accordance with the requirements of these Contract Documents and as outlined herein.

b. Hardware Submittals:

1) Before any components are fabricated and/or integrated into assemblies or shipped to the site, furnish to the Engineer, and receive his review of six (6) copies of full details, shop drawings, catalog cuts, and such other descriptive matter and documentation as may be required to fully describe the equipment and to demonstrate its conformity to these specifications. The decision of the Engineer upon the acceptability of any submittal shall be final. Catalog information shall be submitted for all equipment, regardless of whether or not it is of the same manufacturer as that listed in the specifications.

c. All submittals shall be complete, neat, orderly, and indexed. Partial submittals will not be accepted. All components shall be referenced by the instrument name tag designations shown.

d. If, in the opinion of the Engineer, a submittal is not clear, it will be returned to the Contractor and it shall be revised and resubmitted within 15 days.

e. Specifically, the Contractor shall submit the following material:

1) Catalog information, descriptive literature, wiring diagrams, and shop

drawings on all controllers, recorders, indicators, transmitters, primary elements, flow measuring equipment and appurtenances, gauges, and all other components of the system.

2) Individual data (or specification) sheets shall be provided for all components provided under this section. The purpose of these data sheets is to supplement the generalized catalog information provided by citing all specific features for each specific component (e.g. scale range, materials of construction, special options included, etc.). Each component data sheet shall bear the component name and instrument tag number designation shown in the drawings and specifications.

3) Catalog information on all electrical devices furnished under this section.

4) Shop drawings and catalog material for all control panels and enclosures.

5) Panel elementary diagrams of pre-wired panels. Diagrams shall be similar to those diagrams shown on the Drawings, but with the addition of all switched analog signals and all auxiliary devices such as relays, terminals, alarms, fuses, lights, fans, heaters, etc.

6) Interconnecting wiring diagrams, showing all components and panel terminal board identification numbers and external wire numbers. This diagram shall include all intermediate terminations between field elements and panels (e.g., terminal junction boxes, motor control centers, etc.). This diagram shall be coordinated with the electrical subcontractor and shall bear his mark showing that this has been done. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101. Contractor shall be responsible for developing the conductors numbering system.

7) Loop diagrams which shall consist of an individual wiring diagram for each analog loop showing all terminal numbers, the location of the dc power supply, the location of any booster relays or common dropping resistors, etc. The loop diagram shall be divided into three areas for identification of element locations: panel face, back-of-panel, and field, respectively. On each diagram present, a tabular summary of:

   a) The output capability of the transmitting instruments, and

   b) The input impedance of each receiving instrument.

8) Loop diagrams shall be on individual 8-½" x 11" or 11" x 17" drawings.

1.5 SPARES AND EXPENDABLES RECOMMENDATIONS

a. The Contractor shall provide a list of recommended spares and expendable items in sufficient quantities to sustain the Instrumentation and Control system for a period of 1 year after acceptance. A total purchase cost for the recommended list shall be provided in addition to the unit cost for each item.

b. In addition to the Spares and Expendables List, the Contractor shall provide a Component Parts List. The Component Parts List shall be a complete parts list for the entire Instrumentation and Control System and shall have the following features:

1) All components shall be grouped by component type, with the component types identified in a similar manner to the component identification code used in these Specifications.

2) All components shall be listed with their exact and complete manufacturer's part number, including all options or accessories.

a) All components shall be identified with their complete tag number as shown in these Specifications, or as modified or assigned by the Contractor and approved by the Engineer.

b) All components without tag numbers shall be grouped within component types by manufacturer's part number. Exact quantities shall be listed for each part number.

1.6 DOCUMENTATION

a. The Contractor shall provide documentation for the complete Instrumentation and Control System. This documentation shall include Operating and Maintenance Manuals and other documentation he proposes to prepare.

1) Operating and Maintenance Manuals - The Contractor shall provide three (3) complete sets of loose-leaf operating and maintenance manuals. These manuals shall include descriptive material, drawings, and figures bound in appropriate places.

b. The manuals shall include operating and maintenance literature for all components provided in this section. The submitted literature shall be in

sufficient detail to facilitate the operation, removal, installation, adjustment, calibration, and maintenance of each component provided under this section.

c. The manuals shall include internal wiring diagrams for all components provided in this section. These wiring diagrams shall clearly show all terminal block number designations and wire numbers. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101.

1.7 RECORD DRAWINGS

a. The Contractor shall provide one (1) set of record drawings on reproducible mylar for the following submittal documents.

1) Panel Elementary Diagrams

2) Interconnecting Wiring Diagrams

b. At the completion of construction, the Contractor shall provide one (1) set of marked "as-built" drawings to the Engineer showing the location of buried conduits and all changes or deviations from the original drawings.

PART 2: PRODUCTS

2.1 GENERAL

a. The design of the Instrumentation and Control System is based on the specific equipment specified hereinafter. For example, for equipment listed, the design is based on the named manufacturer. Should the Contractor select other equipment that requires different installation requirements, wiring and conduit, enclosures, intrinsically safe barriers, accessories, etc., the Contractor shall obtain approval from the Engineer for such changes to the design in accordance with this Contract and shall make all approved changes at no additional cost to the Owner.

b. Analog signals shall be 4-20 mA dc and shall conform to the compatibility requirements of ISA Standard S50.1. Unless otherwise noted, circuits shall be Type 2 two-wire. Transmitters shall have a load resistance capability conforming to Class L. Transmitters and receivers shall be fully isolated. All instrumentation shall be compatible with the type of signal specified.

c. Discrete signals are two-state logic signals of two types. Control and alarm signals shall utilize 24V ac sources. All alarm signals shall be normally closed, open to alarm isolated contacts rated for 2 ampere at 24 ac.

d. Whenever any material, article, device, product, or fixture 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 approved equivalent". The decisions relative to equality shall be by the Engineer and Owner.

e. Nameplates, Name Tags and Service Legends:

1) All components provided under this section, both field and panel mounted, shall be provide with permanently mounted name tags bearing the entire ISA tag number of the component. Panel mounted tags shall be plastic; field mounted tags shall be stamped stainless steel.

2) The panel drawings refer to nameplates and service legends: nameplates are defined as inscribed laminated plastic plates mounted under or near a panel face mounted instrument. Service legends are defined as inscribed laminated plastic integrally mounted on a panel face mounted instrument.

3) Service legends and nameplates shall be engraved, rigid, laminated plastic type with adhesive back. Unless otherwise noted, color shall be black with white letters and letter height shall be 3/16-inch high characters.

4) Field mounted tags shall be 16-gauge, 304 stainless steel with 3/16-inch high characters.

5) Each panel shall be provided with a face mounted laminated nameplate as specified above. Unless otherwise noted, color shall be black with letters ½-inch high.

f. Standard Light Colors: Indicating lights shall have colors as shown on the Drawings. Lettering shall be black or white on amber lenses. Lettering shall be white or red on green lenses.

g. Standard Push Button Colors and Inscriptions:

1) Unless otherwise noted on the Drawings, the following color code and inscriptions shall be followed for all push buttons:

Tag	Inscription(s)	Color
START	START	RED
STOP	STOP	GREEN
TEST, etc.	AS SHOWN	BLACK

2) All unused or non-inscribed buttons shall be black. Lettering shall be white on red buttons.

2.2 CONTROL PANELS

a. Where possible, panels shall be completely fabricated, instruments installed, and wired in the manufacturer's factory. All wiring shall be completed and tested prior to shipment. All external connections shall be by way of numbered terminal blocks.

1) Unless otherwise shown or specified, panels shall be NEMA 1 indoors and NEMA 4 stainless steel outdoors. In addition to the NEMA standards, the panels shall conform to the following requirements:

a) Minimum metal thickness shall be 14-gauge.

b) Wherever practical, enclosures shall be a manufactured item, Hoffman, H. F. Cox, Hennessy, or approved equivalent.

c) All panels manufactured or fabricated shall be summarized, and the summary together with catalog cuts and/or shop drawings shall be submitted to the Engineer for approval prior to purchase or fabrication.

d) Panels shall be so sized as to adequately dissipate heat generated by equipment mounted in or on the panel.

b. Control Panel Painting:

1) All surfaces, internal and external, shall be primed and painted in accordance with the following:

a) Sand panel and remove all mill scale, rust, grease, and oil. Fill all imperfections and sand smooth. Paint panel interior and exterior with one coat of epoxy coating metal primer, two finish coats of two-component type epoxy enamel. Sand surfaces lightly between coats. Dry film thickness shall not be less than 3.0 mils. Touch up panel after installation. Panel color shall be Pratt and Lambert Palgard, Koppers or approved equivalent. Interior panel color shall be white and exterior panel shall be premiered.

c. Control Panel Electrical:

1) Power Distribution Within Panels:

a) Each panel will be provided with one or more 120V ac, 60-Hz feeder circuits from the associated circuit breaker distribution panel provided under Division 16, ELECTRICAL. On each panel, make provisions for feeder circuit conduit entry and provide a terminal board for termination of the wires.

b) Provide circuit fusing as shown on elementary schematic drawings. Fuses shall be mounted in terminal block type fuse holders with pivoting type disconnect feature. Provide with neon blown fuse indicators. Furnish 5 spare fuses of each type and rating.

2) Wiring:

a) All electrical wiring shall be in accordance with the applicable requirements of Division 16, ELECTRICAL. Wires shall be 600-volt class, PVC insulated stranded copper and shall be of the size required for the current to be carried, but not below 16 AWG, enclosed in either sheet metal raceway or plastic wiring duct. Wiring for signal circuits shall be twisted shielded pairs no smaller than No. 18 AWG, and be separated at least 6 inches from any power wiring.

b) All interconnecting wires between panel mounted equipment and external equipment shall be terminated at numbered terminal blocks. All wires shall be identified per the requirements of Division 16, ELECTRICAL.

c) Numbering: Provide vinyl cloth or plastic machine numbered labels at each end of each control and power conductor

termination. This shall be done at all terminations including at terminal blocks, I-O terminals (even if number is duplicated on the terminal), and the back panel termination at panel mounted devices.

3) Terminal Blocks:

a) Terminal blocks shall be one piece molded plastic blocks with screw type terminals and barriers rated for 300 volts. Terminals shall be double sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, clearly visible with the protective cover removed.

b) Terminal blocks shall be numbered with wire numbers corresponding to the wiring and interconnection diagrams. Terminals shall be Entrelec Series 5000 Modular Terminals. Minimum terminal size shall be Type M 4/5 of this series. Neutral terminals shall be Type M 6/8 of this series and ground terminals shall be Type M 6/8P. Contractor shall furnish terminals in panels with all accessories to provide a complete installation. Pre-manufactured bus bar and assembled jumper bars shall be used for connection of adjacent blocks of the same wire number. Provide pre-manufactured "circuit separators" to separate logical groupings at terminal blocks as identified by bracketing of external connections or groups of common terminal numbers. Provide a shield connector bar in the terminal for connection of cable shields.

c) Fuse terminals shall be Entrelec Series 1331cVV or 220IbVV. Fuse terminals shall be provided with indicator cartridges for 120V ac operation.

d. Label all components within the control panels with their tags or other identifying designations so that they can be easily identified. Miscellaneous components such as relays may be labeled using a "Dynamo" type plastic tape label and may be affixed to an adjacent location when the component is removable.

e. Packing: Crate all panels with solid plywood sheeting and sufficient blocking and protective material to prevent damage during shipment and storage.

f. Auxiliary Relays: Provide plug-in type 3PDT, 11-pin relays where shown for accomplishing control functions and interfacing. Relays shall have coil voltages

to match the control circuit voltage. Contacts shall be 10 amp, 300 volt rated. Provide mounting via 11-pin phenolic sockets. Provide machine tool relays with contacts rated for 20 AMP, 300 volt for valve and pump control.

2.3 INDICATING LIGHTS, SWITCHES, AND PUSH BUTTONS

a. All panel mounted control switches, (push button or selector type) and indicating lights shall be of heavy-duty, oil-tight construction. Units shall be designed for installation in round panel holes. The devices shall have custom legends, button and lens colors as shown on the Drawings.

b. All indicating units shall be 120-volt ac, transformer type.

c. Indicating lights shall incorporate a press to test feature whereby depressing the lens disconnects the light from the source being monitored and connects the lamp to a continuously energized circuit for immediate test for a faulty lamp. Indicating lights shall be Cutler-Hammer Pres-Test indicating light Catalog No. 10250T74NA or approved equivalent.

d. Switches shall be provided with sufficient contact blocks to accomplish the desired switching functions as shown on the PLC I/O Schematics.

e. Provide to the Owner one complete set of specialty tools required for maintenance of the units, including, but not limited to, lamp and lens removal tool, mounting and retaining nut wrenches and button and lens removal tool.

2.4 PROGRAMMABLE CONTROLLER SYSTEM

a. The programmable logic controller (PLC) system shall be an all solid-state logic control system capable of emulating the same functions as conventional relays, timers, counters, and shift registers, as well as 16-bit data word manipulations and math functions. The PLC shall consist of a Central Processor Unit (CPU), input-output assemblies, programming and monitor terminals, and all necessary I-O cards and interconnecting cables. To maintain City of Newberg's pumping station standards the programmable controller system shall be Control Microsystems Smart Wire.

b. Software Development

1. All hardware and software manuals for the system including technical data on all individual components and installation and operation information shall be

provided to the City of Newberg.

2.5 LEVEL CONTROL

a. Probes:

1) Probes shall be constructed from PVC tubing with molded sensor units at regular intervals along the probe. Each sensor shall be Avesta SM054 stainless steel and shall be PVC injected to prevent ingress of moisture.

2) Sensors shall be spaced along the length of the probe and shall be connected to a numbered conductor. The molded sensors shall be rotated 90 degrees on the probe to prevent tracking between sensors.

3) The cable shall be numbered to correspond to the sensor units. Numbers shall be at regular intervals along the entire length of the cable. Provide adequate cable length to allow adjustment of the sensor throughout the depth of the wet well. The cable shall be capable of supporting the weight of the probe unit without the need for additional support.

4) Probes shall be ITT/Flygt MultiTrode or equivalent.

b. Intrinsically Safe Barrier:

1) The intrinsically safe barrier shall be 5 or 10 channel as shown, panel mounted and designed to protect a multi-sensored conductive probe. The barrier shall be listed for use in hazardous areas.

2) The barrier shall have screw terminals for wire connections.

3) Barrier shall be ITT/Flygt MTISB or equivalent.

PART 3: EXECUTION

3.1 PANELS AND PANEL MOUNTED EQUIPMENT

a. Panels and panel-mounted equipment shall be preassembled at the control supplier's factory. No work, other than correction of minor defects or minor transit damage, shall be done to the panels at the job site.

b. Panels shall be mounted where shown on the Drawings. Control supplier shall

anchor the panel as shown. Provide shims as required to set panels level. Any conflicts with other existing equipment shall be brought to the attention of the Engineer before any modifications are made.

3.2 INSTALLATION

a. Protection During Construction: Throughout this Contract, the Contractor shall provide protection for materials and equipment against loss of damage and from the effects of the weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Specific storage requirements shall be in accordance with the Engineer-reviewed I&C subcontractor's recommendations.

b. Material and Equipment Installation: Follow manufacturer's installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturer's instructions, and these Contract Documents, follow Engineer's decision, at not additional cost to Owner. Keep copy of manufacturer's instructions on the job site available for review at all times.

c. The Contractor shall be ultimately responsible and shall provide for the supply, installation, adjustment, and start up, of a complete, coordinated system which shall reliably perform the specified functions.

d. The Contractor shall make all final power and signal connections, hydraulic, pneumatic and electric, to all elements provided under this section. For all elements provided under this section and all elements interfaced by the I&C System, the Contractor shall verify and certify by written notice to the Owner and Engineer, correctness of final signal connections and correctness of adjustment.

e. All conduits are provided and installed under Division Electrical. With the exception of certain specified special control cables, all wiring and cables are provided and installed under Division ELECTRICAL. Specific special control cables shall be provided under this section.

f. Cleaning and Touch-up Painting: Keep premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and type of surface of the original finish.

3.3 TESTING AND START-UP

a. All elements of the Instrumentation and Control System shall be tested to demonstrate that the total system satisfies all of the requirements of this Specification.

b. All special testing materials and equipment shall be provided by the Contractor. Where it is not practical to test with real process variables, the Contractor shall provide suitable means of simulation. Simulation techniques shall be subject to the approval of the Engineer.

3.4 SITE SUPERVISION

a. In addition, the Contractor shall provide a minimum of 1 day system start up assistance by qualified personnel. One day of start up shall constitute 8 hours of on-site work. During this start up period, the Contractor's personnel are to thoroughly check all of the equipment and perform the on-site tests specified above.

3.5 FIELD SERVICE

a. The Contractor shall provide one (1) field inspection during the first year of service to inspect the equipment, make any necessary adjustments, and instruct operating personnel to assure proper performance of the system. This service shall be furnished without additional cost to the Owner.

PART 4: SPECIAL PROVISION

4.1 MEASUREMENT AND PAYMENT

a. Payment for all work specified under this section to be made as outlined under Part 4 of Section 16000, General Provisions.

b. Payment indicated to include complete compensation for all labor, equipment, materials, and incidentals involved in work specified under this section. No additional compensation to be allowed.