## **TABLE OF CONTENTS**

INVITATION TO BID

**BIDDER'S CHECKLIST** 

RESIDENT BIDDER CERTIFICATION

PROPOSAL/ BID SCHEDULE

INSTRUCTIONS FOR FIRST-TIER SUBCONTRACTOR DISCLOSURE

FIRST TIER SUBCONTRACTOR - DISCLOSURE FORM

AGREEMENT

PERFORMANCE BOND

PAYMENT BOND

**BID BOND GUARANTEE – FOREITURE** 

PROPOSAL BOND

MAINTENANCE AND WARRANTY BOND

NON-COLLUSION AFFIDAVIT

REVISIONS TO TECHNICAL SPECIFICATIONS

**100 GENERAL SPECIFICATIONS** 

300 TECHNICAL SPECIFICATIONS

#### **INVITATION TO BID**

Sealed proposals ("Bid") for 2023 Pavement Maintenance Program will be received by the City of Tualatin (County of Washington, State of Oregon) until **May 09, 2023, at 2:00 pm**, local time ("Bid Closing") at 10699 SW Herman Road, Tualatin, Oregon 97062. Brooke Baxter will be the person designated to receive Bids. Bids will not be accepted after this time.

Bids will be publicly opened and read aloud ("Bid Opening") immediately following the bid closing deadline at 10699 SW Herman Road, Tualatin, Oregon

The First-Tier Subcontractor Disclosure form will be received at the location given for the receipt of the bid until **May 09, 2023, at 4:00 pm**. Instructions for providing the First-Tier Subcontractor Disclosure and the required disclosure form are included in the Contract Documents. The disclosure form shall be submitted no later than two working hours, including lunch hours, after the Bid Closing. THE CITY WILL REJECT A BID IF THE BIDDER FAILS TO SUBMIT THE DISCLOSURE FORM WITH THIS INFORMATION BY THE STATED DEADLINE.

IDENTIFICATION OF PROJECT: Major items of work consist of 3,033 tons of asphalt with fiber reinforcement, 2,036 square yards of full depth patch, 8,372 square yards of cold plane, and 27 ADA ramp improvements. Contract Documents are available at http://bids.tualatinoregon.gov/.

2023 Pavement Maintenance Program

OTHER BID REQUIREMENTS: No proposal for a construction contract shall be received or considered by the City unless the firm is registered with the Construction Contractors Board or is licensed by the State Landscape Contractors Board, as applicable, as specified in OAR 137-049-0230.

Proposals must be made upon the Proposal form bound in the Contract Documents and must be accompanied by a certified check or proposal bond payable to the City of Tualatin (County of Washington, State of Oregon) in an amount not less than ten percent (10%) of the total amount of the bid.

This is a contract for a public work, subject to ORS 279C.800 to 279C.870 and prevailing wage is required contractor must comply fully with the provisions of ORS279C.800 through 279C.870 Contractor and subcontractors shall pay the Oregon Bureau of Labor and Industries (BOLI) wages to workers.

Every subcontract must contain a provision requiring payment of prevailing wage pursuant to the provisions of ORS 279C.800 through 279C.870. Contractor and all subcontractors must file or cause to be filed the certified statements with the BOLI, as provided in ORS 279C.845

The bid must indicate whether the contractor is a resident contractor, as defined in ORS 279A.120.

The Bidder shall deliver as part of the bid a written certification that the Bidder has not discriminated and will not discriminate against minority, women or emerging small business enterprises in obtaining any required subcontracts. Failure to do so shall be grounds for disqualification.

RIGHT OF REJECTION: The City of Tualatin reserves the right to reject any bid not in compliance with all prescribed public procedures and requirements, and may reject for good

cause any or all bids upon a finding that it is in the public interest to do so. Bids cannot be withdrawn within thirty days (30) after the Bid Closing.

WRITTEN ADDENDA: The City reserves the right to make changes to the Invitation to Bid and the Contract Documents by written addenda prior to the Bid Closing. Addenda shall be made available to all contractors who have purchased a copy of the Contract Documents, as provided in the Contract Documents.

For additional information, contact Bert Olheiser at 503-691-3096.

Dated this 21 day of April, 2023.

#### **CITY OF TUALATIN**

(County of Washington, State of Oregon)

Published in the Daily Journal of Commerce on April 24, 2023 and April 26, 2023.

#### **INFORMATION FOR BIDDERS**

#### PROJECT DESCRIPTION

Major items of work consist of street pavement overlay, full depth patch and inlays, ADA ramp improvements, road striping and other pavement and related work.

PLANS

Plans for the **2023 Pavement Maintenance Program**, consisting of drawings and specifications, are included with this document.

#### TIME OF COMPLETION

The bidder agrees to complete the project before August 31, 2023.

#### **BIDDER'S CHECKLIST**

#### To All Plan Holders and/or Prospective Bidders:

Use the following checklist to ensure that your bid package is complete upon submittal to the City of Tualatin on the date listed in the Invitation to Bid.

- Completed the Proposal in ink or typed characters. Filled in all other required information on the Proposal and affixed the proper signatures in ink.
- Filled out and signed the Bid Bond Guarantee Forfeiture form and attached the required Bid Security (10%) <u>OR</u> the Proposal Bond form as defined in the specifications.
- Filled out and signed the Resident Bidder Certification.
- Filled out and signed the Non-collusion Affidavit.
- Bidder is registered with the Construction Contractors Board.
- Bidder acknowledges receipt of all addenda. Bidders are strongly encouraged to contact the City of Tualatin to verify that all addenda are in-hand prior to submitting the bid.
- Filled out and signed the First-Tier Subcontractors Disclosure Form (if necessary)

#### **RESIDENT BIDDER CERTIFICATION**

Being so authorized, I certify that the firm indicated below is a "resident bidder" of the State of Oregon.

| Name of firm and business address:  | CCB #:  |
|---|---|
|   | -   |
|   | -   |
|   | -   |
| Authorized signature:   |   |
| Title:  | -   |
| Date:   | -   |
|   |   |
| If bidding firm is not a resident of the State of Orego<br>resident of the state of<br>preference in that state. (ORS 279A.120 and OAR <sup>2</sup> | on, I certify that the firm listed below is a<br>and is entitled to receive a<br>137-046-0310). |
| Name of firm and business address:  | ССВ #:  |
|   | -   |
|   | -   |
|   | -   |
| Authorized signature:   |   |
|   | -   |
| Date:   | -   |
| Dale.   | -   |

# PROPOSAL for work under the

#### 2023 Pavement Maintenance Program

#### TO: CITY OF TUALATIN

(County of Washington, State of Oregon) mailing address: 18880 SW Martinazzi Avenue Tualatin, Oregon 97062-7092

This proposal is submitted as an offer by the undersigned to enter into contract with the City of Tualatin ("Owner") to furnish all labor, tools, equipment, and materials, and perform all work required under the **2023 Pavement Maintenance Program** in accordance with the contract documents for the construction project, in consideration of the amounts stated in this proposal.

The undersigned agrees that within ten (10) calendar days of receipt of written notice of acceptance of this proposal by Owner, he/she will execute a contract agreement with Owner and provide corporate surety Performance and Payment Bonds, each in the amount of 100 percent of the awarded contract. The undersigned further agrees to provide the Owner within said ten (10) calendar days with proof that the undersigned has filed a Public Works Bond with the Construction Contractors Board, as required by ORS 279C.800 to 279C.870.

The undersigned declares by the signing of this proposal that the undersigned bidder agrees to be bound by and will comply with the provisions of ORS 279C.800 through 279C870 relating to prevailing wage rates. The signing of this proposal constitutes certification of compliance upon which the City is entitled to rely.

The undersigned declares by signing of this proposal that the undersigned bidder has not discriminated and will not discriminate against minority, women, or emerging small business enterprises in obtaining any required subcontracts. The signing of this proposal constitutes certification of compliance upon which the City is entitled to rely.

The bidder shall complete the following bid schedule.

Work on this schedule shall be completed by August 31, 2023.

Bidder agrees that the City may increase, decrease, or delete bid items to match the project with available funds. Payment will be based on the unit prices.

## City of Tualatin 2023 Pavement Maintenance Program BID SCHEDULE



## Schedule A

|    |  | Quantity |      | Engineer's Est |       |
|----|--|----------|------|----------------|-------|
| #  | ITEM                                   | Total    | Unit | Unit Cost      | Total |
| 1  | MOBILIZATION                           | 1        | L.S. |                |       |
| 2  | TRAFFIC CONTROL AND PEDESTRIAN SAFE    | 1        | 1.5  |                |       |
| 2  |  | 1        | L.O. |                |       |
| 3  |  | 1        | L.O. |                |       |
| 5  |  | 2 036    | S Y  |                |       |
| 5  | COLD PLANE PAVEMENT REMOVAL 0 - 2.5"   | 8 583    | SY   |                |       |
| 0  | HMAC. 1/2" LEVEL 3 WITH FIBER          | 0,000    | 0.1. |                |       |
| 7  | REINFORCEMENT                          | 3,041    | TON  |                |       |
| 8  | CURB AND GUTTER                        | 678      | L.F. |                |       |
| 9  | SIDEWALK                               | 4,640    | S.F. |                |       |
| 10 | EXTRA FOR PEDESTRIAN RAMPS             | 30       | EA.  |                |       |
| 11 | EXTRA FOR PEDESTRIAN RAMPS - FIELD FIT | 3        | EA.  |                |       |
| 12 | TRUNCATED DOMES                        | 33       | EA.  |                |       |
| 13 | RECONSTRUCT CATCH BASIN                | 7        | EA.  |                |       |
| 14 | ADJUST MANHOLE                         | 26       | EA.  |                |       |
| 15 | ADJUST VALVE BOX                       | 3        | EA.  |                |       |
| 16 | REPLACE VALVE BOX                      | 26       | EA.  |                |       |
| 17 | ADJUST SURVEY MONUMENT                 | 16       | EA.  |                |       |
| 18 | PAVEMENT MARKINGS                      | 1        | L.S. |                |       |
| 19 | CROSSWALK CLOSED SIGN                  | 6        | EA.  |                |       |
| 20 | REMOVE AND REPLACE EXISTING SIGN       | 5        | EA.  |                |       |
| 21 | LANDSCAPE RESTORATION                  | 28       | EA.  |                |       |
|    | SCHEDULE A TOTAL                       |          |      |                |       |

| PROJECT TOTAL |  |
|---------------|--|

The undersigned agrees that if awarded the contract, he or she will commence work within ten (10) calendar days after the date of receipt of the written notice to proceed, and that he or she will complete the work within specified schedule after receipt of the notice. The effective date of the notice to proceed will be <u>July 10, 2023</u>.

| Enclosed is a bid guarantee, consisting of           | in the |
|--|--------|
| amount of ten percent (10%) of the total bid amount. | _      |

| BUSINESS NAME OF BIDDER   |  |
|---|--|
| BUSINESS ADDRESS  |  |
| TELEPHONE NUMBER  |  |
| ACKNOWLEDGEMENT FOR SO  | LE PROPRIETORSHIP OR PARTNERSHIP:  |
| In witness hereto, the undersigned 20                                     | I has set his or her hand this <u></u> day of <u></u> ,                            |
| SIGNATURE OF BIDDER   |  |
| TITL  | .E   |
|   |  |
| ACKNOWLEDGEMENT FOR CO  | RPORATION:   |
| In witness hereto, the undersigned seal affixed by its duly authorized of | corporation has caused this instruction to be executed and its officers thisday of |
| NAME OF CORPORATION   |  |
| SIGNATURE OF BIDDER   |  |

TITLE

| ATTEST SECRETARY |  |
|------------------|--|
|                  |  |

#### INSTRUCTIONS FOR FIRST-TIER SUBCONTRACTOR DISCLOSURE

Bidders are required to disclose information about certain first-tier subcontractors when the contract value is greater than \$100,000. Specifically, when the contract amount of a first-tier subcontractor furnishing labor or labor and materials and where the contract amount of a first-tier subcontractor would be greater than or equal to: (1) 5% of the project bid, but at least \$15,000; or (2) \$350,000 regardless of the percentage, the Bidder must disclose the following information about that subcontract, either in its bid submission or within two hours after bid closing:

- 1. The subcontractor's name.
- 2. The category of work that the subcontractor would be performing, and
- 3. The dollar value of the subcontract.

Submit this form in a separate envelope clearly marked "FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM", with the bidder's name and project name.

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

# THE CITY MUST REJECT A BID IF THE BIDDER FAILS TO SUBMIT THE DISCLOSURE FORM WITH THIS INFORMATION BY THE STATED DEADLINE.

#### FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

| PROJECT NAME: 2023 Pavement Maintenance Program |       |  |
|---|-------|--|
| BID #:  |       |  |
| BID CLOSING: Date:                              | Time: |  |

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time. Submit this form in a separate envelope clearly marked "FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM", with the bidder's name and project name.

Bidders are required to submit this form where the contract value is estimated by the contracting agency to be more than \$100,000 and where the contract amount of a first-tier subcontractor is greater than or equal to: (1) 5% of the project bid or \$15,000, whichever is greater; or (2) \$350,000 regardless of the percentage of total project bid.

List below the name of each subcontractor that will be furnishing labor or will be furnishing labor and materials and that is required to be disclosed, the category of work that the subcontractor will be performing, and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed and submit the form.

| NAME | DOLLAR VALUE | CATEGORY OF WORK |
|------|--------------|------------------|
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |
|      |              |                  |

(ATTACH ADDITIONAL SHEETS IF NEEDED.)

Failure to submit this form by the disclosure deadline will result in a nonresponsive bid. A nonresponsive bid will not be considered for award.

Form submitted by (bidder name):

Contact name: \_\_\_\_\_

Telephone number:

#### AGREEMENT

THIS AGREEMENT, made and entered into this \_\_\_\_\_day of \_\_\_\_\_, 20\_\_\_, by and between \_\_\_\_\_("Contractor") and the City of Tualatin (County of Washington, State of Oregon) ("Owner").

WITNESSETH that:

WHEREAS, pursuant to the invitation of Owner, on the \_\_\_\_\_day of \_\_\_\_\_, 20\_\_\_, Contractor filed with Owner a proposal containing an offer; and

WHEREAS, Owner has determined that said offer was the best submitted;

NOW, THEREFORE, IT IS AGREED:

That Contractor shall comply in every way with the requirements of those certain documents entitled: Contract Documents for **2023 Pavement Maintenance Program**.

That, in consideration of faithful compliance with the terms and conditions of this agreement, Owner shall pay to Contractor at the times and in the manner provided in the Contract Documents the total sum of \_\_\_\_\_\_\_, which sum is subject, to increase or decrease in such proportion as the quantities named in the proposal are so changed, all in conformance with the Contract Documents.

That the time of completion will be specified as it pertains to each schedule from date of notice to proceed.

That the Contract Documents are made a part of this agreement by actual attachment.

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

Contractor agrees to fully comply with the provisions of ORS 279C.800 through 279C.870 relating to prevailing wage rates, which are made a part of this contract by reference as though fully set forth.

If Contractor is not domiciled in or registered to do business in the State of Oregon, Contractor must promptly provide to the Oregon Department of Revenue and the Secretary of State Corporation Division all information required by those agencies relative to this Contract. Contractor must demonstrate its legal capacity to perform the Work under this Contract in the State of Oregon prior to entering into this Contract. Contractor must have or acquire a City business license prior to executing this Contract.

As required by ORS 279B.110(2)(e), Contractor represents and warrants that Contractor has complied with the tax laws of this state, the City, and applicable political subdivisions of this state, including but not limited to ORS 305.620 and ORS chapters 316, 317 and 318, hereafter ("Tax Laws"). Contractor further covenants to continue to comply with the Tax Laws during the term of this Agreement and Contractor covenants and acknowledges that the failure to comply with the Tax Laws is a default for which City may terminate this Agreement and seek damages.

IN WITNESS WHEREOF, Contractor and Owner have caused this agreement to be executed on the day and year first above written.

#### CONTRACTOR

Name \_\_\_\_\_

Ву \_\_\_\_\_

(typed or printed name)

Title \_\_\_\_\_

Telephone number

#### **CITY OF TUALATIN**

(County of Washington, State of Oregon)

Ву \_\_\_\_\_

(typed or printed name)

Title

Telephone number \_\_\_\_\_

Approved as to form:

Richard Contreras Contracts/Procurement Analyst

#### PERFORMANCE BOND

LET IT BE KNOWN, that we,

\_as Principal, and

a corporation, duly authorized to do business in the State of Oregon as Surety, are jointly and severally held and bound unto the City of Tualatin (County of Washington, State of Oregon) in the sum of

for the

payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns, firmly by these presents.

#### THE CONDITION OF THIS BOND IS SUCH THAT

WHEREAS \_\_\_\_\_\_\_, the Principal herein on the \_\_\_\_day of \_\_\_\_\_\_, 20\_\_\_\_, entered into an agreement with the City of Tualatin (County of Washington, State of Oregon), the Obligee herein, the complete terms and conditions of which are contained in the document entitled "Contract Documents for **2023 Pavement Maintenance Program**", all as hereto attached and made a part hereof, whereby the Principal undertakes to do all labor, furnish all plant and equipment, and furnish all material in accordance with all the terms and conditions set forth in the Contract Documents; and promptly to make payment for all labor, services, and material and promptly pay sums due the Industrial Accident Fund and State Unemployment Compensation Fund and all sums required to be paid over to the Department of Revenue pursuant to the Personal Income Tax Act of 1969 as amended; and to save harmless the Obligee from any reason of the work, as set out more fully in the Contract Documents; and to do and perform all things in the Contract Documents required, in the time and manner and under the terms and conditions therein set forth; and in conformity with all laws, state and national, applicable thereto.

NOW, THEREFORE, if the Principal herein shall in the time and manner, and under the terms and conditions prescribed, well and faithfully do, perform, and furnish all matters and things as by them in the Contract undertaken, and as by law, state and national prescribed, then this obligation shall be void, but otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that this bond is subject to the following further conditions:

- (a) In no event shall the Surety be liable for a greater sum than the penalty of this Bond, or subject to any suit, action, or proceeding thereon that is instituted later than the period of time allowed by the applicable State or Federal Regulation after the complete performance of the Contract and final settlement thereof.
- (b) The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

| IN WITNESS WH       | EREOF, the pa | arties hereto have caused this Bond to be executed ir |
|---------------------|---------------|---|
| quadruplicate, this | sday of       |   |

|                  | PRINCIPAL               |
|------------------|-------------------------|
|                  | Ву                      |
|                  | (typed or printed name) |
|                  | Title                   |
|                  | Telephone Number        |
|                  |                         |
|                  | SURETY                  |
|                  | Ву                      |
|                  | (typed or printed name) |
|                  | Title                   |
|                  | Telephone Number        |
| Countersigned:   |                         |
|                  |                         |
| Resident Agent   |                         |
| Telephone Number |                         |
| Address          |                         |

#### **PAYMENT BOND**

LET IT BE KNOWN, that we,

as Principal, and

a corporation, duly authorized to do business in the State of Oregon as Surety, are jointly and severally held and bound unto the City of Tualatin (County of Washington, State of Oregon) in the sum of:

for the payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns, firmly by these presents.

THE CONDITION OF THIS BOND IS SUCH THAT

\_\_\_, the Principal herein on the\_ WHEREAS day of , 20 , entered into an agreement with the City of Tualatin (County of Washington, State of Oregon) the Obligee herein, the complete terms and conditions of which are contained in the document entitled: "Contract Documents for 2023 Pavement Maintenance **Program**", all as hereto attached and made a part hereof, whereby Principal undertakes to do all labor, furnish all plant and equipment, and furnish all material in accordance with all the terms and conditions set forth in the Contract Documents; and promptly to make payment for all labor, services, and material and promptly pay sums due the Industrial Accident Fund, the State Unemployment Compensation Fund and all sums required to be paid over to the Department of Revenue pursuant to the Personal Income Tax Act of 1969, as amended, and to save harmless the Obligee from any reason of the work, as set out more fully in the Contract Documents; and to do and perform all things in the Contract Documents required, in the time and manner and under the terms and conditions therein set forth; and in conformity with all laws, state and national, applicable thereto.

NOW, THEREFORE, if the Principal herein shall promptly pay all persons furnishing labor, services, material, or insurance to the Principal, or to his subcontractors, or to their assigns, on or about the work; and shall save harmless the Obligee, its officers and agents, from all claims therefore, or from any claim for damages or injury to property or persons arising by reason of the work; and shall pay all sums due the Industrial Accident Fund, the State Unemployment Compensation Fund and all sums required to be paid over to the Department of Revenue pursuant to the Personal Income Tax Act of 1969, then this obligation shall be void, but otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that this bond is subject to the following further conditions:

- (a) All material men and all persons who shall supply such laborers, mechanics of subcontractors with material, supplies, or provisions for carrying on such work, shall have a direct right of action against the Principal and Surety on this bond, second only to the right of the Obligee under this bond, which right of action shall be asserted in proceedings instituted in the appropriate court of the State of Oregon, and insofar as permitted by the laws of Oregon, such rights of action shall be asserted in a proceeding instituted in the name of the Obligee to the use and benefit of the person, firm or corporation instituting such action and of all persons, firms, or corporations having claims hereunder shall have the right to be made a party to such proceeding (but not later than two years after the complete performance of the contract and final settlement and judgment rendered thereon).
- (b) In no event shall the Surety be liable for a greater sum than the penalty of this bond, or subject to any suit, action, or proceeding thereon that is instituted later than the period of

time allowed by the applicable state or federal regulation after the complete performance of the contract and final settlement thereof.

- (c) The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the work or to the specifications.
- (d) It is understood and agreed that the surety shall be liable for payment of wages in an amount not less than the applicable prevailing rate of wages as of the date of the bid opening to each and every person who may be employed in the performance of the contract or any part of the contract.

| IN WITNESS WHEREOF  | , the parties hereto have cause | d this Bond to be executed in |
|---------------------|---------------------------------|-------------------------------|
| quadruplicate, this | _day of                         | , 20                          |

|                  | PRINCIPAL               |
|------------------|-------------------------|
|                  | Ву                      |
|                  |                         |
|                  | (typed or printed name) |
|                  | Title                   |
|                  | Telephone Number        |
|                  |                         |
|                  | SURETY                  |
|                  | Ву                      |
|                  |                         |
|                  | (typed or printed name) |
|                  | Title                   |
|                  | Telephone Number        |
| Countersigned:   |                         |
|                  |                         |
| Resident Agent   |                         |
| Telephone Number |                         |
| Address          |                         |
|                  |                         |

#### **BID BOND GUARANTEE - FORFEITURE**

| Accompanying this proposal is                  |  |
|--|--|
| ("bidder's bond," "cash" or "certified check") | in the amount of                                     |
| Dollars (\$)                                   | ) which amount is not less than ten percent (10%) of |
| the total amount of the bid.                   |  |

If this proposal shall be accepted and the undersigned shall fail to or neglect to contract as aforesaid, and to give a Payment and Performance Bond in the sum of the total amount of the bid as aforesaid, with sureties satisfactory to the City Council within ten (10) days from the date of receiving from the City Council the contract prepared and ready for execution, the City Council may, at its option, determine that the bidder has abandoned the contract, and thereupon forfeiture of the security accompanying this proposal shall operate and the same shall be the property of the City of Tualatin as provided by ORS 279C.385. It is further understood that the bid shall not be withdrawn or revoked for 30 days after the scheduled closing time for receiving bids.

| SIGNED and sealed  | this         | day of |       | ., 20                   |
|--------------------|--------------|--------|-------|-------------------------|
|                    | Signature of | Bidder |       | (legal name of person)  |
|                    |              |        | Ву _  | (typed or printed name) |
|                    |              |        |       | (typed of printed name) |
|                    |              |        | Title |                         |
|                    |              |        |       |                         |
| Name of Contractor |              |        |       |                         |
| Business Address   |              |        |       |                         |
|                    |              |        |       |                         |
| Telephone Number   |              |        |       |                         |

#### PROPOSAL BOND

| LET IT BE KNOWN, that we,_ | a   | s    |
|----------------------------|---|------|
| Principal and the          | , a corporation duly organized ur           | nder |
| the laws of the State of   | , having its principal place of business at |      |

in the State of \_\_\_\_\_\_, and authorized to do business in the State of Oregon, as Surety, are held and firmly bound unto the City of Tualatin for payment as liquidated damages in the amount of ten (10) percent of the total amount of the bid of the principal for the work hereinafter described, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors and assigns, firmly by these presents.

The condition of this bond is such that, whereas the principal herein is herewith submitting this proposal for the following construction, to wit: Contract Documents for <u>2023 Pavement</u> <u>Maintenance Program</u>, the bid and proposal, by reference thereto being hereby made a part hereof. It is further understood that the bid shall not be withdrawn or revoked for 30 days after the scheduled closing time for receiving bids.

NOW, THEREFORE, if the proposal and bid submitted by the Principal be accepted, and the contract be awarded to Principal, and if the Principal shall enter into and execute the contract and shall furnish bonds as required by the City of Tualatin within the time fixed by the City Council, then this obligation shall be void; otherwise it shall remain in full force and effect.

| SIGNED and sealed this | day of | , 20 |
|------------------------|--------|------|
|------------------------|--------|------|

PRINCIPAL

(typed or printed name)

SURETY

Countersigned:

**Resident Agent** 

Telephone Number \_\_\_\_\_

Address \_\_\_\_\_

#### MAINTENANCE AND WARRANTY BOND

LET IT BE KNOWN, that we,

\_\_\_\_\_\_as Principal, and \_\_\_\_\_\_, a corporation duly authorized to do business in the State of Oregon as Surety, are jointly and severally held and bound unto the City of Tualatin (County of Washington, State of Oregon), in the sum of \_\_\_\_\_\_\_for the payment of which we jointly and severally bind ourselves, our heirs, executors,

administrators, successors and assigns, firmly by these presents.

THE CONDITION OF THIS BOND IS SUCH THAT:

WHEREAS \_\_\_\_\_\_\_, the Principal herein on the \_\_\_\_\_day of \_\_\_\_\_\_, 20\_\_\_\_, entered into an agreement with the City of Tualatin (County of Washington, State of Oregon), the Obligee herein, the complete terms and conditions of which are contained in the document entitled "Contract Documents for **2023 Pavement Maintenance Program** all as hereto attached and made a part hereof, whereby the Principal undertakes to do all labor, furnish all plant and equipment, and furnish all material in accordance with all the terms and conditions set forth in the Contract Documents; and promptly to make payment for all labor, services, and material and promptly pay sums due the Industrial Accident Fund, the State Unemployment Compensation Fund and all sums required to be paid over to the Department of Revenue pursuant to the Personal Income Tax Act of 1969, as amended, and to save harmless the Obligee from any reason of the work, as set out more fully in the Contract Documents; and to do and perform all things in the Contract Documents required, in the time and manner and under the terms and conditions therein set forth; and in conformity with all laws, state and national, applicable thereto.

WHEREAS the Principal has completed the improvements and has applied to the Obligee to accept the improvements and in connection therewith, the Principal has agreed to guarantee the work performed against any and all defects in workmanship and materials for one (1) year from the date of acceptance of the improvements as determined by certification of the City of Tualatin, Oregon, City Council, the date of completion being certified as\_\_\_\_\_,

20\_\_\_\_\_. Should corrections in the work be required due to defects in materials and/or workmanship during the one-year period, then as to such corrective work the period shall be extended for and cover to the same extent as if within the original one-year period for an additional one (1) year period from the date of acceptance of the corrective work as certified by the City of Tualatin, Oregon, City Council.

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall guarantee the work performed under the Contract against any and all defects in workmanship and materials for the period of one (1) year from acceptance of the completed work and any corrective work performed under the guarantee, as certified by the City of Tualatin, then this obligation shall be void, otherwise to remain in full force and effect.

| SIGNED and sealed this | day of | , 20 |
|------------------------|--------|------|
|------------------------|--------|------|

PRINCIPAL

(typed or printed name)

SURETY

Countersigned:

Resident Agent

Telephone Number

Address \_\_\_\_\_

#### NON-COLLUSION AFFIDAVIT

Bid For: 2023 Pavement maintenance Program

STATE OF Oregon

County of

I state that I am \_\_\_\_\_\_(title) of \_\_\_\_\_\_(name of firm) and that I am authorized to make this affidavit on behalf of my firm and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

- (1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication, or agreement with any other contractor, bidder, or potential bidder, except as disclosed on the attached appendix.
- (2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.
- (3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
- (4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
- (5) \_\_\_\_\_\_(name of firm), its affiliates, subsidiaries, officers, directors and employees are not currently under investigation by any governmental agency and have not in the last four years been convicted of or found liable for any act prohibited by state or federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as described in the attached appendix.

I state that \_\_\_\_\_\_(name of firm) understands and acknowledges that the above representations are material and important and will be relied on by the City of Tualatin in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the City of Tualatin of the true facts relating to the submission of bids for this contract.

Name of Company / Position

Sworn to and subscribed before me this \_\_\_\_\_day of \_\_\_\_\_\_, 20\_\_\_\_.

Notary Public for the State of Oregon

My Commission Expires: \_\_\_\_\_

## **TECHNICAL SPECIFICATIONS**

## FOR

## **CONSTRUCTION OF**

## 2023 TUALATIN PAVEMENT MANAGEMENT PROGRAM (SCHEDULE A)

Prepared by





EXPIRES: DEC. 31, 2023

Otak, Inc. 808 SW 3<sup>rd</sup> Avenue, Suite 800

Portland, OR 97204

(503) 287-6825

#### 2023 PAVEMENT MANAGEMENT PROGRAM TECHNICAL SPECIFICATIONS INDEX (SCHEDULE A)

The construction work (Schedule A) shall be governed by the latest version of the City of Tualatin Public Works Construction Code and by these Technical Specifications. The contractor shall keep a copy of the Public Works Construction Code at the job site.

Otak Inc. shall act as the City's representative during the design and construction phase of this project.

Work to begin after July 10, 2023 and be completed by August 31, 2023.

| SECTION   | Page Number |
|---|-------------|
| SECTION 301 - MOBILIZATION                            | 2           |
| SECTION 302 - TEMPORARY TRAFFIC CONTROL               | 2           |
| SECTION 309 - ASPHALT CEMENT CONCRETE PAVEMENT        | 4           |
| SECTION 311 - CONCRETE CURB AND GUTTER/STANDARD CURB. | 7           |
| SECTION 312 - CONCRETE SIDEWALK AND DRIVEWAY APPROACH | ES7         |
| SECTION 313 – SURFACE RESTORATION                     | 9           |
| SECTION 315 - COLD PLANE PAVEMENT REMOVAL             |             |
| SECTION 317 - PAVEMENT MARKING                        |             |
| SECTION 318 – PERMANENT TRAFFIC CONTROL               |             |
| SECTION 324 – MANHOLES                                |             |
| SECTION 325 - CATCH BASINS AND INLETS                 |             |
| SECTION 333 - LANDSCAPE RESTORATION                   |             |
| SECTION 334 – ASPHALT CEMENT FIBER ADDITIVE           |             |
| SECTION 335 - EROSION CONTROL AND CLEANUP             |             |
| SECTION 336 - CONSTRUCTION SURVEY                     |             |



#### SECTION 301 – MOBILIZATION

Add the following subsection:

#### 301.4.00 Payment

Payment for the lump sum bid item "Mobilization" shall be based on the percent of the original Contract amount that is earned from other Contract items, not including advances on materials, and as follows:

- When 5 percent is earned, either 50 percent of the amount for mobilization or 5 percent of the original Contract amount, whichever is the least.
- When 10 percent is earned, either 100 percent of mobilization or 10 percent of the original Contract amount, whichever is the least.
- When all work is completed, amount of mobilization exceeding 10 percent of the original Contract amount.

This schedule of mobilization progress payments will not limit or preclude progress payments otherwise provided by the Contract. When the Contract Schedule of Items does not indicate payment for mobilization, no separate or additional payment will be made for mobilization. Payment will be included in payment made for the appropriate items under which this work is required.

## SECTION 302 – TEMPORARY TRAFFIC CONTROL

#### **302.1.00** General – Replace the first sentence with the following:

Contractor shall submit a proposed traffic control plan and temporary pedestrian access route plan to the City seven days in advance of the preconstruction conference. Contractor shall comply with all applicable requirements of this section and the current version of the MUTCD. Contractor shall obtain approval of traffic control plan and the temporary pedestrian access route plan prior to beginning work. Street closures will not be allowed.

**302.2.00** Work Hour Restrictions – Replace the first paragraph with the following:

All work shall be performed during the week within the hours of 7:00 a.m. and 7:00 p.m. and on weekends within the hours of 8:00 a.m. and 6:00 p.m. Two lanes of traffic shall be maintained on SW Avery Street and SW Ibach Street for the pavement repair, grind, overlay/inlay, curb ramp construction, and striping work between the hours of 6 AM - 9 AM and 3 PM – 6 PM.

#### **302.3.00 Project Information Signing -** Add the following:



Signs shall be installed at the beginning and end of each paving project. Obtain approval of sign content at the preconstruction conference and have signs installed seven days before the anticipated start of work date.

Barricades with No Parking notices shall be placed on each street at maximum 100' spacing one week before paving operations begin where parking is allowed. No parking signs shall indicate dates and hours that parking will be restricted.

### **302.4.00** Maintenance of Traffic - Add the following:

Notify, in writing, all residents with direct access onto SW Avery Street and SW Ibach Street seven days in advance of work.

## **302.5.00** Diversion of Vehicle Traffic - Add the following:

One lane of traffic shall remain open at all times on all roadways included in this project. Provide traffic control devices, temporary pavement marking, and schedule the work to restore all roadways for two-way traffic by the end of each work shift.

# 302.6.00 Use of Construction Area Signs, Lights, Barricades, Delineators and Other Devices

Replace the first two paragraphs in this section with the following:

Prior to beginning any work or affecting any roadway or sidewalk, the contractor shall obtain city approval of a site-specific traffic control and temporary pedestrian access route plan for that work, and shall implement all aspects of that plan for that work. Plans must be in accordance with all current MUTCD, ODOT, PROWAG, and other applicable standards, and must include all elements deemed necessary by the city to protect the public interest, mobility, and safety throughout the project.

The City, engineer, and/or inspector may require additional traffic control and/or safety measures and/or revisions of the work area and/or stoppage of work if, in their judgment, it is necessary to do so to protect the public interest, safety, and/or mobility.

Construction area signs, lights, barricades, delineators and other devices furnished by the Contractor for use on an existing public travel way shall be in accordance with the latest version of the "Manual of Uniform Traffic Control Devices" (MUTCD). Regulatory and construction signs shall conform to MUTCD, ODOT, and City of Tualatin specifications and drawings. During the hours of darkness, approved lights shall be maintained in sufficient numbers, in proper working order, and at locations to adequately alert approaching traffic.

All construction area signs shall conform to the dimensions, color, legend and reflectorization or lighting requirements of the plans, the MUTCD and these special provisions. All sign panels shall be the product of a commercial sign manufacturer, but used sign panels, in good repair as determined by the City Engineer, may be furnished.

### **302.8.00** Use of Flaggers - Add the following:

The maximum time allowed for traffic queuing shall be 10 minutes.

Add the following subsection:

#### 302.9.00 Payment

Payment for the lump sum bid item "Traffic Control and Pedestrian Safe Walking Devices" shall be full payment for furnishing all labor, equipment, and materials necessary to perform the temporary traffic control associated with the work of this project, including, but not limited to, preparation of an approved traffic control plan(s), furnishing and placing traffic control devices, providing flagging personnel, furnishing and placing temporary barricades, furnishing and placing construction signs, furnishing and placing temporary bicycle and pedestrian access routes, in accordance with the approved traffic plan. The bid item also includes all labor necessary to adjust, remove, move, and rearrange traffic control devices, and all other work items necessary in order to maintain temporary traffic control. This bid item also includes furnishing and placing project information signs.

#### **SECTION 309 - ASPHALT CEMENT CONCRETE PAVEMENT**

#### **309.1.01 Scope -** Add the following:

Perform the following work as specified or as marked on the street by the Engineer. The Contractor shall pursue the work vigorously to completion. Once started, there shall be daily progress until the street pavement, including temporary pavement marking is finished and normal traffic is resumed.

Work sequencing shall be as follows:

- 1. Obtain approval of work schedule, mix design, striping materials, and traffic control plan 7 days prior to beginning work.
- 2. Install signs and notify agencies and residents as specified in Section 302 of these Technical Specifications.
- 3. Install erosion control measures prior to start of project work.
- 4. Maintain traffic per Section 302 of these Technical Specifications.
- 5. Perform full depth patching as shown on plans or as marked in the field.
- 6. Sawcut and Grind along lines shown on plans or as marked in the field, including curb edge transitions and end tapers.
- 7. Note any required warping of pavement at proposed curb ramps to create slopes <5% at the gutter. Obtain approval from Engineer prior to paving.
- 8. Remove all remaining legends and striping by hydro blasting.
- 9. Place Asphalt Overlay or Inlay.



## **309.2.01** New Aggregates - Add the following:

The City will have qualifying tests run on stockpiled aggregates at the batch plant in advance and also sample aggregate during production of plant mix.

#### 309.2.01B Fracture of Gravel

In the last sentence, replace WAQCT TM 1 with AASHTO TP 61.

## 309.2.03 Asphalt Concrete

Revise the first paragraph as follows:

Asphalt concrete shall be 1/2" Level 3 HMAC as shown on the Plans. Asphalt concrete shall conform to and be manufactured in accordance with the applicable provisions of this section and section 00744 and 00745 of the 2021 Oregon Standard Specifications for Construction. The asphalt cement shall be PG 64-22. The use of warm mix asphalt is allowed.

## 309.2.04 Job Mix Formula

Revise this subsection to conform to section 00744 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions.

#### **309.2.05** Composition and Proportion of Mixtures

Revise this subsection to conform to section 00744 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions.

#### 309.2.06 Reclaimed Asphalt Pavement Material

Revise this subsection to conform to section 00744 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions.

#### 309.2.07 Tolerances

Revise this subsection to conform to section 00744 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions.

#### 309.2.08 Asphalt Tack Coat

Revise this subsection to conform to section 00744 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions.

#### 309.2.10 Asphalt Cement Additives



Revise this subsection to conform to section 00744 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions.

#### **309.3.06 Tack Coat -** Add the following to the last paragraph:

Coat the buried face of the curb, gutter and catch basins at 0.50 gal/sy. Coat the side edges of all Full Depth, Overlay and Inlay areas.

Cover existing striping and pavement markings outside of re-striping limits to protect them from tack and equipment damage. Damaged striping and/or pavement markings shall be repaired or replaced to the City's satisfaction at no additional cost.

## **309.3.08C Placing -** Add the following:

Rake out coarse aggregate when feathering edges in the top lift and to eliminate an open graded surface.

#### **309.3.09A General -** Add the following:

Use only competent, experienced, and qualified roller operators.

## **309.3.09A-1** Rolling and Surface Repair - Revise as follows:

In the third paragraph, replace "shall be subject to removal and replacement" (2 locations) with – "shall be removed and replaced".

## **309.3.09A-2 Temperature -** Add to the first paragraph:

Repair unacceptable areas as directed by the Engineer.

#### **309.3.12** Longitudinal Joints - Add the following:

Cold longitudinal joints shall be located outside the wheel path.

## **309.4.00 Payment -** Add the following:

Bid item "HMAC, ½" Level 3 with Fiber Reinforcement" will be measured and paid by the number of tons of mix placed and accepted to the nearest 0.1 ton. Payment shall be full payment for furnishing all materials, labor, tools, and equipment necessary to construct asphalt concrete pavement for the street overlays and inlays, including the asphalt concrete fiber additive per specification 334. Asphalt concrete placed for Full Depth Patching shall be incidental to the Full Depth Patching bid item. Asphalt concrete placed for curb ramp improvements shall be incidental to the curb and gutter bid item. Protect curb or gutter from damage. Damaged curb or gutter shall be replaced by the contractor in full segments, usually 15 feet, at no cost to the City.



## SECTION 311 – CONCRETE CURB AND GUTTER/STANDARD CURB

#### **311.1.01 Scope -** Add the following:

Match existing joints, or saw cut existing curb as marked.

Add the following subsection:

#### 311.5.00 Payment

Payment for bid item "Curb and Gutter" shall be made based on the lineal foot of curb and gutter marked out by the engineer and reconstructed measured along the gutter line. Payment shall include all labor, equipment and materials to complete the removal and installation work. Curb and gutter damaged by the contractor shall be replaced at no cost to the City. Contractor is advised to take special care to protect the existing compromised curb, gutter, and driveway approaches. Payment for the pavement reconstruction in front of the curb and gutter reconstruction shall be incidental to the curb reconstruction. Care shall be taken to protect the existing pavement in front of the curb and gutter, reconstructing as little pavement as possible.

Any grade curb constructed at the back or side of the sidewalk shall be included in the surface area square foot measurement and payment for sidewalk. No separate payment will be made for this curb. The curb at the back of the sidewalk shall be allowed to be monolithic with the sidewalk and to not extend to a depth greater than the sidewalk.

#### **SECTION 312 - CONCRETE SIDEWALK AND DRIVEWAY APPROACHES**

#### 312.1.0 General

**312.1.01 Scope** – Add the following:

The contractor shall be responsible for layout and forming of the sidewalk ramp reconstructions, including survey stakeout.

#### 312.2.0 Materials – add the following subsection:

#### 312.2.07 Truncated Domes

Furnish Armor-Tile Tactile Systems Cast-in-Place Tiles truncated dome detectable warning surfaces for new sidewalk curb ramps, color: Federal Yellow.

#### 312.3.0 Workmanship



#### **312.3.03** Forms – Add the following:

The contractor shall receive interim approval for sidewalk ramp forms prior to proceeding with the concrete pour.

Add the following subsection:

## 312.3.11 Truncated Domes

On all sidewalk curb ramps, install truncated domes as shown. Place according to the manufacturer's recommendations and in accordance with ADA standards.

**312.6.0 Payment** – Add the following:

#### 312.6.01 Sidewalks

Payment for concrete sidewalks will be based upon the unit price per square foot set forth in the Contractor's Proposal. Payment constitutes full payment for all work required for demolition and construction of concrete sidewalks as specified herein including the curb at the back and side of the sidewalk ramps and landing and backfill after removal of forms. Payment shall be made after approval by the City that the finished product meets ADA standards for accessibility.

#### 312.6.02 Sidewalk Ramps

Payment for the bid item "Extra for Pedestrian Ramps" shall include all labor, tools, material, equipment, and incidentals necessary to install new sidewalk ramps to meet ADA standards as shown on the Plans. Payment for this bid item is in addition to payment for the ramp under Concrete Sidewalk and covers the extra cost of workmanship for the ramp. The bid item includes all labor and material for any re-work required to meet ADA standards.

Payment for the bid item "Extra for Pedestrian Ramps – Field Fit" shall include all labor, tools, material, equipment, and incidentals necessary to install new sidewalk ramps to meet ADA standards. Payment for this bid item is in addition to payment for the ramp under Concrete Sidewalk and covers the extra cost of workmanship for the ramp and additional labor required to determine the limits, elevations, and slopes of the new ramps and landings to meet ADA standards based on field conditions. The bid item includes all labor and material for any re-work required to meet ADA standards.

#### 312.6.03 Truncated Domes

Payment for the bid item "Truncated Domes" shall be on a per each (EA.) ramp basis include all labor, tools, material, equipment, and incidentals necessary to install truncated domes to meet ADA standards as shown on the Plans. The bid item includes all labor and material for any re-work required to meet ADA standards. This bid items includes cutting panels per manufacturer's recommendations for curved installation where shown on plans.



### 312.6.04 Curb Driveway Drop

Payment for curb, driveway, or ramp drop is included in Section 311, Curb and Gutter.

#### 312.6.05 Gravel Base

Payment for gravel base is incidental to driveway and sidewalk.

#### SECTION 313 – SURFACE RESTORATION

#### **313.2.02A** Surface Course - Revise the following:

Delete the first sentence and replace with "Asphalt concrete shall be as specified in Section 309 Asphalt Concrete."

#### **313.2.02B Base Course -** Revise the following:

Delete the second sentence and replace with "Asphalt concrete shall be as specified in Section 309 Asphalt Concrete."

#### 313.3.04A Valve and Monument Box Adjustment - Add the following:

Adjust existing or install new valve boxes as indicated or as directed. The new box shall comply with City detail 600. Adjust the top to match the finish lift. Replace valve boxes noted for adjustment if the overlapping gap between the vertical pipe sleeves is less than 4 inches after adjustment. Replace valve boxes as requested which do not meet current standards per detail 600.

Furnish and install new monument boxes according to City detail 520 as indicated or as directed. Adjust the monument box and cover to the finish grade.

#### 313.4.00 Full Depth Patching

Construct full depth patches as indicated on the contract drawings including saw cutting, excavation, removal and disposal of existing asphalt pavement, aggregate base preparation, and asphalt cement concrete pavement to the depths and locations directed by the Engineer.

Location and dimensions for full depth patches shown in the contract drawings are approximate and will be field verified by the Engineer prior to construction.

Protect curb or gutter from damage. Damaged curb or gutter shall be replaced by the contractor in full segments, usually 15 feet, at no cost to the City.

Add the following subsections:

#### 313.5.00 Payment



## 313.5.01 Adjust Valve Box

Payment for the bid item "Adjust Valve Box" shall be on a per each (EA.) basis and shall be full payment for furnishing all materials, labor, tools, and equipment necessary to set existing valve box to finished surface elevations and grades.

## 313.5.02 Replace Valve Box

Payment for the bid item "Replace Valve Box" shall be on a per each (EA.) basis and shall be full payment for furnishing all materials, labor, tools, and equipment necessary to furnish new valve box and set to finished surface elevations and grades.

## 313.5.03 Adjust Survey Monument

Payment for the bid item "Adjust Survey Monument" shall be on a per each (EA.) basis and shall be full payment for furnishing all materials, labor, tools, and equipment necessary to set existing survey monuments or monument boxes to finished surface elevations and grades as specified.

## 313.5.04 Full Depth Patching

Measurement for the bid item "Full Depth Patching" shall be on a per square yard (S.Y.) basis. Payment for bid item Full Depth Patching" shall be full payment for furnishing all materials, labor, tools, and equipment necessary to construct the full depth patch as described in the contract documents, including but not limited to, saw cutting, excavation, aggregate base preparation, and asphalt cement concrete pavement to the depths and locations directed by the Engineer. Full depth patching under overlay/inlay areas to be quantified to the bottom of the overlay/inlay. The final overlay/inlay thickness in these areas to be quantified as part of the adjacent overlay/inlay and included in bid item "HMAC, ½" Level 3 (with Fiber Reinf.)".

## SECTION 315 - COLD PLANE PAVEMENT REMOVAL

## **315.1.01 Scope -** Add the following:

Cold planing shall consist of 20-foot or 30-foot long tapered end transitions the crosswidth of the road at the ends of the overlay limits as shown on the plans. The tapers shall transition from the depth of the overlay thickness at the match lines to 0 inches at the end of the transition length, matching existing surface grade.

Cold planing along the gutter or curb line shall be the depth of the overlay thickness at the gutter or curb line, and taper to 0 inches six feet out, matching existing surface grade.



Thin lifts of existing asphalt pavement (<1" thick after grinding) not bonded to the lower remaining layer of paving shall be removed prior to paving.

Full depth inlays shall be cold planed to the depth shown in the plans. When planing for inlays do not allow loaded trucks on the subgrade or within one foot of the edge of the pavement.

Protect curb or gutter from damage. Damaged curb or gutter shall be replaced by the contractor in full segments, usually 15 feet, at no cost to the City.

Sediment filter bags to be installed in the catch basins prior to grinding to prevent grindings from entering storm system.

Add the following subsection:

## 315.3.04 Inlays

Sawcut existing pavement as marked and remove pavement to specified depth as shown on plans. For full-depth patching, compact base rock sufficiently until no evidence of further consolidation is detected.

Clean pavement edges of loose material and apply tack to entire surface using pressure spray equipment. Where tack fails to adhere to old pavement, clean again by brushing, scraping, etc., until satisfactory adhesion is made with new tack. For full-depth patching, fill and compact specified mix in 3" first lift thickness and 3" second lift thickness. Use plate compactor to achieve compaction of corners. Sand seal edges of inlays and patches unless under an overlay. When complete, the finished surface shall match and be in the same plane as the surrounding pavement, not puddle, and not vary more than 1/4" when tested with a 10-foot straightedge measured parallel with or at right angles to the centerline of the road.

Add the following subsection:

## 315.4.00 Payment

Payment for the bid item "Cold Plane Pavement Removal 0-2.5"" shall be made on a square yard (S.Y.) basis and shall be full payment for furnishing all materials, labor, tools, and equipment necessary to perform the work as specified. All work of this kind in the project shall be considered part of this bid item, including but not limited to furnishing all equipment, labor and incidentals, removal of pavement and disposal of the grindings.

## **SECTION 317 - PAVEMENT MARKING**

## **317.1.00 General –** Add the following:



All new striping to be Thermoplastic.

Contractor shall provide striping material submittals at the preconstruction conference.

Remove existing striping or legend material where required to accommodate new materials or paving.

The contractor shall layout the pavement marking as shown on the plans and obtain the Engineer's approval of the layout prior to placing materials. Striping shall be installed per the manufacturer's recommendations.

Temporary striping shall be installed where striping currently exists prior to opening the road to two-way traffic until the permanent striping is installed.

Add the following subsections:

#### 317.3.06 Protection

All markings shall be protected from damage until dry. Remove any tracking and repair any damage to the City's satisfaction at no additional cost to the City. Painting out tracking with black paint will not be accepted.

#### 317.4.00 Payment

Payment for the lump sum (LS) bid item "Pavement Markings" shall be full payment for furnishing all materials, labor, tools, and equipment necessary to install pavement markings as indicated.

#### SECTION 318 – PERMANENT TRAFFIC CONTROL

Add the following subsection:

#### 317.4.00 Payment

Payment for the bid items "Crosswalk Closed Sign" and "Remove and Replace Existing Sign" shall be on a per each (EA.) basin and shall be full payment for furnishing all materials, labor, tools, and equipment necessary to furnish and install signs as indicated.

#### **SECTION 324 – MANHOLES**

Add the following subsections:

#### 324.2.09 Manhole Riser



If necessary, existing manhole covers shall be adjusted to finish grade using cast iron riser rings manufactured in the USA with USA material when the adjustment is uniform depth around the perimeter of the cover. Manhole riser rings shall be installed to set the manhole cover to the proposed grade of the pavement inlay. The riser ring shall be adhered to the existing frame with a  $\frac{1}{4}$ " to  $\frac{1}{2}$ " flexible-rope, butyl rubber, gasketing material conforming to Kent Seal<sup>TM</sup> No 2 or equivalent.

Manhole risers for communications manholes shall be provided by the appropriate franchise utility agency. Contractor to coordinate with the agency for installation by the contractor.

## 324.2.10 Manhole Adjustment

Existing manhole frames shall be adjusted to finish grade using concrete collars of nonshrink grout below the frame when the adjustment is not of uniform grade around the perimeter of the frame.

#### 324.4.00 Payment

Payment for the bid item "Adjust Manhole" shall be on a per each (EA.) basis and shall be full payment for furnishing all materials, labor, tools, and equipment necessary to adjust existing manhole frame to finished surface elevations and grades.

#### **SECTION 325 - CATCH BASINS AND INLETS**

#### **325.4.00 Payment** – Add the following:

#### 325.4.01 <u>Catch Basins</u>

Payment for bid item "Reconstruct Catch Basin" will be based upon the unit price for each catch basin reconstruction as set forth in the Contractor's Proposal. Payment shall include all time, equipment and materials to complete the work, including but not limited to, removal of existing catch basins, installation of new catch basins, connecting existing pipes to new catch basins, and removal of existing pipes where shown on plans. Payment for the pavement reconstruction in front of the catch basin reconstruction shall be incidental to the catch basin reconstruction. Care shall be taken to protect the existing pavement in front of the catch basin, reconstructing as little pavement as possible. Curb and sidewalk shall be paid under the appropriate bid item.

Add the following sections:

#### SECTION 333 – LANDSCAPE RESTORATION

#### 333.1.00 General


The scope of work included in the bid item Landscape Restoration shall include restoration of the landscaped area disturbed by the construction to existing or better condition, including minor grading and adjustment/repair of irrigation sprinklers, backfilling and surface restoration to match existing conditions of the area between the street curb and the sidewalk and behind the sidewalk, reconstruction of retaining walls, paths, fences, and the like. Backfilling behind the sidewalk and the ramp curb shall be incidental to the sidewalk and curb bid item.

## 333.2.00 Payment

The bid item "Landscape Restoration" shall include all labor, tools, material, equipment and incidentals necessary to restore areas adjacent to new ramp and sidewalk to existing conditions or better and will be paid on a per each (EA) basis, one item for each curb return "corner".

# SECTION 334 – ASPHALT CEMENT FIBER ADDITIVE

## 334.1.00 General

The work included in this section shall generally conform to section 00745 of the 2021 ODOT Standard Specifications for Construction and associated Special Provisions, modified as follows:

**00745.11**(b) **Asphalt Cement Additives –** Add the following bullets:

- Add the following fiber reinforcement to the ACP according to the manufacturer's recommendation:
- FORTA-FI fiber reinforcement, HMA blend
  - Manufacturer: FORTA Corporation 100 N. Forta Drive Grove City, PA 16127 (800) 245-0306 www.forta-fi.com
  - Technical Contact: Mike Hass Pacific Geosource 10779 SW Manhasset Dr Tualatin, OR 97062 (503) 214-0376 mhass@pacificgeosource.com



**00745.13** Job Mix Formula Requirements – Add the following paragraph to the end of the section:

When fiber reinforced ACP is used, design asphalt mix without fiber and do not alter the final mix design for the addition of fiber at the plant.

Add the following subsections:

# 00745.25 Fiber Storage, Mixing and Mix Production –

Store, mix and produce the fiber reinforced ACP mixture in accordance with the following requirements:

- 1. Deliver fiber-reinforcement in sealed, undamaged containers with labels intact and legible, indicating material name and lot number.
- 2. Deliver fiber-reinforcement to location where it will be added to each batch or loaded into the mixer.
- 3. Store materials covered and off the ground. Keep sand and dust out of boxes and do not allow boxes to become wet.
- 4. Add aramid and polyolefin reinforcing fiber blends at a dosage rate of one (1) pound fiber per one (1) ton of asphalt. Non-aramid fiber blends, aramid fiber blends with dosages less than 1 pound per ton, or fiber ton equivalents will not be accepted.
- 5. Have a fiber manufacturer's representative on site during mixing and production. This requirement can be waived if fiber manufacturer and asphalt producer can supply evidence of manufacturer's brand of fiber being successfully produced a minimum of three times at the asphalt plant to be used for the project.
- 6. Batch Plant. When a batch plant is used, add fiber to the aggregate in the weigh hopper and increase both dry and wet mixing times. Ensure that the fiber is uniformly distributed before the injection of asphalt cement into the mixture.
- 7. Drum Plant:
  - a. Inject fibers through the RAP collar manually or by feeding them with a metered air blown system to promote rapid and complete fiber dispersion. Rate the feeding of fibers with the rate the plant is producing asphalt mix. If there is any evidence of fiber bundles at the discharge chute, increase the mixing time and/or temperature or change the angle of the fiber feeder line to increase dry mixing time.
  - b. Add fibers continuously and in a steady uniform manner. Provide automated proportioning devices and control delivery within ±10% of the mass of the fibers required. Perform an equipment calibration to the satisfaction of the fiber manufacturer's representative to show that the fiber is being accurately metered and uniformly distributed into the mix.
    - Include the following with the air blown system:
    - Low level indicators
    - No-flow indicators
    - A printout of feed rate status in pounds/minute



- A section of transparent pipe in the fiber supply line for observing consistency of flow or feed.
- Manufacturer's representative's approval of fiber addition system

**00745.31 Quality Control –** Evaluate fiber mix dispersion visually according to the following:

- 1. Aramid Dispersion Visual Test: Collect a 10kg sample of mix from the discharge chute during first 50 tons of production. Visually assess the state of aramid fibers in the sample as "Pass" or "Fail" as described below.
  - i. "Pass" = All fibers exist in an Individual State and no Undistributed Clips or Agitated Bundles of fiber are detected.
  - ii. "Fail" = One or more Undistributed Clips or Agitated Bundles are detected.
- 2. If a sample is rated as "Fail", adjust mixing operations to improve fiber dispersion and repeat Step 1 above.
- 3. If Visual Test results in three consecutive "Fail" ratings, contact the fiber manufacturer for corrective measures.
- 4. In addition to Visual Test, use a shovel to inspect FRAC mix in the back of first three trucks and every tenth truck thereafter to confirm adequate blending of the fiber.
- 5. Remove any observed fiber bundles from placed mixture and adjust operations per the manufacturer's recommendation to eliminate future fiber bundle development and repeat Steps 1 through 3 above to confirm adequate aramid fiber dispersion.

# SECTION 335 – EROSION CONTROL AND CLEANUP

#### 335.1.00 General

Refer to Chapter 6 Erosion Prevention and Sediment Control of the Clean Water Services Design and Construction Standards for erosion control and cleanup requirements.

## 335.2.00 Payment

Payment for the lump sum (LS) bid item "Erosion Control" shall be full payment for furnishing all materials, labor, tools, and equipment necessary to construct and maintain the temporary water pollution/erosion control throughout the life of the project, and to remove the temporary control devices when approved by the City.

# **SECTION 336 – CONSTRUCTION SURVEY**

## 336.1.00 General



Based upon the information provided by the Contract Documents, develop and make all detail surveys necessary for layout and construction, including exact component location, working points, lines and elevations. Prior to construction, the field layout will be inspected by the Engineer.

Carefully preserve bench marks, reference points and stakes, and in the case of destruction thereof by the work or resulting from negligence, the contractor shall be charged with the expense and damage resulting, therefore, and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

Bench marks and/or survey monuments may be present within the project boundaries and are indicated on the Plans where previously found. Preserve all bench marks and replace all damaged or destroyed bench marks and/or survey monuments at the contractor's expense. Survey monuments shall be reestablished by a licensed land surveyor in coordination with the appropriate authority to reset and document the bench mark's elevation information.

## 336.2.00 Payment

Payment for the lump sum (LS) bid item "Construction Staking" shall be full payment for furnishing all materials, labor, tools, and equipment necessary to develop and make all detail surveys necessary for layout and construction throughout the life of the project.



# **CHAPTER 100**

# **GENERAL SPECIFICATIONS**

| 100 | Title                                | 3  |
|-----|--------------------------------------|----|
| 101 | Definitions And Abbreviations        | 5  |
| 102 | Permit Requirements                  | 13 |
| 103 | Scope Of Work                        |    |
| 104 | Control Of Work                      |    |
| 105 | Control Of Materials                 | 41 |
| 106 | Legal Relations And Responsibilities | 45 |
| 107 | Prosecution And Progress Of Work     |    |

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## 100 TITLE

This Code may be cited as the City of Tualatin Public Works Construction Code.

## 100.1.00 Application of Provisions

The provisions of the Code apply to all City owned public works facilities and Public Utility construction proposed by any private party, quasi-public body, partnership, firm, association, corporation, or public agency.

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### 101 DEFINITIONS AND ABBREVIATIONS

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 prerogative of the City Engineer.

Command type sentences are used throughout the Code. In all cases the command expressed or implied is directed to the Permittee.

### 101.1.00 <u>Definitions</u>

**Accessway** - A non-vehicular, paved, pathway designed for pedestrian and bicycle use and providing convenient linkages between a development and adjacent residential and commercial properties and areas intended for public use such as schools, parks, and adjacent collector and arterial streets where transit stops or bike lanes are provided or designated. An accessway is not a sidewalk.

**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.

Applicant - The person or firm making application for a permit from the City.

**Approved Equal** - A product, component or process whose use in or on a particular project is specified as a standard for comparison purposes only. The "equal" product, component or process shall be the same or better than that named in function, performance, reliability, quality and general configuration. Determination of equality in reference to the project design requirements will be made by the City Engineer.

**As Approved** - Whenever the phrases "as approved by the City" or the like is used in these standards, it shall be interpreted to allow the City through their authorized representatives, to interpret the provisions in question in a manner to protect the public health and safety, consistent with other applicable laws and other standards of the City, and to preserve the safe and reliable operation of the public works facilities.

**As Built Drawings** - The drawings made or revised by the Contractor and design engineer during progress of construction and approved by the City Engineer, illustrating how various elements of the work were constructed.

Attorney - The City Attorney of the City of Tualatin, Oregon.

**Bike (Bicycle) Facilities** - On and off street improvements and facilities designed to accommodate bicycles.

**Bike (Bicycle) Lane** - A portion of roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

**Bike (Bicycle) Path** - A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way or easement.

**Bikeway** - Any street, road, path or way open to bicycle travel regardless of whether such facilities are designated for the preferential use of bicycles or are to be shared with other transportation modes.

**City** - The City of Tualatin, Oregon, a municipal corporation organized and operating pursuant to the City of Tualatin Charter of 1967, as amended, the Oregon Constitution, Article XI, Section 2 and its municipal ordinances and resolutions.

**City Engineer** - The person appointed by the City Manager to fulfill the responsibilities of City Engineer as set forth in this Code, or the person authorized by the City Engineer to fulfill such responsibilities.

**Code** - The City of Tualatin Public Works Construction Code as defined by Resolution No. 4766-08, and any amendments thereto.

**Confined Space** - As defined by Oregon Administrative Rules (OAR) Chapter 437, a confined space means a space that:

- (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- (2) Has limited or restricted means for entry or exit (for example: tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
- (3) Is not designed for continuous employee occupancy.

**Constructed Wetlands** - Those wetlands developed as a water quality or quantity facility, subject to change and maintenance as such. These areas must be clearly defined and/or separated from existing or created wetlands. This separation shall preclude a free and open connection to such other wetlands.

**Contractor** - The person, company, or corporation duly licensed or approved by the State of Oregon and designated by the Permittee to do the work in question. The Contractor shall be registered and in good standing with the Contractor's Board of the State of Oregon.

**Controlled Low Strength Material (CLSM)** – A highly flowable lean concrete mix with a 28-day compressive strength of 100 psi - 200 psi.; a mixture of fly ash, cement, fine aggregates, water and admixtures, if necessary.

**Created Wetlands** - Those wetlands developed in an area previously identified as a non-wetland to replace or mitigate wetland destruction or displacement. A created wetland shall be regulated and managed the same as an existing wetland.

**Design Engineer** - The Design Engineer is the Permittee's representative and shall be responsible for preparation of the Plans, Special Specifications, and As-built Drawings for proposed public works facilities. The design engineer shall be registered in the State of Oregon.

**Easement** - The right to use or occupy a defined area of property for a specific purpose or purposes as set forth in a document which has been approved and accepted by the City.

**Erosion Control Permit** – The permit required for all construction projects that will cause, or are likely to cause a temporary or permanent increase in the rate of soil erosion from a site, including but not limited to grading, excavating, filling, working of land, or stripping of soil or vegetation from land.

**Existing Wetlands** - Those areas identified and delineated as set forth in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 1989, by a qualified wetland specialist.

**Extra Work** - An item of work not provided for in the Permit as issued, but determined by the City Engineer as essential to the proper completion of the Permit within its intended scope.

**Field Order** - An order issued by the City Engineer to the Permittee to carry out minor revisions in the work.

**Final Completion** - The completion of all of the work called for under the Permit including but not limited to satisfactory operation of all equipment, by means of acceptance tests, correction of all punch list items to the satisfaction of the City Engineer, settlement of all claims, if any, delivery of all guarantees and maintenance warranties, equipment operation and maintenance manuals, as-built drawings, building certificate required prior to occupancy, electrical certificates, mechanical certificates, plumbing certificates, all other required approvals and acceptances by city, county and state governments, or other authority having jurisdiction, and removal of all debris, tools, scaffolding, equipment, and surplus materials and equipment from job site.

**Highway** - The whole area within the boundaries of a public right-of-way which is reserved for and secured for public use in constructing and maintaining a roadway and its appurtenances.

**Holiday** - Those days designated by the President or the Congress of the United States or by the Governor or Legislature of the State of Oregon or by the City Council of Tualatin as a holiday.

**Improvement** - General term encompassing all phases of the work to be performed under the Permit and is synonymous to the term Project.

**Inspector** - The authorized representative of the City Engineer entrusted with making detailed inspections of the work or materials.

**Land Development** - Land development shall have the meaning of Oregon Administrative Rules, Section 340-41-006(22), adopted December 14, 1989.

**Notice** - A written communication delivered 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 business address of the individual, firm or corporation as specified on the Permit Application. In the case of a Permit with two (2) or more persons, firms or corporations, notice to one shall be deemed notice to all.

**Outdoor Recreation Access Route** - A pedestrian path that provides access to a recreation trail. These routes are on City-owned property, exclusive rights-of-way or easements, but are not necessarily located in a designated greenway. They are typically 1/4 mile or less in length.

**Outdoor Recreation Trail** - A pedestrian path that provides access to and through recreational elements and open spaces. These trails are generally located within the City's designated greenways. Typically they are 1/4 mile or more in length and serve as part of the recreation experience, but can also function as routes for commuter or destination-oriented trips.

**Pavement Coring** – Pavement coring is an exploratory vacuum excavation not more than 12 inches in diameter to uncover an existing utility for the purpose of determining its precise location and elevation.

**Pedestrian Facilities** - Facilities such as sidewalks, walkways, pedestrian paths, outdoor recreation trails, outdoor recreation access routes, accessways, and other amenities designed to accommodate pedestrians.

**Pedestrian Paths** - Pedestrian paths are generally located within the City's designated greenways, but may be located elsewhere to provide access between residential, commercial, public, and semi-public uses. The paths serve as routes for recreational, commuter, and destination-oriented trips.

**Permit** - A permit issued by the City Engineer. May refer to a Public Works Construction Permit, Water Quality Permit, Erosion Control Permit, Public Utility Permit, or other.

**Permit Documents** - The Permit, Plans, Standard Drawings and Specifications, and the Code.

**Permittee** - The person or firm that has received a permit from the City Engineer.

**Plans** - The official plans, profiles, cross sections, elevations, details and other working, supplementary and detail drawings, or reproductions, signed by the Design Engineer, which show the location, character, dimensions and details of the work to be performed.

**Prequalification -** See definition and provisions, subsection 102.5.00.

**Project** - General term encompassing all phases of the work to be performed under the Permit and is synonymous with "improvement".

**Provide** - When related to an item of work, provide shall be understood to mean furnish and install the work complete in place, so that the work is functional.

**Public Utility** – Any corporation, company, individual, association of individuals, or its lessees, trustees or receivers, that owns, operates, manages or controls all or a part of any line, facility, or system for producing, transmitting, or distributing communications, power, electricity, heat, gas, oil, water, steam, waste, stormwater, or any other similar commodity which directly or indirectly serves the public. The term may also mean the utility company, district, or cooperative owning and operating such facilities, including any wholly owned or controlled subsidiary.

Public Utility also includes any corporation, company, individual or association of individuals, which is party to an oral or written agreement for the payment by a public utility, for service, managerial construction, engineering or financing fees, and having an affiliated interest with the public utility.

**Public Utility Permit** – The permit required for Public Utilities to perform work within a Right-of-Way or public easement. Public Utilities must have a current Franchise agreement or Rights-of-Way License with the City of Tualatin to apply for a Public Utility Permit.

**Public Works Construction** - Any construction or improvement carried on in the public right-of-way or easements, natural drainage ways, creeks, streams, rivers, or tracts to be dedicated to the City. Domestic wells, septic tanks and any type of construction regulated by the State Building Code shall not be included in the definition of Public Works Construction.

**Public Works Construction Permit** - The Permit issued by the City Engineer for public works construction performed by any private party, quasi-public body, public agency or governmental agency, excepting construction performed by City agents or employees.

**Public Works Facilities** - Any and all on-site and off-site improvements and related accessories to be accepted for ownership, maintenance and operation by the City, including but not limited to sanitary sewers, pump stations, water lines and hydrants, storm drain systems, streets, alleys, street lights, street name signs, greenways, bikepaths, traffic control systems and devices.

**Punch List** - A list of the Contractor's incomplete work or work items requiring correction or modification, prepared by the City Engineer.

**Reference Specifications** - Bulletins, standards, rules, methods of analysis or testing, codes and specifications of other agencies, engineering societies, or industrial associations referred to in the Code. All such references refer to the latest edition, including amendments which are in effect and published at the time issuing the Permit for the project.

**Right-of-Way** - A general term denoting land, property, or interest property acquired for or devoted to public use.

**Road** - Every road or roadway, thoroughfare, and place including bridges, viaducts and other structures used or intended for use of vehicles.

#### Sensitive Area -

- A. Includes:
  - 1. Existing and created wetlands;
  - 2. Rivers, streams, and springs, whether flow is perennial or intermittent;
  - 3. Natural lakes, ponds, and in-stream impoundments.
- B. Does not include:
  - 1. Stormwater infrastructure;
  - 2. A Vegetated corridor (a buffer) adjacent to the Sensitive Area;
  - 3. An off-stream recreational lake, wastewater treatment lagoon, fire pond, or reservoir; or
  - 4. Drainage ditches.

**Shop Drawings** - Supplementary plans or data which the Permit or Specifications requires the Contractor to submit to the Engineer including, but not limited to, steel bending details, erection plans, and catalog data explaining equipment proposed for use.

Shown - Work shown on the plans.

**Special Specifications or (Special Provisions)** - Requirements peculiar to the project and changes and modifications of the standard specifications. Special specifications are used interchangeably with special provisions.

Specified - Means as required by the Public Works Construction Code.

**Sidewalk/Driveway Approach Permit** - The Permit issued by the City Engineer for reconstruction or modification of an existing sidewalk or driveway fronting residential or commercial properties within the public Right-of-Way, or public easements. This permit covers work not involving a public utility and shall be submitted in the name of the property owner or contractor for the property owner.

**Standard Plans or Drawings** - Details of structures, devices, or instructions adopted by the City as a standard and referred to in this Code by title or number.

**Standard Specifications** - The terms, directions, provisions and requirements set forth in this Code.

Station - A distance of 100 feet measured horizontally along a surveyed centerline. Page 10 August 2020 **Stop Work Order** - A written notice delivered by hand and/or by mail to the Permittee or Contractor, directing the work performed under a Permit to be stopped because deficiencies in materials or workmanship or for lack of compliance with the approved Plans and this Code. A Stop Work Order shall be signed by the City Engineer or his designated representative.

**Street** - Any road, highway, parkway, freeway, avenue, alley, walk, or way, including sidewalks, bike lanes, parking strips and all other structures including utilities above and below the surface, land and improvements within the public right-of-way between property lines.

**Substantially Complete** – The water quality facility can be deemed substantially complete once active green growth has occurred to an average growth of 3-inches and plant density is an average of approximately 6 plants per square foot.

Ton - The short ton of 2,000 pounds avoirdupois.

**Use of Pronoun** - 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** - Any physical component of a system, including but not limited to poles, pipes, mains, conduits, ducts, junction boxes, vaults, structures, cables, wires, transmitters, equipment, and other facilities, located within, under, or above rights-of-way, any portion of which is used or designed to be used to deliver, transmit, or otherwise provide utility service.

**Water Quality Facility** - Water quality facility is a used to temporarily store, route or filter runoff for the purpose of improving water quality.

**Water Quality Permit** – The permit issued by the City Engineer for construction of a water quality facility.

**Work** - That which is proposed to be constructed or performed under the Permit, including the furnishing of all material, labor, tools, machinery and appurtenances necessary to complete the requirements of the Permit, and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item described or indicated as required by good practice to provide a complete and satisfactory system or structure.

**Working Days** - Working days shall be Monday through Friday, excluding holidays. The Contractor shall provide the City Engineer at least one (1) working day's notice prior to performing work on holidays, Saturdays, or Sundays.

**Working Drawings** - Stress sheets, shop drawings, erection plans, falsework plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, or any other supplementary plans or similar data which the Contractor is required to submit to the City Engineer for approval.

# 101.2.00 Abbreviations

| AAN    | American Association of Nurserymen                                      |
|--------|---|
| AASHTO | American Association of State Highway and Transportation Officials      |
| ACI    | American Concrete Institute   |
| ADA    | Americans with Disabilities Act   |
| 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  |
| BLI    | Oregon Bureau of Labor and Industries                                   |
| CRSI   | Concrete Reinforcing Steel Institute                                    |
| CWS    | Clean Water Services  |
| DEQ    | Department of Environmental Quality                                     |
| DFPA   | Division for Product Approval of American Plywood Association           |
| EPA    | Environmental Protection Agency   |
| FHWA   | Federal Highway Administration  |
| ITE    | Institute of Traffic Engineers  |
| JIC    | Joint Industry Conferences of Hydraulic Manufacturers                   |
| MUTCD  | Manual of Uniform Traffic Control Devices                               |
| NEC    | National Electrical Code  |
| NEMA   | National Electrical Manufacturer's Association                          |
| NPDES  | National Pollution Discharge Elimination System                         |
| NLMA   | National Lumber Manufacturer's Association                              |
| OAR    | Oregon Administrative Rules   |
| ODOT   | Oregon Department of Transportation                                     |
| ORS    | Oregon Revised Statutes   |
| OSHA   | Occupational Safety and Health Administration                           |
| PCA    | Portland Cement Association   |
| PROWAG | 2011 Proposed Accessibility Guidelines for Pedestrian Facilities in the |
|        | Public Right-of-Way   |
| PWCC   | City of Tualatin Public Works Construction Code                         |
| TDC    | Tualatin Development Code   |
| UBC    | Uniform Building Code   |
| UL     | Underwriter's Laboratories, Inc.  |
| WWPA   | Western Wood Products Association                                       |

### **102 PERMIT REQUIREMENTS**

### 102.1.00 Construction Permits Required

Property owners, developers, and others proposing construction within public Rights-of-Way, easements, tracts, streams, creeks, or natural drainage ways, or construction of a Water Quality Facility on private land, are required to obtain all applicable permits and land-use approvals as appropriate, pay all applicable fees, and secure applicable performance assurances before commencing any work.

## 102.1.1 Public Works Construction Permit

A Public Works Construction Permit is required to construct public works facilities within the public Right-of-Way, public easements, or land to be dedicated to the public.

Obtain a Public Works Construction Permit using the application form provided by the City Engineer. With the application, include a permit fee deposit as set forth in subsection 102.3.1, Permit Fees and Deposits, complete plans and specifications as set forth in subsection 102.4.1, Plans and Specification Requirements, and a preliminary engineer's estimate.

Prior to submitting an application for a Public Works Construction Permit, attend a pre-application meeting with the Engineering Division. Required attendees include the owner, the design engineer, and the contractor if known.

## 102.1.2 Water Quality Permit

A Water Quality Permit is required to construct or modify a public or private water quality facility.

Obtain a Water Quality Permit using the application form provided by the City Engineer. With the application, include a permit fee deposit as set forth in subsection 102.3.1, Permit Fees and Deposits, complete plans and specifications as set forth in subsection 102.4.1, Plans and Specification Requirements, and a preliminary engineer's estimate.

Prior to submitting an application for a Water Quality Permit, attend a preapplication meeting with the Engineering Division. Required attendees include the owner, the design engineer, and the contractor if known.

## 102.1.3 Public Utility Permit

A Public Utility Permit is required to perform work on any public utility within

Rights-of-Way and easements.

Obtain a Public Utility Permit from the City Engineer using the application forms provided. Complete plans and specifications as set forth in Section 207, Public Utility Design.

### 102.1.4 Erosion Control Permit

An Erosion Control Permit is required if changes to improved or unimproved real property cause, will cause, or are likely to cause a temporary or permanent increase in the rate of soil erosion from the site, as described in Clean Water Services Design and Construction Standards Section 2.03.4, Erosion Control Permits. Obtain Erosion Control Permits in conjunction with other permits as applicable.

There are four categories of Erosion Control Permits issued by the City for construction outside the building footprint. Obtain the applicable Erosion Control Permit using the process outlined below and in Section 102.4.5, Erosion Control Plan Review Procedure. With the application, include a permit fee as set forth in the current version of the City of Tualatin Fee Schedule located on the City of Tualatin website and pay all required DEQ fees.

#### 102.1.4A Single-Family Residence

A single-family residence Erosion Control Permit is required for modifications to a single family residence lot for work that has ground disturbing activities.

If a Site Assessment is required in accordance with Clean Water Services Chapter 3, Sensitive Areas and Vegetated Corridors, obtain an Erosion Control Permit following the requirements of Section 102.1.4B, Erosion Control (Disturbing Under One Acre).

If a water quantity or quality approach is required in accordance with Clean Water Services Chapter 4, Runoff Treatment and Control, obtain an Erosion Control Permit following the requirements of Section 102.1.4B, Erosion Control (Disturbing Under One Acre).

#### 102.1.4B Erosion Control (Disturbing Under One Acre)

If the proposed construction activities will cause or are likely to cause physical disturbance to the surface of the land less than one acre but more than 500 square feet, obtain an Erosion Control Permit from the City Engineer.

#### 102.1.4C <u>1200-CN (Disturbing Between 1 and 5 Acres)</u>

A NPDES 1200-CN Construction Stormwater (Erosion Control) Permit is required for construction activities on sites that disturb between one acre and five acres to control stormwater runoff during construction.

#### 102.1.4D <u>1200-C (Disturbing Five Acres and Greater)</u>

A NPDES 1200-C Construction Stormwater (Erosion Control) Permit is required for construction activities on sites that disturb five acres and larger to control stormwater runoff during construction.

#### 102.1.4E Erosion Control (Disturbing less than 500 SF)

If the proposed construction activities will cause or are likely to cause physical disturbance to the surface of the land less than 500 SF, no Erosion Control Permit from the City is required provided all the following criteria are met:

- 1. No land development activity or disturbance of land surface occurs within 100 feet of a Sensitive Area, and
- 2. The work on the site involves the disturbance of less than 500 square feet of land surface where the slope is less than 20 percent or less than 50 square feet where the slope is 20 percent or greater, and
- 3. The excavation, fill, or combination thereof involves less than 20 cubic yards of material.

Erosion control measures must still be in place during construction, even if a permit is not required.

Exception from the Erosion Control permit requirement does not exempt the Property Owner from the responsibilities of CWS Design and Construction Standards Section 6.02.1, Erosion Prohibited.

For projects that disturb less than 500 square feet that do not meet all criteria in this section, an Erosion Control Permit is required. Obtain an Erosion Control Permit following the requirements of Sections 102.1.4B and 102.4.5B, Erosion Control (Disturbing Under One Acre).

### 102.1.5 Sidewalk/Driveway Approach Permit

A Sidewalk/Driveway Approach Permit is required to reconstruct or modify an existing sidewalk or driveway fronting residential or commercial properties within the public Right-of-Way, or public easements. This permit applies when there is no other development work, land-use actions, or other work in the right of way such as a water or sewer service. In those cases, a Public Works Permit will be required per Section 102.1.1.

Obtain a Sidewalk/Driveway Approach Permit using the application form provided by the City Engineer. With the application, include a permit fee as set forth in subsection 102.3.1, Permit Fees and Deposits.

### 102.3.1 Permit Fees and Deposits

This section applies to Public Works Construction Permits, Water Quality Permits, Erosion Control Permits, and Sidewalk/Driveway Approach Permits.

### 102.3.2 Public Works Construction Permit Deposit

Public Works Construction Permit deposits are paid by the applicant as follows:

- 1. At the time construction plans are submitted for approval by the City Engineer, pay the deposit shown in the current version of the City of Tualatin Fee Schedule located on the City of Tualatin website.
- 2. As the work progresses, the City's actual costs may exceed the amount deposited. If this occurs, the Permittee will receive an invoice for the full actual cost incurred by the City, less previous payments.
- 3. If the City's actual costs exceed the amount deposited, the City Engineer may require an additional amount to be deposited. If an additional deposit is requested, deposit the amount with the City within 15 days of the date requested. If the deposit is not made, stop all work on the project until the deposit is made.
- 4. Before acceptance of work by the City, pay all outstanding amounts due to the City in full.
- 5. Upon completion and acceptance of the work by the City, should the amount deposited exceed the actual cost, the difference will be refunded to the Permittee. No interest will be paid on refunded amounts.

The permit deposit is intended to defray costs incurred by the City in providing technical or inspection services related to any public works or water quality facility construction. Costs incurred by the City may be through services provided by the City staff or through a private engineer and Contractor at the applicant's expense.

Services provided by the City include but are not limited to the following:

- 1. Meeting with the applicant, the design engineer or agent to review City standards, specifications, ordinances, and procedures.
- 2. Providing the applicant's design engineer with information on existing conditions and facilities.
- 3. Provide information and data for State or County approvals that are required.
- 4. Reviewing all construction drawings, engineering calculations, and specifications.
- 5. Making inspections necessary to ensure compliance with City standards and specifications.
- 6. Keeping notes and records for inclusion in the as-built drawings.
- 7. Updating City maps, files, and records by incorporating as-built information.
- 8. Meeting with the various utility companies to review all utility construction and installations.
- 9. Soils testing, asphalt testing, re-televising sanitary and storm sewer during 1-year maintenance period, and other material tests specified in this Code or deemed necessary by the City Engineer.
- 10. In cases in which an emergency exists that threatens the health, safety, and welfare of residents of the City of Tualatin as a result of actions taken by the applicant or the applicant's representative, the City may take such measures as it deems necessary to correct such hazardous situations and bill all costs incurred by the City to the applicant.
- 11. Other necessary expenses related to permit work.

The City's actual cost of technical services includes consultant costs, direct payroll costs and expenses plus a percentage for insurance, benefits, and overhead as determined by the City Engineer.

#### 102.3.3 <u>Erosion Control Fees</u>

For all projects requiring an erosion control permit, pay the fees shown in the current version of the City of Tualatin Fee Schedule located on the City of Tualatin website. If applicable, pay all required DEQ fees as well.

## 102.3.4 Water Quality Permit Deposit

Water Quality Permit deposits are paid by the applicant as follows:

- 1. At the time construction plans are submitted for approval by the City Engineer, pay the deposit shown in the current version of the City of Tualatin Fee Schedule located on the City of Tualatin website.
- 2. As the work progresses, the City's actual costs may exceed the amount deposited. If this occurs, the Permittee will receive an invoice for the full actual cost incurred by the City, less previous payments.
- 3. If the City's actual costs exceed the amount deposited, the City Engineer may require an additional amount to be deposited. If an additional deposit is requested, deposit the amount with the City within 15 days of the date requested. If the deposit is not made, stop all work on the project until the deposit is made.
- 4. Before acceptance of work by the City, pay all outstanding amounts due to the City in full.
- 5. Upon completion and acceptance of the work by the City, should the amount deposited exceed the actual cost, the difference will be refunded to the Permittee. No interest will be paid on refunded amounts.

The permit deposit is intended to defray costs incurred by the City in providing technical or inspection services related to any public works or water quality facility construction. Costs incurred by the City may be through services provided by the City staff or through a private engineer and Contractor at the applicant's expense. Services provided by the City may include but are not limited to the following:

- 1. Meeting with the applicant, the design engineer or agent to review City standards, specifications, ordinances, and procedures.
- 2. Providing the applicant's design engineer with information on existing conditions and facilities.
- 3. Provide information and data for State or County approvals that are required.
- 4. Reviewing all construction drawings, engineering calculations, and specifications.
- 5. Making inspections necessary to ensure compliance with City standards and specifications.
- 6. Keeping notes and records for inclusion in the as-built drawings.
- 7. Updating City maps, files, and records by incorporating as-built information.

- 8. Meeting with the various utility companies to review all utility construction and installations.
- 9. In cases in which an emergency exists that threatens the health, safety, and welfare of residents of the City of Tualatin as a result of actions taken by the applicant or the applicant's representative, the City may take such measures as it deems necessary to correct such hazardous situations and bill all costs incurred by the City to the applicant.

10. Other necessary expenses related to permit work.

The City's actual cost of technical services includes consultant costs, direct payroll costs and expenses plus a percentage for insurance, fringe benefits, and overhead as determined by the City Engineer.

### 102.3.5 Sidewalk/Driveway Approach Permit Fees

For Sidewalk/Driveway Approach Permits pay the fees shown on the application and in the current version of the City of Tualatin Fee Schedule located on the City of Tualatin website.

## 102.4.1 Plans and Specifications

#### 102.4.2 Plan and Specification Requirements

For Public Works Construction Permits, Water Quality Permits, and Erosion Control Permits, the required plans and specifications must be prepared by the Design Engineer who must be a registered engineer licensed to practice engineering in the State of Oregon. Prepare the plans and specifications to be used in conjunction with the Standard Specifications and Standard Drawings, and provide sufficient detail to ensure full disclosure of the proposed work. Conform to the design requirements of Chapter 200 of this Code.

For Erosion Control Permit plans and specifications, conform to CWS Design and Construction Standards, Chapter 6, Erosion Prevention and Sediment Control.

For Public Utility Permit plans, conform to the design requirements of Section 207, Public Utility Design, of this Code.

#### 102.4.2 Public Works Plan Review Procedure

Submit complete plans and required calculations to the City Engineer for review. The City Engineer may request up to six sets of plans.

The City will verify required information was provided and conforms to this Code, applicable portions of CWS Design and Construction Standards, and the development approval conditions.

If the submittal does not meet the requirements, the City will prepare a correction list or "red line" set of construction plans for the design engineer specifying what is needed and return the plans to design engineer.

After the design engineer has completed all revisions, submit five revised plans and the original "red line" plans to the City for approval. If approved by the City, and if the plans include storm drain or sanitary sewer design, the City will forward one set of plans to CWS for approval. The City may require the design engineer to incorporate CWS' comments into final approval of construction plans.

The City will issue a Public Works Construction Permit once the following have been completed:

- 1. The plans and specifications have been approved for construction.
- 2. The necessary deposits are paid.
- 3. The necessary insurance certificates are submitted and approved.
- 4. Copies of other agency permits are submitted.
- 5. All other requirements made by the City Engineer have been met.

Once approved, up to three sets will be stamped approved by the City Engineer and returned at time of issuance of the Public Works Construction Permit. Approval does not relieve the design engineer from liability for errors and omissions.

#### 102.4.4 <u>Water Quality Plan Review Procedure</u>

Submit plans and calculations for review. The City Engineer may request up to four sets of plans and calculations.

The City will verify required information was provided and conforms to this Code, CWS Design and Construction Standards, and the land-use conditions of approval.

If the submittal does not meet requirements, the City will prepare a correction list or "red line" set of construction plans for the design engineer specifying what is needed.

After the design engineer has completed all revisions, submit three revised plans and the original "red line" plans to the City for approval. If the City approves the submittal, the City will forward one set of plans to CWS approval. The City may require the design engineer to incorporate CWS' comments into final approval of construction plans. The City will issue a Water Quality Permit once the following have been completed:

- 1. The plans and specifications have been approved for construction.
- 2. The necessary deposits are paid.
- 3. The maintenance plans and agreement are submitted and approved.
- 4. All other requirements made by the City Engineer have been met.

Once approved, up to four sets will be stamped approved by the City Engineer and returned at time of issuance of the Water Quality Permit. Approval does not relieve the design engineer from liability for errors and omissions.

#### 102.4.5 Erosion Control Plan Review Procedure

Submit the required plans and all additional documents as described in the subsections below.

The City will verify required information was provided and conforms to this Code and CWS Design and Construction Standards.

If the submittal does not meet the requirements, the City will prepare a correction list or "redline" set of erosion control plans specifying what is needed.

After all revisions have been completed, submit revised plans and documents and the original "redline" plans to the City for approval. The City will forward plans to CWS for approval. The City may require the design engineer to incorporate CWS' comments into final approval of construction plans.

Once the requirements for the applicable erosion control category have been approved and the necessary fees paid, the City will issue an Erosion Control Permit. Approval does not relieve the design engineer from liability for errors and omissions.

#### 102.4.5A Single-Family Residence

No plans are required. Submit a single-family residence Erosion Control Permit to the City Building Department using the application forms provided.

Construction must conform to the requirements of Standard Drawing 001, Example Single Family Erosion & Sediment Control Site Plan

Once the application has been approved and the necessary fees paid, the City will issue an Erosion Control Permit.

#### 102.4.5B Erosion Control (Disturbing Under One Acre)

Submit two sets of plans that meet the requirements of Clean Water Services Design and Construction Standards, Chapter 6, Erosion Prevention and Sediment Control for the City Engineer to review.

#### 102.4.5C <u>1200-CN (Disturbing Between 1-5 Acres)</u>

Submit two sets of plans for the City to review that meet the requirements of the most current 1200-CN template. With the plans submit a signed DEQ 1200-CN ESC Plan Checklist. The plan template and checklist are available on Clean Water Services website.

The City will issue a 1200-CN Construction Stormwater (Erosion Control) Permit once the following have been completed:

- 1. The plans and specifications have been approved.
- 2. The signed DEQ 1200-CN ESC Plan Checklist has been submitted.
- 3. The necessary fees paid.

#### 102.4.5D <u>1200-C (Disturbing Five Acres and Greater)</u>

Submit three sets of plans for the City to review that meet the requirements of the most current 1200-C template. With the plans submit a signed DEQ 1200-C ESC Plan Checklist and the DEQ 1200-C Construction Stormwater (Erosion Control) Permit Application. For more information regarding the plan template, checklist, and DEQ application refer to Clean Water Services website.

Upon City approval two sets of plans will be forwarded to CWS for approval. Upon CWS approval one set of plans will be forwarded to DEQ for a 14-day public review period.

Clean Water Services and the City act as permit agents for DEQ. At the conclusion of the required 14-day public comment period, DEQ will authorize issuance of the 1200-C Permit.

The City will issue a 1200-C Construction Stormwater (Erosion Control) Permit once the following have been completed:

- 1. The plans and specifications have been approved.
- 2. The signed DEQ 1200-C ESC Plan Checklist has been submitted.

- 3. The DEQ 1200-C Construction Stormwater (Erosion Control) Permit Application has been submitted.
- 4. The necessary fees paid.
- 5. The 14-day public review period has been observed.

### 102.4.6 Public Utility Plan Review Procedure

Submit one set of plans in compliance with Section 207, Public Utility Design, for review with the permit application.

The City will verify required information conforms to this Code and City of Tualatin Municipal Code Chapter 03-06, Utility Facilities in the Rights-of-Way. Submit all required permits, agreements or documents from other jurisdictions or persons as required.

If the submittal does not meet the standards, the applicant will be informed of needed changes and additional requirements. A new review period will begin once the applicant resubmits the required information or documents.

### 102.5.00 Pregualification of Contractor

All Contractors engaged by the Permittee to perform public works construction must be prequalified with the City in compliance with Chapter 279 of the Oregon Revised Statutes, City Ordinance No. 327-76 as amended and Resolution No. 1789- 86 and any special prequalification standards approved by the City.

This provision may be waived by the City Engineer for work having an estimated value of less than \$10,000, if in the opinion of the City Engineer the Contractor has sufficient experience, personnel, and equipment for the type and scope of work contemplated.

Public Utilities are exempt from the requirements of this section.

## 102.6.1 Insurance and Indemnification

#### 102.6.2 <u>Contractor's and Subcontractor's Insurance</u>

The Contractor shall not commence work until the Contractor has obtained all the insurance required hereunder and such insurance has been approved by the City Engineer, nor shall the Contractor allow any subcontractor to commence work on the subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Approval of the insurance by the City Engineer shall not relieve or decrease the liability of the Contractor. All insurance required under sections 102.6.3 shall be primary with regard to the additional insureds and any coverage the additional insureds may carry will be secondary.

## 102.6.3 Insurance Coverage Requirements

Contractor must provide City with evidence of the following insurance coverage's prior to permit issuance. A copy of each insurance policy, issued by a company currently licensed in the State of Oregon and certified as a true copy by an authorized representative of the issuing company or a certificate in a form satisfactory to City certifying to the issuance of such insurance, must be furnished to City. All policies must be written on an "occurrence basis," and maintained in full force for the duration of the permitted work. All policies must provide for not less than 30 days' written notice to City before they may be revised, non-renewed, canceled, or coverage reduced. Excepting professional liability and worker's compensation coverage, all policies must provide an endorsement naming the City, its officers, employees, and agents as additional insureds.

**A. Automobile.** Comprehensive automobile and vehicle liability insurance covering claims for injuries to members of the public and/or damages to property of others arising from the use of motor vehicles, including on-site and off-site operations, and owned, non-owned, or hired vehicles, with \$2,000,000 combined single limits. For Driveway Approach and Sidewalk Permits the comprehensive automobile and vehicle liability insurance requirement is \$1,000,000.

**B. General Liability.** Commercial general liability insurance covering claims for injuries to members of the public or damage to property of others arising out of any act or omission of Contractor or of any of its employers, agents, or subcontractors. The general liability policy must include, without deductible, coverage for premises operations, explosion and collapse hazard, underground hazard, products completed operations, contractual insurance, and independent contractors. The policy must also provide for a cross-liability endorsement and must guarantee to the City the amount of coverage, notwithstanding the naming of additional insureds. The policy amounts must, or not less than the following:

**1. For bodily injury including death:** \$1,000,000 for one claimant and \$2,000,000 for each occurrence. Driveway Approach and Sidewalk Permits require \$1,000,000 for each occurrence.

**2. For property damage:** \$2,000,000 for each occurrence. Driveway Approach and Sidewalk Permits require \$1,000,000 for each occurrence.

**3.** In lieu of 1 and 2 above: A combined single limit policy of \$2,000,000 per occurrence and in the aggregate.

**C. Policy Coverage.** Coverage provided by this policy(ies) must be primary and any other insurance carried by City is excess. Contractor will be responsible for any deductible amounts payable under all policies of insurance.

**D. Workers Compensation.** Contractor, its subcontractors, if any, and all employers are subject employers under the Oregon Worker's Compensation Law and must comply with ORS 656.017.

Notwithstanding the naming of additional insureds, the policy(ies) must protect each insured in the same manner as though a separate policy had been issued to each; but nothing will increase the insurer's liability as set forth elsewhere in the policy beyond the amount or amounts for which the insurer would have been liable if only one person or interest had been named as insured. Any annual policy aggregate of insurance coverage must be fully maintained and, if necessary, replenished in the required amounts regardless of claims that are paid or reserved against the policy and whether or not arising out of work performed under this Permit.

Proof of compliance and evidence of insurance, together with the proper endorsement, must be filed with the City Engineer and is subject to the approval by the City Attorney as to the adequacy of protection.

Any violation of this provision can result in suspension of the permit and enforcement action by the City.

### 102.6.4 Indemnification

Contractor shall defend, indemnify and save the City, as well as its officers, employees and agents, harmless from liability and loss because of injury including death to any person, or damage to any property that may occur or may be alleged to have arisen out of, connected with, or related to performance of the work, as a result, directly or indirectly, of contractor's or its subcontractors' or suppliers' acts or omissions, or of their servants, agents, and employees, and whether or not such injury or damage is jointly attributable to the City's fault or negligence. This section shall survive acceptance of the work and completion of the Permit, including any applicable warranty period.

In any and all claims against the City or its agents or employees these indemnification obligations shall not be limited in any way by any limitation in the amount or type of damages, the amount or type of insurance, compensation or benefits payable by or for Contractor's worker's compensation acts, disability acts or other employee benefits.

#### 102.6.5 (Deleted)

#### 102.6.6 Exemption for Public Utilities

For Public Utility insurance and indemnification requirements, comply with City of Tualatin Municipal Code Chapter 03-06, Utility Facilities in the Right-of-Way.

#### **Easements and Tracts**

#### 102.7.2 Easements and Tracts Granted to the City

All required easements and tracts are to be granted to, and accepted by, the City prior to the issuance of Water Quality and Public Works Construction Permits. Provide the City with the documents necessary to grant such easements and tracts free and clear of encumbrances and all taxes paid.

The City Engineer determines what facilities need to be part of the publicly owned system. When it is not possible or practical to install these facilities within dedicated public Right-of-Way, grant an easement or tract to the City. Facilities include, but are not be limited to, water works, sanitary sewers, storm systems, slopes for public streets, sensitive areas, created and constructed wetlands, greenways, pedestrian pathways or bikeways, and water quality or quantity facilities.

Center public water systems, sanitary sewers or storm systems within a permanent easement that has a minimum width of 15-feet along its entire length unless otherwise approved by the City Engineer. When a sanitary and storm sewer are within the same easement, provide a minimum easement width of 20 feet. The City may require a larger easement when either the sanitary or the storm sewers are larger than 24-inches. Do not install a pipe within 5-feet of an easement line.

Slope easement widths for roadway slopes extending beyond the dedicated public Right-of-Way will be as determined by the City Engineer.

Widths of easements for sensitive areas, wetlands, greenways, pedestrian pathways or bikeways, or access ways, will be as determined by the City Engineer.

Tracts deeded to the City are required for access to all easements including the public water quality and quantity facilities that include outlet control structures and to manholes where required by the City. Widths of such tracts will be as determined by the City Engineer.

#### 102.7.3 <u>Temporary Construction Easements</u>

Prior to the issuance of a construction permit, provide to the City Engineer, for review and documentation, all temporary construction easements necessary to perform the work.

#### 102.10.00 <u>Contributed Equity Information</u>

As part of the Public Works Construction Permit and Water Quality Permit, provide to the City Engineer, for review and documentation, the costs of all public works improvements that will become the property of the City. Prior to issuance of a construction permit, provide Page 26 August 2020 the following information:

- 1. The diameter, length, and value of all storm, domestic water, and sanitary lines within the proposed project.
- 2. The area, in acres, of any streets being dedicated to the City.
- 3. The area, in acres, of any open space being dedicated to the City.
- 4. The area, in acres, of any tracts being dedicated to the City.
- 5. The value of any street improvements along with the appropriate lineal footage.
- 6. The quantity and value of any sidewalk improvements other than those constructed as part of residential development.
- 7. The number of and value of any street lights installed.
- 8. The area of any easements dedicated to the City other than those within the subdivision lots.

## 102.11.00 Confined Space Entry Information

Prior to the issuance of a permit for work within the public Right-of-Way or easements requiring confined spaces construction, submit written documentation to the City Engineer regarding confined space program(s), that the Contractor will follow. Confined Space Entry within the public Right-of-Way or easements will only be allowed through compliance with a confined space program meeting the requirements of OAR Chapter 437, Oregon Occupational Safety and Health Division.

#### 102.12.00 Other Agency Permits

If the construction includes work within Clackamas County, Washington County, or State of Oregon rights-of-way or easements, or includes Clean Water Services (CWS) sensitive areas, a permit to perform such work is required from the respective agency prior to the start of construction. Provide copies of these permits, and all other agency-required permits, to the City Engineer for review and documentation prior to issuance of the City permit.

#### 102.13.00 Issuance. Expiration. Reinstatement and Amendments

Once the plans and specifications have been approved for construction, the necessary fees paid, the Contractor's prequalification accepted, the necessary certificates of insurance submitted and approved, the required easements submitted and approved, copies of other agency permits submitted, the grading/erosion control information worksheet submitted, the erosion control joint permit submitted, the contributed equity information and written documentation of confined space entry information submitted, the City Engineer will issue a permit for the proposed work. The City Engineer may impose any additional conditions, including but not limited to imposing time constraints and limits on work to be performed in existing public Right-of-Way and on existing public works facilities, which the City Engineer deems necessary to the permit. The date of issuance and the conditions under which the construction is authorized by the City will be clearly described in the permit.

When the City Engineer issues the permit, the City Engineer will endorse in writing or stamp the plans and specifications "APPROVED." Do not change, modify, or alter approved plans and specifications without authorization from the City Engineer. Complete all work regulated by this code in accordance with the approved plans.

Keep one set of approved plans and specifications on the site of the work at all times during which the work authorized thereby is in progress.

The issuance or granting of a permit or approval of plans, specifications and computations will not be construed to be a permit for, or an approval of, any violation of this code or of any other ordinance of the City. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the City will not be valid.

The issuance of a permit based upon plans, specifications and other data does not prevent the City Engineer from requiring the correction of errors in the plans, specifications and other data, or from preventing operations being carried on when in violation of this code or of any other ordinances of the City.

Every permit issued by the City Engineer under this code expires by limitation and becomes null and void if the work authorized by such permit has not commenced within 180 days from the date of such permit, or if the work authorized by such permit is suspended or abandoned at any time after the work has commenced for a period of 180 days. Before such work can be resumed, reinstate the permit.

To reinstate the permit, submit a written request for reinstatement to the City Engineer giving the reasons for failure to begin construction and a date when construction will be commenced. In reinstating the permit, the City Engineer may impose any additional conditions deemed necessary or require amendment to the permit.

Any Permittee holding an unexpired permit may apply for an extension of the time within which to may commence work under that permit when the Permittee is unable to commence work within the time required by this section for good and satisfactory reasons. The City Engineer may extend the time for action by the Permittee for a period not exceeding 180 days upon written request by the Permittee showing that circumstances beyond the control of the Permittee have prevented action from being taken. A permit will not be extended more than once.

The City Engineer may, in writing, suspend or revoke a permit issued under this code whenever the permit is issued in error or on the basis of incorrect information supplied, or in violation of any ordinance or regulation or this Code. The Permittee may appeal the suspension or revocation of the permit as set forth in Section 104.6.00, Appeal of Disputed Work or Rulings, of this Code.

Changes to the approved plans and special specifications will only be allowed when requested by Permittee and approved by the City Engineer. Incorporate authorized changes by amendment to the permit and approved plans.

### 102.14.00 Performance of the Work

In order to protect the safety of the public and the integrity of the City's public works facilities, enter into a Public Improvement Agreement for work proposed on an existing public works facility. Public works facilities include any public transportation, sanitary sewer, storm drainage, water, or park facility.

If the scope of work necessitates a Public Improvement Agreement, the permit for the project will not be issued until the Contract is executed and filed with the City. The contract is enforceable by and against the parties, their heirs, successors and assigns.

As a condition of the agreement, a bond, cash deposit, or other security acceptable to the City will be required from the applicant in an amount equal to the value of the improvements to the existing public facilities, but not less than \$25,000. For Sidewalk/Driveway Approach Permits only, the bond amount shall be equal to twice the cost of construction as approved by the City Engineer. This assurance is to ensure that the applicant constructs and completes all required improvements to the public facilities.

Fulfill the conditions of the agreement within the time limitations specified. Failure to fulfill a condition within the time may result in the City collecting the assurance and completing the improvements.

Further, notwithstanding any other provision, the City has the authority to deny a permit upon a determination that the applicant, or any officer, or principal of the applicant, willfully has failed to fulfill conditions of approval imposed in any previous permit and a determination that such a decision would encourage compliance or is necessary to protect the public from future noncompliance. (BLANK PAGE)

## 103 SCOPE OF WORK

#### 103.1.00 Plans and Specifications

This code, plans, specifications, and other standard drawings will govern the work to be done. Anything mentioned in the specifications and not shown on the standard drawings, or shown on the plans and standard drawings and not mentioned in the specifications, shall be of like effect as though shown or mentioned in both. Specifications and plans referred to shall be considered as being included in the document in which such reference is made. A reference to a particular specification or standard drawings shall exclude any modification thereof. When a particular standard or specification is referred to, such reference shall be to the standard or specification including officially adopted revisions or amendments thereto which is in force at the time of Permit issuance or reinstatement.

#### 103.2.00 Precedence of Permit Documents

In case of conflict, the order of precedence of the following documents in controlling the work shall be:

- 1. Public Works Construction Code/Permit
- 2. Permits from outside agencies required by law
- 3. Standard Drawings
- 4. Standard Specifications
- 5. Plans

Approved changes in the work will take precedence over the documents listed above.

#### 103.3.00 Shop Drawings

Plans furnished and included with specifications show details necessary to comprehensively indicate the work proposed and the results that are intended to be accomplished. Supply any shop drawings required in connection with the prosecution or construction of any part of such work.

Furnish the specified number of copies of all layout, detail, shop, and working drawings requested by the City Engineer. Shop drawings shall be of sufficient size and scale to clearly show details. After review and approval by the City Engineer, three copies will be returned to the Permittee.

The approval by the City Engineer of the Contractor's drawings is a general approval relating only to compliance with the intent of the plans and specifications, and shall not constitute a waiver of errors, discrepancies, or omissions.

No materials shall be furnished or work done on items requiring shop drawings prior to approval.

Page 31

#### Changes in the Work

### 103.4.2 <u>By the City</u>

The City Engineer may make changes in the plans or in standards contained in this code to protect the public interest or the normal operations of the City. Such changes shall be made at the sole discretion of the City Engineer and may include, but not limited to, the allowance of new or different materials or products which are equivalent to or better than the product specified herein.

#### 103.4.3 By the Permittee

Changes in the work may be authorized by the City Engineer by amendment to the approved plans and Permit. Requested changes shall be submitted in writing by the design engineer of the project.

#### 103.5.00 <u>Salvage</u>

The Contractor shall carefully salvage and furnish to the City, as directed, all castings, pipe or other materials shown or specified as salvageable by the City Engineer.
### 104 CONTROL OF WORK

### 104.1.00 <u>Authority of the City Engineer</u>

The City Engineer shall be the City's representative during the design and construction phase of the project.

The City Engineer will decide all questions as to the design requirements and as to the quantity, quality, and acceptability of materials furnished and work performed, and shall have authority to reject all work and material that are not in accordance with the intent and requirements of the plans and specifications. In addition, the City Engineer may stop the work or revoke the Permit, if necessary, to insure compliance with this code and the plans and specifications. The City Engineer shall have the authority to vary the requirements of this Code when he/she determines it is in the best interest of the City, or necessary to protect the City, its citizens and/or infrastructure.

Approval by the City Engineer signifies favorable opinion and qualified consent; it does not carry with it certification, nor assurance of completeness, nor assurance of quality, nor assurance of accuracy concerning details, dimensions and quantities. Such approval will not relieve the Contractor from responsibility for errors, for improper fabrication, for nonconformance to requirements or for deficiencies within the Contractor's control.

It is not incumbent upon City Engineer to notify Contractor when to begin, cease or resume work, nor to give early notice of rejection of faulty work, nor in any way to superintend so as to relieve Contractor of any responsibility or of any consequences for neglect or carelessness by Contractor or Contractor's subordinates.

### 104.2.00 Authority and Duties of Inspectors

The City Engineer may appoint inspectors to inspect all materials used and all work done. These inspectors may be employees of the City or private consultants appointed by the City. Such inspection may extend to all parts of the work and to the preparation or manufacture of the materials to be used. The inspectors may not revoke, alter, enlarge or relax the provisions of this Code. An inspector is placed on the work to check the necessary lines and grades, to keep the City Engineer informed as to the progress of the work and the manner in which it is being done, and to call to the Contractor's attention to any infringements upon plans or specifications. However, failure of the inspector or the City Engineer to call the Contractor's attention to faulty work or infringements upon the plans or specifications shall not constitute acceptance of said work. Visits, observations and inspections by the City Engineer or inspector shall not relieve the Contractor's obligation to conduct comprehensive inspections of the work, and to furnish materials and perform acceptable work and to provide acceptable safety precautions, in conformance with the intent of the contract.

An inspector may not approve or accept any portion of the work or issue instructions

contrary to the plans and specifications. The inspector may reject defective material and suspend any work that is being improperly done, subject to the final decision of the City Engineer. The inspector may exercise such additional authority as may be specifically delegated to him from time to time by the City Engineer.

### 104.3.00 Responsibility of Design Engineer

The design engineer shall be the Permittee's representative during the design and construction phase of the project. He or she shall be responsible for completeness and accuracy of the plans and special specifications, for all surveys, construction staking, and matters pertaining to the measurement and payment provisions affecting the Permittee and Contractor. The design engineer shall make sufficient on-site inspections to assure himself or herself of the completeness and accuracy of as-built drawings.

#### 104.4.00 Responsibility of Contractor

The Contractor shall do all work and furnish all labor, materials, equipment, tools, and machines necessary for the performance and completion of the project in accordance with this code, the Permit, plans and specifications.

Contractor shall employ only competent, skillful persons to do the work. Contractor shall keep on the work, during its progress, competent, supervisory personnel. Contractor shall give efficient supervision to the work using the highest level of skill and attention.

### 104.5.00 Quality of Work

The Permittee shall furnish high quality equipment, supplies, and materials, and perform the work in accordance with this code. Any failure or omission by the City inspector to reject any defective equipment, supplies, materials, or work shall not be construed as acceptance nor release the Permittee from Permittee's obligations hereunder. Upon notification of deficiency by City Engineer, the Permittee shall properly reconstruct or replace defective equipment, supplies, materials, or work at Permittee's own cost at any time upon discovery of the defect during the period of construction and for the full guarantee period following acceptance of the work and indemnify City from any resulting claims.

### 104.6.00 Appeal of Disputed Work or Rulings

If the Contractor considers any work demanded by the City Engineer to be outside the scope of the Permit or considers a ruling of the City Engineer to be unfair, upon such demand or ruling, the Contractor shall proceed without delay to perform the work or to conform to the ruling. The Contractor shall within ten (10) days after date of receipt of the instructions or ruling, file a written protest with the City Engineer, stating clearly and in detail the basis of objection, and include an itemized statement of any extra costs which may have resulted.

Except for such protests or objections as are made of record in the manner specified and within the time limit stated, the records, rulings, instructions or decisions of the City Engineer shall be final and conclusive. Contractor expressly waives any protest or objection for which written protest is not filed within ten (10) days after date of receipt of the City Engineer's instructions or ruling.

### 104.7.00 Notifications Relative to Contractor's Activities

Obtain prior approval from the City Engineer before working in the Right-of-Way or easements, and before closing or partially closing any road, street, alley, sidewalk, bike lane, or other public thoroughfare. Provide notice not less than two working days in advance of all construction in Rights-of-Way and easements. Notify the City and all agencies providing public services including, but not limited to, the sheriff, police, fire, ambulance services, Tri-Met, and the school district transportation services.

Notify all public utilities at least two working days before beginning work.

Verify location of all public utilities and public works facilities prior to construction and meet requirements of Oregon Administrative Rule (OAR) 952 Division 1. In accordance with OAR 952 Division 1, notify the Oregon Utility Notification Center of the date and location of the proposed excavation at least two working days and not more than ten working days before commencing work.

Notify all agencies and public utilities affected by the operations in order to coordinate and expedite the work in order to cause the least amount of conflict and interference between the operations and those of other agencies.

Include in the notification the time that work will begin and end, names of streets or location of alleys to be closed or impacted, schedule of operations, routes of possible detours, and additional information requested by the City Engineer.

The Permittee is responsible for all damages or claims resulting from improper or insufficient notification of the affected agencies.

### 104.8.00 Utilities and Existing Improvements

Do not block, obstruct or interfere with any portion of the City's public works facilities, including roads, bike lanes, and sidewalks.

Provide for the flow of sewers, drains, and watercourses interrupted during the progress of the work and restore all drains and watercourses as approved by the City Engineer.

Make excavations and pavement coring ahead of work as necessary to determine the exact location of existing utilities. If the Contractor is unable to determine the exact location of public storm and sanitary sewer utilities, provide a TV inspection after construction, if approved by the City Engineer.

Coordinate with Public Utilities to complete all installations, relocations, repairs, or replacements needed for those utilities before work begins, unless otherwise agreed to by the Public Utility. Provide the time needed for such public utility work to be accomplished during construction.

Where it is necessary to connect to existing public works facilities, do not interrupt City operations to make such connections. Before making connections to existing public works facilities, obtain approval from the City Engineer and schedule the work to be done at a time that is convenient to the City.

In accordance with Section 104.10.00, Protection of Property, the Contractor is responsible for all damage and associated costs caused directly or indirectly by execution of the work.

### 104.9.00 Protection of Survey Markers

The Contractor shall not disturb permanent survey monuments, stakes, or bench marks without the consent of the City Engineer, and shall notify the City Engineer and bear the expense of replacing any that may be disturbed without permission. Replacement shall be done by a registered land surveyor, in compliance with the provisions of ORS 209.150 and ORS 209.160, at no expense to the City.

When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, the monument and cover shall be adjusted to the new grade.

### 104.10.00 Protection of Property

The Contractor shall 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.

Site-parked mobile equipment and operable machinery, and hazardous parts on the new construction site, subject to vandalism, shall be kept locked or otherwise made inoperable whenever left unattended.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams or waterways. All wastes shall be removed from the site and disposed in a manner complying with local ordinances, state and federal anti-pollution laws.

The Contractor shall restore and bear the cost of any public or private improvement, facility or structure which is damaged or injured directly or indirectly by or on account of any act, omission or neglect in the execution of the work and which is not designated for removal. Contractor shall be responsible for any injury, loss, or damage to any presently existing improvements on the premises caused by Contractor or Contractor's employees, agents or subcontractors, and in the event of such injury, loss or damage shall promptly make such

repairs or replacements as required by the City Engineer without cost to the City.

The Contractor shall 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.

The Contractor shall protect all designated trees and planted areas within the right-ofway or easements, and shall exercise care and conduct operations so as to minimize damages to other planted areas.

The Contractor shall review with the City 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.

The completed work shall include all necessary permanent safety devices such as machinery guards and similar ordinary safety items, required by the State and Federal (OSHA) industrial authorities and applicable local and national code. Any such features of the work subject to safety regulations shall be fabricated, furnished and installed in compliance with these requirements.

### 104.11.00 Protection of Work

Until acceptance of the project, the Contractor shall at all times protect from damage all public property and private property which may be affected by the work and preserve all materials, supplies, and equipment, and all work already performed, from the nature of the work, the action of the elements, and damage by any person or persons or from any other cause. Any work or materials lost, removed or damaged by any cause or for any reason shall be the responsibility of Contractor until such time as the City has indicated acceptance and approval of same, according to the provisions of this Code.

#### 104.12.00

### **Use of Work During Construction**

Upon request and with approval of the City Engineer, Contractor will be relieved of the duty of maintaining and protecting certain portions of work which are approved to be placed in service and which have been completed in accordance with the plans and specifications, including cleanup. Such use shall not be considered as final acceptance of the improvement, and nothing in this section shall be construed as relieving Contractor from full responsibility for making good, work or materials found to be defective. Such action by the City Engineer will not relieve the Contractor of responsibility for injury or damage to said completed portions of the work resulting from use by public traffic or from the action of the elements or from any other cause.

### 104.13.00 <u>Traffic Maintenance</u>

Erect and maintain all barricades, guards, standard construction signs, warning signs, and detour signs as necessary to warn and protect the public at all times from injury, inconvenience, or damage as a result of the work operations on highways, roads, or streets affected by such operations. Install and maintain all detours/signs, traffic control devices and markings per the requirements of the MUTCD and Oregon Supplement, or the Oregon Temporary Traffic Control Handbook. Submit a plan and schedule for detours/signs, traffic control devices and markings to be approved by the City Engineer prior to installation and before construction starts.

Upon failure to immediately provide the necessary flaggers or to provide, erect, maintain, and remove barricades, detours, lights, and standard signs when so ordered, the City may issue a stop work order or at its discretion provide appropriate traffic control necessary to protect the public and assess all of the costs to the Permittee. Nothing contained in this section will require the City to do so or relieve the Permittee and Contractor of their responsibilities to provide traffic control for public safety.

At the end of each day, in locations where vehicular or pedestrian traffic will pass over trenches before they are paved, repair the pavement in accordance with Section 313.3.03G, Temporary Surfacing. Maintain a smooth driving surface to the satisfaction of the City Engineer for as long as the temporary surface is in place. If the Contractor or Permittee fails to maintain a smooth driving surface, the City may at its discretion repair the surface and assess all of the costs to the Permittee.

Provide access driveways where needed and maintain pedestrian access around the construction zone as directed. Commence cleanup operations immediately following backfilling and maintain the work site in an orderly condition at all times.

See Section 302, Temporary Traffic Control, for additional traffic control requirements.

### 104.14.00 Dust Control. Water and Air Pollution

During all phases of the construction work, and when directed, the Contractor shall take precautions to abate dust nuisance by cleaning up, sweeping, sprinkling with water, or other means as necessary to accomplish the suppression of dust.

Contractor's operations shall conform to applicable laws and regulations of the Oregon Department of Environmental Quality, Clean Water Services, and other agencies of the State and Federal Government, as well as local ordinances designed to prevent, control and abate water and air pollution. Such agencies are referred to in subsection 106.2.00.

# 104.15.00 Removal of Defective or Unauthorized Work

All work which does not conform to the requirements of this code shall be considered as unacceptable.

The Permittee shall immediately remove unacceptable and defective work found to exist prior to acceptance of the work. Replace by work and materials which conform to the plans and specifications, or remedy otherwise in an approved manner.

#### 104.16.00 Restoration and Clean-up

The Contractor shall periodically, or as directed by the City Engineer, as the work progresses, and immediately after completion of the work, clean up and remove all refuse, debris, equipment and unused materials resulting from the work. Upon failure to do so within 24-hours after directed, the work may be done by the City or third party and the cost assessed to the Permittee.

As a condition precedent to final acceptance of the project, the Contractor shall remove all equipment and temporary structures, and all rubbish, waste and generally clean up the right-of-way, easements, and project area to conform substantially to conditions as they existed before the commencement of work.

### 104.17.00 <u>Final Inspection</u>

When all construction work on the project is complete, the Contractor shall notify the City Engineer in writing. City Engineer will make an inspection of the project and project records within fifteen (15) days of receiving said notice. If, at such inspection, all construction is found completed and satisfactory, such inspection shall constitute final inspection.

If work is found unsatisfactory, the City Engineer will so notify the Contractor. After corrections are made, the Permittee or Contractor shall notify the City Engineer in writing. City Engineer will make another inspection within fifteen (15) days after such notice, and if all work is satisfactory, then this inspection shall constitute the final inspection.

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### 105 CONTROL OF MATERIALS

### 105.1.00 Quality of Materials

The Contractor shall use only new materials, parts, products, and equipment in the work which conform to specified requirements. Materials and products which after approval are found to be unsuitable or unacceptable for use, regardless of cause, will be rejected by the City Engineer and shall be removed from the site by the Contractor.

### 105.2.00 Sampling and Testing

Tests of materials will be made by Permittee in accordance with methods described or designated in the applicable specifications, and at any time during the production, fabrication, preparation and use of the materials.

City reserves the right to require samples and to test products for compliance with pertinent specifications irrespective of prior certification of the products by the manufacturer as set forth in Section 105.3.00.

When tests of materials are necessary, as determined by the City Engineer, such tests will be made by and at the expense of the Permittee unless otherwise specified.

In the absence of reference specifications, such materials shall meet the most recent specifications and requirements of the American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), or the American Association of State Highway and Transportation Officials (AASHTO), as directed by the City Engineer. When there is no pertinent coverage under ASTM, AWWA, or AASHTO, the material concerned shall meet specifications and requirements of applicable Commercial Standards of the Commodity Standards Division of the US Department of Commerce. Lacking such coverage, materials shall meet requirements established by reputable industry for a high quality product of the kind involved.

All testing shall be performed as directed by the City Engineer.

### 105.3.00 <u>Certification</u>

For commercial products inclusive of industry standardized products, in lieu of normal sampling and testing procedures by the Contractor and the City, the City Engineer may accept from Contractor two (2) 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 the City's requirements and that representative samples thereof have been sampled and tested as specified.

Page 41

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 the City 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) The City shall not be responsible for costs of certification or for costs of sampling and testing products.

### 105.4.00 Inspection Requirements

The Contractor shall allow access to the City Engineer or the City Engineer's representatives to all parts of the work. Furnish all samples required for testing purposes at no expense to City.

No work shall be covered until inspected and approved by the City Engineer or inspector. This provision shall apply to street subgrade, base rock, and all buried conduits. Inspector shall be notified 24-hours in advance of any required inspection. If any work should be covered up without approval or consent of the City Engineer, it shall, if required by the City Engineer, be uncovered for examination at Contractor's expense.

# 105.5.00 Inspection by Others

Inspection of work by persons other than representatives of the City Engineer will not constitute inspection by the City Engineer, except as set forth in Section 105.3.00.

# 105.6.00 Storage and Protection of Materials

Contractor shall store materials to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. Portions of the right-of-way may be used for storage purposes, including Contractor's equipment, upon issuance of a Permit therefore by the City Engineer. Contractor shall not use private property for storage purposes without written permission of the property owner or lessee. When requested, the Contractor shall furnish copies of such written permission to the City Engineer.

# 105.7.00 Trade Names, Approved Equals or Substitutions

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, quality, utility, or merit.

Unless otherwise clearly indicated, whenever a process is designated or a manufacturer's name, brand or item specification is called for on the plans is given or whenever a process or material covered by patent is designated or described, it shall be understood that the words "or approved equal" follow such name, designation or description, whether in fact they do so or not.

### 105.8.00 Failure to Reject Defective Work

Failure of City Engineer to discover or reject defective work during the progress of the work or work not in accordance with the drawings, details, or specifications shall not be deemed as acceptance. No partial or final occupancy or use of the project facility by City shall be construed to be an acceptance of work or materials which are not strictly in accordance with this Code, nor a waiver of City's rights to reject the work in part or in whole.

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### 106 LEGAL RELATIONS AND RESPONSIBILITIES

### 106.1.00 Laws and Regulations

The Contractor shall keep fully informed of all federal, state and local laws, ordinances and regulations and all orders and decrees by governing jurisdiction or authority, which affects the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders and decrees. The Contractor shall protect and indemnify the City, its agents and employees against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor, subcontractors, suppliers of materials or services, or others engaged by the Contractor or the employee of any of them.

#### 106.2.00 Environmental and Natural Resources Laws and Rules

The following is a list of federal, state, and local agencies of which the City has knowledge that have enacted ordinances or regulations dealing with the prevention of environmental pollution and the preservation of natural resources that may affect the performance of the work:

#### **Federal Agencies**

Department of Agriculture Forest Service, Soil Conservation Service Department of Defense Army Corps of Engineers Environmental Protection Agency Department of Interior Bureaus: Sport Fisheries and Wildlife, Outdoor Recreation, Land Management, Indian Affairs, Reclamation

Department of Labor Occupational Safety and Health Administration Department of Transportation Coast Guard Federal Highway Administration Federal Emergency Management Agency National Marine Fisheries Services

### **State Agencies**

Department of Agriculture Department of Environmental Quality Department of Fish and Wildlife Department of Forestry Department of Geology and Mineral Industries Department of Human Resources (State Agencies cont.)

Department of Land Conservation and Development Department of Transportation Division of State Lands State Engineer Water Resources Board

#### Local Agencies

City Council Board of County Commissioners / Clackamas and Washington Port of Portland Metropolitan Service District (Metro) Water Districts Tualatin Valley Fire & Rescue Clean Water Services

### 106.3.00 <u>Contractor and Subcontractors</u>

The Contractor and any subcontractors will be considered by the City as authorized agents of the Permittee, unless otherwise provided for in the Permit. Any instructions or orders given to the Contractor or subcontractors will be treated as if given directly to the Permittee.

The Permittee shall inform the Contractor and any subcontractors of the provisions of the code and their application to the work.

### 106.4.00 Right of Entry of Work

Work for which a Permit is issued will normally be performed within dedicated public rights-of-way or easement. However, when the work involves proposed streets and easements, such as within new subdivisions, the Permittee must provide the City and City Engineer with permission to enter upon the affected property, with continuous access to the work.

By accepting the Permit, the Permittee grants the City or its agents access to the project site at all times.

### 106.5.00 <u>Responsibility of Permittee</u>

In accepting the Permit, the Permittee agrees to comply with all provisions of this code and related laws and regulations. Failure to comply may result in revocation of the Permit.

### 106.6.00 Permits, Licenses and Taxes

The Contractor shall procure all permits and licenses, pay all charges, fees and taxes and give all notices necessary and incidental to the due and lawful prosecution of the work except those listed in the special conditions.

#### 106.7.00 Public Safety and Convenience

The Contractor shall conduct the project with proper regard for the safety and convenience of the public. When the project involves use of public rights-of-way, the Contractor shall provide flaggers when directed, and install and maintain means of free 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 City Engineer or specific permission of the property owner. The Contractor shall not obstruct or interfere with travel over any public street or sidewalk without approval. The Contractor shall provide adequate barricades for open trenches and excavation. At night, the Contractor shall mark all open work and obstructions by lights. The Contractor shall install and maintain all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges and facilities.

Emergency traffic such as police, fire, and disaster units shall be provided reasonable access to the work area at all times.

The Contractor shall comply with all requirements of the US Postal Service with regard to the location of mail boxes which must be disturbed during construction. Mail boxes may be moved to temporary locations as designated by the US Postal Service. At the completion of the work in each area, the Contractor shall replace them in their original location and in a condition satisfactory to the US Postal Service.

The Contractor shall be liable for any damages which may result from failure to provide such reasonable access or failure to notify the appropriate authority.

### 106.8.00 <u>Personal Safety</u>

The Contractor shall be responsible for conditions of the job site, including safety of all persons and property during performance of the work. Contractor shall protect the project and materials from damage due to the nature of the work, the elements, carelessness of other contractors or from any cause whatever until the completion and acceptance of the project. Contractor shall be responsible for all loss or damages arising out of the nature of the work. This requirement will apply continuously and not be limited to normal work hours. Safety provisions shall conform to the applicable federal, state, county and local laws, ordinances and codes. Where any of these are in conflict, the more stringent requirement shall apply.

The duty of the City Engineer to conduct construction reviews of the Contractor's performance is not intended to include a review of the adequacy of the Contractor's safety measures in, on or near the construction site. If obvious safety conditions are not being addressed, OSHA may be contracted to review on-site conditions.

### 106.9.00 <u>Detours</u>

The Contractor shall construct and maintain detours needed by work operations. The Contractor shall submit plans for such detours to City Engineer for approval.

The Contractor shall construct and maintain temporary detours to provide safe passage of public traffic and protection of the work at all times.

The Contractor assumes full responsibility for detours within the limits of the project such as side street crossings, temporary bridges over freshly placed concrete, or utilization of one or more lanes of the construction area for maintenance of traffic.

The Contractor shall install, maintain, and/or remove detours or detour bridges when directed to do so by City Engineer. City may without notice to Contractor or Contractor's surety, provide, maintain, or remove the detour with the expense to be assessed to the permit fee.

#### 106.10.00 <u>Labor</u>

Upon notification in writing from the City Engineer, the Contractor shall remove immediately from the job any laborer, worker, mechanic, foreperson, superintendent, or other person employed who is found to be incompetent, intemperate, troublesome, disorderly, or otherwise objectionable, or who fails or refuses to perform work properly and acceptably.

#### 106.11.00 Use of Explosives

Blasting or use of explosives requires a Public Works Permit and is subject to all the laws, orders, provisions, and regulations of the City and any other governmental authority in whose jurisdiction such work may be done.

### 106.12.00 Railroad Crossings or Right-of-Way

The Contractor shall submit a program of proposed operations whenever the project or work involves the crossing of a railroad or the encroachment on any railroad right-of-way. This program of proposed operations shall be approved by the appropriate railroad officials, ODOT Rail, and the City Engineer before the work is started within such area. The Contractor shall provide for services of flaggers and/or watchpersons required by the railroad company and shall provide and install piling, cribbing, bridges, tunnels, pipe casing, and do all other work required by the railroad company for safety or maintenance of railroad traffic. The Contractor shall furnish any bond or insurance required of the Permittee by the railroad company or ODOT Rail as a result of such intended construction and indemnify City for any and all expenses incurred by Permittee, and assume any and all liability or claims thereof imposed by the railroad as a result of operations in railroad right-of-way area.

### 106.13.00 Rights-of-Way, Easements, and Premises

The Contractor shall confine construction activities within property lines, limits of easements and limits of construction permits as shown or specified in the plans, unless arrangements are made with owner of adjacent private property. Prior to the use of private property outside these specified boundaries, the Contractor shall file with the City Engineer a written permission of the property owner(s) and upon terminating such usage, the Contractor shall file with the City Engineer a release from all damages, signed by the property owner

### 106.14.00 <u>Waste Sites</u>

Excavated materials not suitable or not required for backfill or embankment shall be deposited on one or both of the following waste sites:

(1) predesignated waste sites contained in the plans or special specifications, and/or

(2) waste sites selected by the Contractor.

The Contractor shall operate either type of waste site in such a manner as to meet all safety and health requirements of State and local agencies. Sites, operations, or the result of such operations, which create a nuisance problem, or which result in damage to public or private properties will not be permitted.

# 106.15.00 Vermin Control

At the time of occupancy by the owner, any structure or structures entirely constructed under the Permit shall be free of rodents, insects, vermin and pests. The Contractor shall arrange and pay for extermination work as may be necessary as part of the work. Work shall be performed by a licensed agency in accordance with the requirements of governing authorities. The Contractor shall assume responsibility for any injury to persons or property resulting from extermination work and for the elimination of any offensive odors.

# 106.16.1 Warranty and Maintenance

Upon completion of the construction and just prior to the acceptance of the improvements, the Permittee shall submit to the City Engineer a maintenance assurance. The maintenance assurance may be in the form of a maintenance bond or cash deposit. The amount of the maintenance assurance shall be fifteen (15) percent of the total cost of the

improvements. The maintenance assurance shall guarantee the correction of faulty workmanship and replacement of faulty materials and equipment for a period of not less than one year from the date of acceptance by the City by resolution.

The Permittee shall make all necessary repairs and replacements to remedy, in a manner satisfactory to the City Engineer and at no cost to the City, all defects, breaks, or failures of the work occurring within one (1) year following the date of final acceptance of the work or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Permit due to faulty or inadequate materials or workmanship, and for 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 Permittee in performing the duties and obligations under the Permit.

When such defects or damage occur, within the time period described, in any part of the surface or subsurface work performed under the Permit, or in any adjacent surface of subsurface improvements not included in the work under the Permit, the Permittee shall promptly repair the defect or damage and the one year maintenance period required shall, with relation to such required repair, be extended one year from the date of acceptance of the repair. Permittee agrees to hold the City Engineer harmless from liability arising from damage due to faulty or inadequate materials or workmanship. If Permittee fails to make repairs and replacements promptly, the City may do the work, and the Permittee and his or her surety shall be liable for the cost thereof.

# 106.16.2 Landscaping Warranty and Maintenance

For all water quality and/or quantity facilities, the maintenance assurance amount shall be ten percent of the cost of construction of the facilities, or 50 percent of the cost to replant the landscaping plus 100 percent of the cost to maintain the landscaping for a two year period, whichever is greater. The maintenance assurance shall be for a two year period from the date of acceptance of the improvements by the City Council

At the end of the two year maintenance period, 80 percent of each type of vegetation must be established and healthy. If at any time during the maintenance period, the landscaping falls below the 80 percent level, the Permittee shall immediately reinstall all deficient planting at the next appropriate planting opportunity and the two year maintenance period shall begin again from the date of replanting. If the Permittee fails to make replanting promptly, the City may do the work and the Permittee and surety shall be responsible for the cost thereof.

For water quality facilities, the permittee is responsible for the maintenance of this facility for a minimum of two years following construction and acceptance per the approved maintenance plan agreement. Irrigation is to be provided per separate irrigation plan as approved. The engineer or owner's representative is to visit and evaluate the site a minimum of twice annually. The facility shall be re-excavated and planted if siltration is greater than 3-inches in depth occurs within the two year maintenance period.

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### 107 PROSECUTION AND PROGRESS OF WORK

### 107.1.00 Preconstruction Conference

The Contractor shall, when requested or specified, meet with the City Engineer for a preconstruction conference at a time mutually agreed upon to discuss the construction schedule set forth in Section 107.2.00 and items of work which require special coordination between the Contractor and City.

### 107.2.00 <u>Contractor's Construction Schedule</u>

Before starting work, the Contractor shall submit a proposed construction schedule to the City Engineer.

### 107.3.00 <u>Authorization to Proceed</u>

Issuance of the Permit shall serve as authorization for the Contractor to proceed. Accordingly, the Permit will not be issued until all required provisions for fees, insurance, permits, easements, and rights-of-way have been satisfied by the applicant.

Authorization to proceed for street projects may be delayed by City until required utility relocation, construction, or reconstruction has been completed or has progressed to a satisfactory degree of conformance which will allow initial construction work to commence.

The Contractor shall notify the City Engineer at least two working days in advance of the time and place work will be started.

### 107.4.00 Suspension of Work

The Contractor shall immediately suspend work on the project wholly, or in part, as directed by the City Engineer pursuant to Sections 104.1.00 and 104.2.00 due to: (1) failure to correct unsafe conditions for working personnel, the general public or City's employees, (2) failure to carry out provisions of the plans and specifications, and (3) failure to carry out orders or directives for such periods as the City Engineer deems necessary due to conditions considered unsuitable for the performance of the work or for public health, safety, and welfare.

When the Contractor voluntarily suspends operations because of seasonal conditions or other unsuitable conditions, an order to suspend the work may not be required or issued by the City Engineer.

Voluntary or involuntary suspension or slowdown of the work, with or without the

approval of the City Engineer, and suspension of work ordered by the City Engineer, will not be grounds for claims for damages, idle equipment, or labor by the Contractor.

The Contractor shall be responsible for the care of work performed and take every precaution to prevent damage or deterioration of the work. The Contractor shall be responsible for work, including temporary protection devised to warn, safeguard, protect, guide and inform traffic during suspension, the same as though its performance had been continuous and without interferences.

In cases of involuntary suspension, work will be resumed only upon written order of the City Engineer.

# 107.5.00 <u>Revocation of Permit</u>

Should the Permittee or Contractor fail to comply with an order to suspend work or otherwise continue operating in violation of this code, the City Engineer may revoke the Permit, as provided in Section 104.1.00.

The Permittee may appeal the suspension or revocation of the Permit as set forth in Section 104.6.00 of this Code.

### 107.6.00 <u>Contractor's Representative</u>

The Contractor shall designate in writing, before starting work, an authorized representative who shall have complete authority to represent and to act for Contractor, in Contractor's absence from the work site, in all directions given by the City Engineer. Contractor or Contractor's authorized representative, shall supervise the work, and shall be present on-site continually during its progress. The Contractor shall maintain an office on or adjacent to the project site. The Contractor shall keep a complete copy of the stamped, approved plans and specifications on or near the site at all times. If Contractor and Contractor's authorized representative are not present on any part of the work where it may be necessary to give instructions, directions may be given by the City Engineer to the superintendent or foreman who may have charge of that particular part of the project, and such directive shall be received and followed. Such directions shall not change the status of Contractor or subcontractor, nor make the City an employer, or give City direct responsibility for the methods of construction or scheduling of the work. Such directions of major importance will be confirmed in writing. Minor directives will be confirmed in each case in writing upon request from the Contractor.

# 107.7.00 Conflicts, Errors, Omissions, and Additional Drawings

The Contractor shall check and compare all plans prior to construction and notify City Engineer of any discrepancies or omissions to permit correction in a timely manner. Coordination of plans and specifications is intended. The intent of the plans and specifications intend to show and describe a complete project within the project limits. Dimensions shown on plans shall be followed, rather than scale measurements. Whenever 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. In case of conflict between requirements set forth in the Permit, the provisions for order of precedence in Section 103.2.00 shall apply.

# 107.8.1 <u>As-Built Plans</u>

### 107.8.2 Public Works Permit

Prior to final inspection, one (1) set of as-built drawings shall be submitted for preliminary review. Depth of sanitary and storm sewer laterals to be shown and laterals to be "tied" to nearest property corner. Drawings shall describe all revisions to the previously approved construction plans. If this submittal is acceptable, the Design Engineer shall submit the as-built drawings on 3 mil minimum thickness mylar (maximum size: 24" x 36") suitable for reproducing and microfilming. If the first submittal was not acceptable, the City Engineer will give the design engineer notice of what is required for resubmittal.

### 107.8.3 <u>Water Quality Permit</u>

Prior to final inspection, one set of as-built drawings shall be submitted for preliminary review. Drawings shall describe all revisions to the previously approved construction plan. If this submittal is acceptable, the Design Engineer shall submit stamped as-built drawings (maximum size 24" x 36") suitable for reproducing. If the first submittal was not acceptable, the City Engineer will give the design engineer notice of what is required for resubmittal.

# 107.9.1 <u>Completion and Acceptance</u>

### 107.9.2 Public Works Permit

Upon completion, the Contractor shall notify the City Engineer (in writing) that the work is completed and request a final inspection, as provided in Section 104.17.00.

When the City Engineer is satisfied the completed work complies with the approved plans and specifications, the Permittee has furnished as-built drawings, the maintenance assurance has been submitted and accepted as required in Section 106.16.00, and all fees have been paid in accordance with Section 102.3.01, the City Engineer shall recommend acceptance of the work by the City. Final acceptance will be by resolution of the City Council. The maintenance and warranty period shall

commence on the date of the resolution accepting the work.

### 107.9.3 Water Quality Permit

Upon completion, the Contractor shall notify the City Engineer in writing that the work is completed and request a final inspection as provided in Section 104.17.00.

When the City Engineer is satisfied that the completed work complies with the approved plans, the Permittee has furnished as-built drawings, the maintenance assurance has been submitted and accepted as required in Section 106.16.01, and all fees have been paid in accordance with Section 102.3.01, the City Engineer can recommend approval of a Certificate of Occupancy. This approval does not remove the need to complete all other work required through the land use approval or other permits.

# **CHAPTER 300**

# **TECHNICAL SPECIFICATIONS**

| 301 | Mobilization   | 126 |
|-----|--|-----|
| 302 | Temporary Traffic Control  | 128 |
| 303 | Clearing and Grubbing  | 133 |
| 304 | Road Excavation and Embankment   | 136 |
| 305 | Subgrade   | 140 |
| 306 | Watering   | 145 |
| 307 | Geotextile Fabric  | 147 |
| 308 | Base and Leveling Courses  | 152 |
| 309 | Asphalt Concrete Pavement  | 157 |
| 310 | Portland Cement Concrete Pavement  | 183 |
| 311 | Concrete Curb and Gutter/Standard Curb                                       | 203 |
| 312 | Concrete Sidewalks, Pathways, and Driveway Approaches                        | 209 |
| 313 | Surface Restoration  | 217 |
| 314 | Hydroseeding and Mulching  | 224 |
| 315 | Cold Plane Pavement Removal  | 229 |
| 316 | Mailbox Installation   | 232 |
| 317 | Pavement Marking   | 234 |
| 318 | Permanent Traffic Control  | 240 |
| 319 | Tree Preservation and Protection   | 244 |
| 320 | Trench Excavation and Backfill   | 249 |
| 321 | Storm Drain Pipe   | 256 |
| 322 | Sanitary Sewer Gravity Pipe  | 262 |
| 323 | Water Quality Facilities   | 270 |
| 324 | Manholes   | 274 |
| 325 | Catch Basins and Ditch Inlets  | 280 |
| 326 | Water Pipe and Fittings  | 284 |
| 327 | Water Valves and Related Equipment   | 297 |
| 328 | Fire Hydrant Assemblies  | 304 |
| 329 | Water Meters and Boxes   | 308 |
| 330 | Water Backflow Preventer (Prevention) Assemblies                             | 311 |
| 331 | Public Utility Installation  | 315 |
| 332 | Pole Attachments, Small Cell Wireless, and Distributed Antenna Systems (DAS) | 317 |

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#### 301 MOBILIZATION

#### 301.1.00 <u>General</u>

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; construct project information signs if required; prepare for construction; demobilize including removal of all facilities and clean up.

#### 301.2.00 Materials

Provide all materials required to accomplish the work as specified.

### 301.3.00 Workmanship

#### 301.3.01 <u>General</u>

Set up construction facilities in a neat and orderly manner within designated or approved work area. Supply all labor and equipment necessary to accomplish the work as specified. Conform to applicable requirements of the GENERAL SPECIFICATIONS including, but not limited to required notifications, protection of surveying monuments and other markers, temporary traffic control, temporary utility connections, protection of property, and dust control. (BLANK PAGE)

# 302 TEMPORARY TRAFFIC CONTROL

### 302.1.00 <u>General</u>

With the permit application submittal, provide a proposed traffic control plan that meets the requirements of this Code and the current version of the Manual of Uniform Traffic Control Devices or the Oregon Temporary Traffic Control Handbook for project durations of three days or less as approved by the City Engineer. On the traffic control plan, show all planned vehicular and bicycle lane closures, sidewalk closures, temporary traffic control devices, and all traffic control devices that may be impacted by the project, including but not limited to signals and signs.

Provide for the safe and proper routing of vehicular, bicycle, and pedestrian traffic in a manner that will minimize congestion and delay and maintain safety. Furnish, install, and maintain all construction signs and detour signs, temporary signs, temporary striping and pavement markings, lights, flares, barricades, cones, guardrail, runways, pavement, bridges, stairs, temporary pedestrian walkways, and other devices and facilities necessary to safeguard the public and the work. All temporary pedestrian walkways shall comply with the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way. Relocate devices and facilities as necessary to accomplish the proper routing of traffic as the work progresses and, when no longer needed, remove from the work site.

Notify the City Engineer, Fire Department, other Emergency Services, Police Department, appropriate School District, and Tri-Met before closing any street or portion of a street. For signal shutdowns, obtain a Washington County Traffic Signal Shutdown Permit and provide notifications as required by the permit.

Do not close a street or portion of a street, bicycle lane, or pedestrian route without the City Engineer's approval. Notify those departments when the streets are again passable for emergency vehicles. Do not block emergency vehicle access to consecutive arterial crossings or dead-end streets without special written permission from the Fire Department. Conduct operations with the least interference to the fire equipment access and at no time prevent such access.

Provide night emergency telephone number(s) to the City Engineer, Police Department, and Fire Department so the contractor may be contacted at all times.

### 302.2.00 Work Hour Restrictions

To reduce impacts on traffic and the public, all work on collectors and arterials (as defined and listed in the Tualatin Development Code) shall be subject to the following restrictions:

1. In non-residential areas, the work shall be performed between the hours of 7:00 p.m. and 5:00 a.m., unless otherwise approved by the City Engineer.

2. In residential areas, and areas of exception to 1. Above, no work that impedes traffic in any way will be allowed between the hours of 6:00 a.m. and 9:00 a.m. and between the hours of 3:00 p.m. and 6:00 p.m.

The City Engineer may revise, reduce, or extend the work hour restrictions, and apply restrictions to work in local streets, as necessary to reduce and minimize impacts to traffic.

The Contractor shall conduct its operations such that no work occurs during the restricted time periods. If at any time the Contractor's operations extend into the restricted time periods, all permit work shall immediately cease.

# 302.3.00 Project Information Signing

On all public works permit projects, including franchise utility projects, where the work duration will exceed one week, the Contractor shall provide and install project information signs.

The signs shall be a minimum of 48" x 60" and shall contain the following information:

| Estimated Duration: | (Date)   | to _ | (Date)        |  |
|---------------------|----------|------|---------------|--|
| Project Owner:      |          |      |               |  |
| Project Contractor: |          |      |               |  |
| or More Information | Contact: | (na  | me / phone #) |  |

The signs shall consist of 4" to 6" black letters on a white background, and the signs shall be the product of a commercial sign manufacturer.

The Contractor shall prominently display the signs so that they are visible to the public with one sign facing each direction of traffic, as directed by the City Engineer. No project work will be allowed until the installation of the information signs is complete, and the Contractor shall maintain the signs through the duration of the project.

# 302.4.00 Maintenance Of Traffic

The Contractor shall not store, stockpile or place on a public street, way or sidewalk, any equipment, materials or supplies without first obtaining the authorization of the City Engineer and then only within the limits the City Engineer may designate.

Those parts of public streets, ways and sidewalks that are occupied by the Contractor shall be immediately vacated by the Contractor and returned to public use when his/her use thereof is no longer necessary for the prosecution of the work.

The Contractor shall not impede, at any time, free access for vehicles and pedestrians

to warehouses, offices, dwellings, garages and other properties in the vicinity of the work and on adjacent streets. The Contractor shall provide for local access by phasing operations, bridging or employing other approved means, however, he/she may make special mutual arrangements with occupants and the City Engineer for temporary impediment of such access.

The Contractor shall maintain postal service facilities in accordance with the requirements of the U.S. Post Office Department. The Contractor shall move mailboxes to temporary locations designated by the Post Office Department, and at the completion of the work in each area, replace them in their original location and in a condition satisfactory to the U.S. Post Office Department.

# 302.5.00 Diversion Of Vehicular Traffic

When it becomes necessary to close one or more lanes to vehicular traffic or to otherwise divert such traffic from its normal paths, the Contractor, upon approval of the City Engineer, shall clearly delineate a temporary centerline separating two-way traffic, and dividing lines for other temporary traffic lanes, by employing cones, barricades, reflectors or other approved methods or devices. Placing of devices shall commence sufficiently in advance of the obstruction or other cause of the diverting of traffic, to minimize congestion and shall enable traffic to enter, traverse and leave the site of the work without abrupt or unwarranted changes in direction. The Contractor shall not place devices in the roadway until the City Engineer has approved the type of device and its location.

### 302.6.00 <u>Use Of Construction Area Signs, Lights, Barricades, Delineators And</u> <u>Other Devices</u>

Construction area signs, lights, barricades, delineators and other devices furnished by the Contractor for use on an existing public travel way shall be in accordance with the "2003 Manual of Uniform Traffic Control Devices" (MUTCD). Regulatory and construction signs shall conform to OSHD specifications and drawings. During the hours of darkness, approved lights shall be maintained in sufficient numbers, in proper working order, and locations to adequately alert approaching traffic.

All construction area signs shall conform to the dimensions, color, legend and reflectorization or lighting requirements of the plans, the 2003 MUTCD and these special provisions. All sign panels shall be the product of a commercial sign manufacturer, but used sign panels, in good repair as determined by the City Engineer, may be furnished.

Construction area signs shall not be used until needed and when no longer needed they shall be removed from the site of the work. The Contractor may be required to cover certain signs during the progress of the work.

Covers for construction area signs shall be of sufficient size and density to completely block out the message so that it is not visible either during the day or night and shall be securely fastened to prevent movement by wind action.

Signs damaged by any cause shall be repaired or, if determined by the City Engineer to be irreparable, replaced by the Contractor at the Contractor's expense. To properly provide for changing traffic conditions and damage caused by public traffic or otherwise, the Contractor shall be prepared to furnish on short notice additional construction sign panels, posts and mounting hardware or portable sign mounts. The Contractor shall maintain an inventory of the commonly required items at the job site or shall make arrangements with a supplier who is able, on a daily basis, to furnish such items on short notice.

Prior to starting work which will affect the normal flow of traffic, the Contractor shall furnish and install, wherever necessary or directed by the City Engineer, approved signs mounted on pedestals, posts, barricades or other supports which will orient the sign vertical and normal to the direction of traffic.

Barricades shall be furnished and maintained by the Contractor to channelize traffic in the normal path of travel or to direct traffic along a limited channel. Delineators include lane, edge and channelizing striping, raised pavement markers, various forms of posts, and cylindrical or cone shaped objects commonly known as delineators. Delineation for night time use must be reflectorized.

### 302.7.00 <u>Relocation And Removal Of Existing Permanent Traffic Control And</u> <u>Other Signs</u>

On projects, such as rechannelization and street widening work, where changes in traffic patterns require either relocation, removal or installation of permanent regulatory traffic control and other signs, the Contractor shall relocate, remove or install signs and standards shown on the plans, or directed by the Engineer.

For all existing permanent traffic control signs which are to be removed and not relocated, the Contractor shall remove signs, hardware and standards and place them where directed by the City Engineer. Any signs, standards or hardware damaged by the Contractor through his/her negligence shall be replaced by the Contractor, at no cost to the City.

Temporary relocation of each STOP or other traffic regulatory sign shall be done by the Contractor immediately upon its removal. The relocation of each sign shall be as close as possible to the original position of the sign or as directed by the City Engineer.

### 302.8.00 Use Of Flaggers

During the time of any approved temporary use of any part of the roadway where traffic must be directed through or around the work, the Contractor shall provide trained and properly equipped flaggers, whose sole duty shall be to assist the movement of traffic through or around the work, as applicable.

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### 303 CLEARING AND GRUBBING

#### 303.1.00 <u>General</u>

This section covers work necessary for the completion of all clearing and grubbing including, but not limited to, the removal and disposal of all debris and vegetation such as stumps, trees, logs, roots, shrubs, vines, grass and weeds, and the removal of curbs, pavement, driveways and other structures as required.

#### 303.2.00 Workmanship

#### 302.2.01 <u>General</u>

Clearing and grubbing shall consist of the removal of trees, stumps, debris, plant materials, curbs, pavement, driveways, guard rails, barbed wire fence, and other structures as required. Existing catch basins, culverts, or similar structures which are to be abandoned shall be removed.

Areas to be excavated or occupied by embankment, shall be cleared of all grass and other plant material and all stumps shall be completely removed by grubbing, or other suitable means. All roots and other embedded wood shall be removed to a depth of not less than one foot below the limit lines of excavation. Holes resulting from any grubbing operations shall be filled with suitable materials and thoroughly compacted.

The area on which clearing and grubbing is to be performed shall normally be the area within the right-of-way or slope easements or any area affected by the improvements, or on each side of the roadway centerline to a width of two feet outside of excavation and embankment slope lines or in the case of private driveways, one foot outside of the excavation and embankment slope lines for the driveway.

Where portions of existing driveways and streets are to be removed, the Contractor shall sawcut the driveway and street at the limits of removal. The removal operation shall be performed without damage to any portion of the existing driveway or street that is to remain. Any damage to the existing driveway or street which is to remain in place shall be repaired to a condition equal to that existing prior to the beginning of removal operations. The cost of repairing existing concrete damaged by the Contractor's operations shall be at his expense.

Protect all trees, shrubbery, and other vegetation, not designated for removal, from damage caused by the work as directed. Cut and remove tree branches only where approved. When directed, remove branches other than those required to provide a balanced appearance of any tree.

The Contractor shall give reasonable notice to occupants or owners of adjacent property to permit them to salvage or relocate plants, trees, fences, sprinklers, and other improvements within the right-of-way which are designated for removal and would be destroyed because of the work.

### 303.2.02 Disposal of Waste Material

Remove and dispose of all waste materials or debris at approved disposal sites.

### 303.2.03 Backfilling and Cleanup

In areas not subject to future excavations, fill all holes and depressions caused by clearing and grubbing with material acceptable to the City Engineer and reshape area to conform to adjacent undisturbed topography.

Leave work area in a clean and sightly condition, free from litter and debris.

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# 304 ROAD EXCAVATION AND EMBANKMENT

## 304.1.00 <u>General</u>

#### 304.1.01 <u>Scope</u>

This section covers the work necessary for excavation, construction of embankment, foundation stabilization, and disposal of excess material required in construction of the street improvements.

#### 304.2.00 Materials

### 304.2.01 General Excavation

Excavation is unclassified. Excavate all materials regardless of formation encountered. Contractor shall make his own estimate of the kind and extent of materials that may be encountered.

### 304.2.02 Embankment Foundation Excavation

Excavate all unsuitable material where indicated on the plans or established by the City Engineer and made for the purpose of preparing and stabilizing embankment foundations within areas to be occupied by embankments.

### 304.2.03 Embankment

Embankment shall be suitable excavated materials originating from the project site or where necessary, an approved imported material. The embankment materials shall be free of peat, humus, muck, organic matter, debris, rock fragments in excess of 6 inches in dimension, or other materials detrimental to construction of firm, dense and sound embankment. The Contractor shall make his own investigation and analysis of existing conditions to determine on-site material availability, as the amount suitable for embankment construction is unknown.

Imported material shall be from one source with reasonable grading to be approved by the City Engineer. The Contractor shall notify the City Engineer, as soon as possible, the proposed source of the material and arrange access for the City Engineer's designated geotechnical representative to obtain a test sample, if this is considered necessary.

# 304.2.04 Foundation Stabilization

Foundation stabilization material shall be 4" minus or 1-1/2" minus crushed rock, well graded from coarse to fine, and free of clay or organic material. A suitable geotextile may also be specified at the discretion of the City geotechnical Engineer or the designated representative.

# 304.3.00 Workmanship

# 304.3.01 Excavation

Excavation shall be carried to the lines and grades shown on the Plans and approved by the City Engineer. Special care shall be taken to not excavate below subgrade. Where the street has been excavated below subgrade due to faulty workmanship, it shall be brought to grade with base course material or other suitable material approved by the City Engineer.

# 304.3.03 Embankment

# 304.3.03A Preparation of Embankment Foundations

Prior to construction of embankments, excavate unstable or unsuitable foundation material and dispose of as directed. Limit excavation to lines, grades, and cross sections shown on the Plans or approved by the City Engineer. Scarify, moisture condition and compact natural ground underlying embankments to the depth of grubbing or a minimum of 12-inches, to percentage density specified for the embankment material to be placed. The requirement to scarify and recompact the subgrade may be waived at the discretion of the City Engineer or the City Engineer's designated geotechnical representative on the basis of proof rolling, probing, or other evaluation. On ground with slopes steeper than 5:1 (horizontal:vertical) bench into the existing slope "stair-step" fashion, approved by the City Engineer, to place the embankment material in relatively horizontal compacted lifts to prevent slippage at the embankment-existing slope interface.

# 304.3.03B Embankment Construction

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 density specified. similar structures, in holes, and where embankment and fill materials cannot be reached by normal compacting equipment, compact to specified density by approved methods.

# 304.3.03C Embankment Compacting and Density Requirement

Compact all embankments, fills, and backfills to a minimum density of 92 percent of maximum density per AASHTO T 180. Where materials are used that cannot be tested utilizing the above method (such as coarse aggregates or foundation stabilization material) a method compaction specification will be required. Provide the method compaction specification to the City Engineer or the City Engineer's designated geotechnical representative based on the material characteristics and appropriate compaction equipment.

Apply water to materials to provide compaction of embankments and backfills and to alleviate dust nuisance. Apply water with approved tanker trucks equipped with spray bars, by hose and nozzle, or by other approved equal means that will ensure uniform and controlled application. The use of splash boards will not be permitted without prior approval.

Do not place embankment or backfill materials in final position until moisture in excess of optimum moisture has been stabilized near optimum. Place and compact fill or backfill at a moisture content near optimum to provide a compact stable grade. Where unstable conditions are evident due to moisture deviation from optimum and/or disturbance due to construction traffic, remove or rework, and compact unstable fill to provide a stable grade meeting the compaction requirements outlined above. ( BLANK PAGE )

# 305 SUBGRADE

# 305.1.00 <u>General</u>

This section covers work necessary for preparation of the subgrade, complete. See also Section 303 for Clearing and Grubbing, and Section 304 for Road Excavation and Embankment.

Subgrade is defined as the area of new or existing roads, streets, alleys, driveways, sidewalks, or other public places upon which additional materials are to be placed as a part of work covered in other sections or by future work. Where applicable, subgrade is considered to extend over the full width of the specified base course. Subgrade is classified as untreated or treated.

# 305.1.01 Untreated Subgrade

The uppermost material placed in embankments or cuts in the normal grading of the roadbed and which is brought to true line and grade, shaped and compacted as necessary to provide a foundation for the pavement structure.

## 305.1.02 Treated Subgrade

Subgrade which is improved by the addition of stabilizers and prepared as in 305.1.01 Untreated Subgrade.

### 305.2.00 <u>Materials</u>

### 305.2.01 Soil Stabilizing Materials

Soil stabilizing materials shall conform to the following requirements:

| Material                 | Туре                                | Grade                         |
|--------------------------|-------------------------------------|-------------------------------|
| Granular Quicklime (CaO) | AASHTO T 27 and T 219 for           | 100% passing, 3/8-inch sieve, |
|                          | grading and hydroxide content, with | max 25% passing, 100 sieve    |
|                          | min. 85% calcium hydroxide          |                               |
| Calcium Chloride         | ASSHTO M 144, sample and testing    |                               |
|                          | in accordance with ASSHTO T 143     |                               |
| Sodium Chloride          | AASHTO M 143                        |                               |
| Portland Cement          | ASSHTO M 85                         | Conform to Portland Cement in |
|                          |                                     | Section 310                   |

Storage of materials shall conform to storage and protection of materials in General Specifications.

## 305.2.02 <u>Water</u>

Conform to the requirements in Section 306 Watering.

## 305.3.00 Workmanship

### 305.3.01 Preparation

In advance of setting line and grade, clear and dispose of brush, weeds, vegetation, grass, and debris off the subgrade. Drain all depressions or ruts which contain water. Blade and drag subgrade to remove irregularities and secure a uniform surface.

Complete all underground work contemplated in the area of the subgrade including backfill before subgrade work is started. This requirement includes work under the permit, work to be performed by the City or by others.

## 305.3.02 Untreated Subgrade

Excavate and shape subgrade to line, grade, and cross section. Compact to the depth of grubbing or a minimum of 12-inches, not less than 92 percent of maximum density as determined by AASHTO T 180. Remove all soft or otherwise unsuitable material disclosed by the proof-rolling as directed and replace with approved material. Compact to one foot beyond the edge of paving, curb, or form.

Subgrade areas that cannot be compacted to specified density, but which in the judgment of the City Engineer otherwise meet the requirements herein, may be removed and aerated or stabilized with an approved soil stabilizing material.

Do not excavate or shape subgrade in the rain.

### 305.3.03 Treated Subgrade

### 305.3.03A General

At Contractor's option, the subgrade material may be moistened and/or loosened by scarifying to the depth to be treated prior to application of the stabilizing materials, as approved.

Dry and reduce cemented soil clods to moisture content and size specified. Shape and size the subgrade material blanket to the size that can pass through the mixing machine. Apply stabilizing materials only when temperature is above freezing, or when wind and other weather conditions are not detrimental to the work or to the public, as approved. Take all precautions necessary to prevent injury to persons, livestock, or property. Any material which is spilled or deposited at places other than on areas designated to be treated must be immediately picked up, buried, or made harmless.

## 305.3.03B Addition of Stabilizing Material

Apply stabilizer at a uniform rate as specified. Use equipment and methods that will ensure the uniformity of stabilizer distribution. Immediately discontinue use of any equipment or methods which result in excessive loss or displacement of the stabilizer, as directed. Replace stabilizer lost, displaced by blowing, washing, or misplaced by other causes before it is mixed with or incorporated in the soil. The use of blade graders to distribute lime and cement will not be permitted. No equipment except that used for watering and for applying and mixing the stabilizer will be permitted to pass over spread stabilizer until after it is mixed into the soil. If necessary, add water during mixing operations to provide an optimum moisture content.

Apply at a uniform rate, as specified, calcium chloride or sodium chloride or Portland Cement to the scarified subgrade in the same manner as for lime.

## 305.3.03C Mixing

Spread soil stabilizing material on a treated subgrade with approved equipment which uniformly distributes the required amount of material for the full width of the prepared subgrade. Continue mixing or remixing operations until the mixture is uniform, free of streaks or pockets of soil stabilizing material, and all material other than stones will pass a 2-inch sieve and at least 60 percent of which will pass a No. 4 sieve.

The stabilizing material content of samples taken periodically from the spread mixtures shall be within 1 percent of the content specified or approved.

### 305.3.03D Compaction

Immediately after mixing treated subgrade, spread mixture to specified line, grade, and cross section and compact entire depth of mixture to not less than 92 percent of maximum density as determined by AASHTO T 180.

Compact and finish cement treated surface within three hours after cement is applied. Compact and finish other treated surfaces within 12 hours after compaction begins. If not compacted and finished within this time period, loosen the mixture and add stabilizing material and water as directed, remix, relay, and compact. During compaction, maintain surface of mixture at proper grade and cross section and lightly water to retain optimum moisture content. Accomplish final finishing by rolling accompanied by light watering and reshaping to provide a surface free of hairline cracking.

# 305.3.04 <u>Tolerances</u>

Rework areas found to be deficient in thickness by more than 0.04-foot or excessive in thickness by more than 0.08-foot, except that fresh stabilizing material shall be added in an amount equal to one-half of the original amount, as specified.

The finished surface of treated and untreated subgrade shall not vary more than 0.04-foot from established grade and cross section at any point. The finished surface, when tested with a 10-foot straightedge, shall not vary from the testing edge by more than 0.08-foot at any point.

# 305.3.05 Curing Treated Subgrade

Limit traffic over treated subgrade to wheel loads which do not cause any damage to the subgrade and which do not visibly deflect, ravel or wear the surface. Keep the finished surface moist and protected from rutting, spalling, displacement, and disfiguration until a subsequent course of planned construction, which will prevent drying of the mixture by evaporation or absorption, is placed thereon. (BLANK PAGE)

## 306 WATERING

### 306.1.00 <u>General</u>

This section covers work necessary to furnish and apply water or combinations of water and compatible binders or additives for roadway excavations, embankments, subgrades, road beds, backfills, subbases, bases and surfacings, and water for the alleviation or prevention of dust within the project limits, as directed.

Excluded from this section is watering used in connection with Portland Cement concrete construction, wetting foundations preparatory to placing concrete thereon, curing concrete, and watering which is specified as incidental.

## 306.2.00 Materials

### 306.2.01 <u>Water</u>

Water shall be free of silts and other deleterious matter. Maintain an adequate supply of water at all times, as approved. Where the Contractor proposes using water from the City's water system, including hydrants, all necessary meters and/or permits from the City Operations Department shall be obtained prior to any usage.

### 306.2.02 Binders and Additives

When shown, specified or directed use a mixture of water and an approved compatible binder or additive material.

### 306.3.00 Workmanship

Watering shall at all times be under the direction and subject to control of the City Engineer, as approved.

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 necessary. Sprinkle directly on the road only when loss by evaporation is at a minimum, unless otherwise directed.

When compatible binder material or additive is combined with water in the work, mix in conformance with the manufacturer's directions, as specified or as directed.

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# 307 GEOTEXTILE FABRIC

# 307.1.00 <u>General</u>

### 307.1.01 <u>Scope</u>

This section consists of furnishing and placing geotextile fabric in drains, under embankments and riprap, behind retaining structures, over roadbed subgrades, and beneath pavement overlays as shown on the Plans or as directed by the City Engineer.

### 307.2.00 Materials

# 307.2.01 <u>General</u>

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. Geotextiles may be rejected by the City Engineer if dimensional stability or resistance to ambient temperatures, acid and alkaline conditions and micro-organisms/insects does not appear to be satisfactory for the intended purpose.

### 307.2.02 Acceptance Requirements

Acceptance will be based on either the manufacturer's certification or the manufacturer's brochure of geotextile properties.

(a) If a manufacturer's certification is furnished, it shall state that the geotextile delivered meets or exceeds the minimum average roll values for each of the specified properties.

(b) If a brochure is furnished, it shall be current and accurate and indicate that all specified properties have been met or exceeded.

(c) The City Engineer reserves the right to require samples and to test for compliance.

# 307.2.03 Property Requirements

Both monofilament-woven or non-woven fabric (except pavement overlays, use non-woven fabric only) shall be furnished, manufactured specifically for use in civil engineering applications with fibers consisting of long chain synthetic polymers. Slit film or slit tape fabrics will only be permitted for subgrade or embankment applications. The following requirements shall apply:

## MINIMUM TEST VALUES

|  |           | Geot   | extile Appli | cation     |         |
|--|-----------|--------|--------------|------------|---------|
| Geotextile Property  | Drainage  | Riprap | Subgrade     | Embankment | Overlay |
| Grab Tensile Strength lbs.<br>ASTM D 4632                                | 180       | 260    | 180          | 230        | 80      |
| Grab Elongation %<br>ASTM D 4632   | 15        | 15     | -            | -          | 50      |
| Burst Strength psi<br>(Diaphragm Method)<br>ASTM D 3786                  | 290       | 430    | 290          | 430        | -       |
| Puncture Strength lbs.<br>ASTM D 3787                                    | 80        | 110    | 80           | 110        | -       |
| Apparent Opening Size<br>(or smaller opening)<br>US Std Sieve ASTM D 475 | 1) 70     | 70     | 30           | 30         | -       |
| Water Permeability cm./sec<br>ASTM D 4491                                | c.<br>0.1 | 0.1    | 0.005        | 5 0.005    | -       |
| Ultraviolet Stability<br>% strength retained<br>ASTM D 4355 @ 500 hours  | s -       | 70     | -            | -          | -       |
| Asphalt Retention gal./sq.ye<br>OSHD TM 817                              | d.<br>-   | -      | -            | -          | 0.2     |
| Melting Point F<br>ASTM D 276  | -         | -      | -            | -          | 300     |

## 307.3.00 Workmanship

## 307.3.01 <u>General</u>

The geotextile shall be installed as described herein and as shown on the plans, or as directed by the City Engineer. The geotextile will be rejected if, at the time of installation, it has defects, deterioration, or damage, as determined by the City Engineer.

The surface receiving the geotextile shall be prepared to a smooth condition free of obstructions, depressions and debris, unless otherwise directed by the City Engineer. The geotextile shall be placed loosely and without wrinkles so that placement of the overlying material will not tear the geotextile, with laps as specified, at the ends and sides of adjoining sheets, adequately secured to prevent slippage. The machine direction shall be oriented up-down the slope and the upper sheets shall lap over the top of the lower sheets.

Placement of fill material shall start at the toe of the slope and proceed upwards.

Geotextile placed under water shall not progress more than 50-feet ahead of the backfill material; and when placed on soft ground allow sufficient extra fabric at the edges to maintain a separation layer between the fill material and soft ground with settlement/consolidation of the underlying soil.

# 307.3.02 Protection of Geotextile

Traffic or construction equipment will not be permitted directly on the geotextile and it shall be protected from surface runoff or other possible sources of contamination until the placement of cover material; uncovered conditions shall not exceed 7 days. Specified cover material shall be placed in such a manner that the textile is not torn, punctured, or shifted.

For geotextile under riprap, the Contractor shall demonstrate to the satisfaction of the City Engineer that the combination of the rock fill drop height (not to exceed 3feet) and the thickness of any aggregate cushion, when specified or required, is adequate so as not to puncture or damage the geotextile. After placement of the riprap, all voids in the riprap face that allow the geotextile to be visible shall be satisfactorily backfilled so that the geotextile is completely covered.

For roadbed subgrade separation geotextile placement, construction vehicles shall be limited in size and weight such that rutting in the initial lift above the geotextile is no greater than 3-inches deep. The turning of vehicles on the first lift will not be permitted. Geotextile failures, as evidenced by soil pumping or roadbed distortion, shall be corrected by removing any covering material in the affected area and repairing any damaged or distorted geotextile.

All geotextiles that are torn, punctured, or contaminated during construction shall be repaired or replaced by the Contractor. The repair shall consist of a patch of the same type of geotextile placed over the affected area, overlapping a minimum of 2feet from the edge of any part of the rupture.

# 307.3.03 <u>Overlaps</u>

Minimum overlap requirements for geotextiles are one foot for drains and two

feet for all other applications, except overlays which shall have an overlap of not more than 6-inches in the direction of the paving.

# 307.3.04 Overlay Sealant

Apply PBA-5 asphalt at normal application temperature at the rate of 0.20 to 0.30 gallons per square yard. A cationic emulsion may be used as approved, but do not use cutbacks.

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# 308 BASE AND LEVELING COURSES

## 308.1.00 <u>General</u>

#### 308.1.01 <u>Scope</u>

This section covers the material quality and work necessary for the construction of the base and leveling courses, including the gravel base under concrete sidewalks and driveways, complete as shown on the plans and specified under these items.

### 308.1.02 Subgrade Approval

Base course work shall not start until subgrade preparation work has been completed and approved by the City Engineer.

### 308.2.00 Materials

Aggregates for base and leveling coarse shall be crushed gravel or crushed rock conforming to the requirements contained herein.

### 308.2.01 Base and Leveling Course Rock

Base and leveling course rock shall conform to the following:

| Sieve  | Size Base          | Leveling |
|--------|--------------------|----------|
| Passir | ng 1-1/2"          | 3/4"     |
| 2"     | 100                |          |
| 1-1/2" | 95-100             |          |
| 1"     |                    | 100      |
| 3/4"   | 55-75              | 90-100   |
| 3/8"   |                    | 55-75    |
| 1/4"   | 35- 50             | 40- 60   |
|        | Fraction Pass 1/4" |          |
| # 10   | 40- 60             | 40- 60   |

# **GRADING REQUIREMENTS**

Where a tolerance range is set forth in the above grading requirements, 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. The determination of sizes and grading of aggregate shall conform to AASHTO T27.

| Test             | Test Method | Requirements     |
|------------------|-------------|------------------|
| Liquid Limit     | AASHTO T 89 | N.P. or 33 max.* |
| Plasticity Index | AASHTO T 90 | N.P. or 6 max.*  |

## LIQUID LIMIT AND PLASTICITY INDEX

\* When tested as specified, both the liquid limit and plasticity index test results shall conform to the following:

| Percent of Material | Liquid Limit | Plasticity Index |
|---------------------|--------------|------------------|
| Passing # 40 Sieve  | (Max.)       | (Max.)           |
| AASHTO T 90         |              |                  |
| 0.0 to 5.0, incl.   | 33           | 6                |
| 5.1 to 10.0, incl.  | 30           | 5                |
| 10.1 to 15.0, incl. | 27           | 4                |
| 15.1 to 20.0, incl. | 24           | 3                |
| 20.1 to 25.0, incl. | 21           | 2                |
| Over 25.0           | 21           | <u>0 or N.P.</u> |

## FRACTURE OF ROUNDED ROCK

Fracture of rounded rock will be determined according to ODOT TM 213. Provide at least one mechanically fractured face based on the following percentage of particles retained on the  $\frac{1}{4}$ " sieve for the designated size:

| Designated Size      | Minimum % of Fractured Particles (by mass) of Material Retained on ¼" Sieve |
|----------------------|---|
| 1½" – 0 and larger   | 50  |
| Smaller than 1½" – 0 | 70  |

# DURABILITY

Base aggregate shall meet the following durability requirements:

| Test                            | Test Method | Requirements |
|---------------------------------|-------------|--------------|
| Abrasion                        | AASHTO T 96 | 30.0% Max.   |
| Degradation (Coarse Aggregate): |             |              |
| Passing 850μm sieve             | ODOT TM 208 | 30.0% Max.   |
| Sediment Height                 | ODOT TM 208 | 3.0" Max.    |

## 308.2.02 Gravel Base Under Sidewalks and Driveways

Gravel base rock shall be the same as leveling course rock described in Section 308.2.01 above.

### 308.3.00 <u>Workmanship</u>

No rock shall be placed or compacted against concrete, curb or gutter, or other structures, until seven days after the concrete has been placed, and they have been backfilled to provide lateral support.

## 308.3.01 Base Course

Spread base course material on the prepared subgrade to such a depth that when thoroughly compacted it will conform to the grades and dimensions shown on the Plans, with proper allowance for the leveling course hereinafter specified. Build the base course up in layers, with a maximum compacted thickness of 6 inches per layer. Spread crushed rock in an even course of uniform thickness from vehicles equipped with spreading devices. Avoid segregation of material and spread material to be free from pockets of large or fine material.

In general, begin spreading at the end of the work farthest from the point of loading materials. Do not dump base course materials in piles upon the subgrade.

After the base course has been spread and brought to line and cross section, compact with approved equipment to achieve a minimum of 92 percent of the maximum density when tested in accordance with AASHTO T 180, as determined by the City Engineer. Add sufficient water as needed to facilitate the movement of key material into the voids. Remove all soft or otherwise unsuitable material disclosed by the proof-rolling as directed and replace with an approved material as specified herein.

The surface of the base course must be parallel with the cross section and grade established for the top of base course within 0.04 feet.

# 308.3.02 Leveling Course

Spread leveling course material on the completed base course to such a depth that when thoroughly compacted, it will conform to the grades and dimensions shown on the Plans with proper allowance for the finished pavement. The leveling course shall be bladed and rolled to a true surface and cross section. The finished surface of the leveling course shall not vary more than 0.02 foot above or below the specified cross section or grade at any point. The compaction and watering of the leveling course shall be performed as hereinbefore specified for the base course.

# 308.3.03 Care of the Work

Following construction of each layer and following completion of the subbase or base, the Contractor shall do such work as the City Engineer determines necessary to prevent or repair segregation, raveling or rutting, and to maintain the layer or course to specified condition until it is covered with a following layer or course, or until all permit work is completed, as pertinent. ( BLANK PAGE )

# 309 ASPHALT CONCRETE PAVEMENT

### 309.1.00 <u>General</u>

#### 309.1.01 <u>Scope</u>

This work consists of constructing one or more courses of asphalt cement concrete pavement, plant mixed into a uniformly coated mass, hot laid on a prepared foundation, compacted to specified density and finished a specified smoothness to the lines, grades, thicknesses, and cross sections shown on the Plans or established by the City Engineer.

Asphalt concrete shall be a hot mixture of asphalt cement (HMAC); well graded, high quality aggregate; mineral filler and additives as required.

The Contractor may substitute warm mixed asphalt concrete (WMAC) where HMAC is called for.

Warm mixed asphalt concrete is an asphalt concrete mix following all requirements of HMAC, except that through use of additives or processes, it is mixed and placed at lower temperatures.

### 309.1.02 Prior Approval

Asphalt concrete work shall not start until base and leveling course work has been completed and approved and all underground utility tests (e.g. mandrel, pressure test, television inspection) have been completed and approved by the City Engineer. Repair or replace curbs prior to top/final lift.

### 309.2.00 Materials

### 309.2.01 <u>New Aggregates</u>

#### 309.2.01A General

New aggregates shall be hard, sound, durable, and free of deleterious substances. No sandstone, shale, or other soft material will be allowed.

Prior to producing aggregates, the Contractor shall advise the City Engineer as to the type of bituminous mixing plant to be used and the size or sizes of coarse and fine aggregate to be produced. The supplier shall maintain current records of the test results at the plant and make them available to the Engineer for information and use in the approval of mixtures. The Contractor shall modify or adjust crushing and screening operations as necessary to produce materials meeting the specifications. During production of aggregates, samples of each size shall be provided as frequently as the Engineer considers necessary to determine conformance to the specifications.

When treatment of aggregates with hydrated lime is required, all testing requirements will apply prior to treatment.

The aggregate shall be stockpiled and removed from stockpiles in a manner that will minimize segregation.

Provide and stockpile new aggregates and RAP aggregates according to the following requirements:

- (a) General Produce and stockpile aggregate as follows:
  - (1) <u>Separated Sizes</u> Advise the Engineer of the separated size(s) of coarse and fine aggregate that will be used and the proposed targets for each individual sieve size for each stockpile. If the contractor wishes to produce coarse and fine aggregates in separated sizes other than those specified, request the proposed size changes in writing, and state the proposed target value and specified tolerance for each of the individual sieve sizes of the proposed materials.
  - (2) <u>Scalping</u> Scalp the rock on a ¾" sieve screen deck (after it has passed through the primary crusher if quarry rock is used). The material remaining may be accepted for use by visual inspection. The Engineer may perform verification testing of the gradation. The material shall meet the following:

| Table 1 - | Scalping |
|-----------|----------|
|-----------|----------|

<u>Sieve Size</u> 8" 3⁄4" Percent Passing (by Mass) 95-100 5 Max.

# 309.2.01B Fracture of Gravel

A minimum of 75 percent of crushed gravel retained on the 1/4-inch sieve shall have two fractured faces. A minimum of 75 percent of the material passing the 1/4-inch sieve but retained on the #10 sieve shall have one fractured face. Testing for fracture shall conform to WAQCT TM 1.

### 309.2.01C Sand Equivalent

Sand equivalent shall not be less than 45 when tested in accordance with AASHTO T 178, except as follows. Fine aggregate produced in two separate sizes (1/4" - #10 and #10 - 0) shall be blended together at a 1:1 ratio when testing for sand equivalent.

## 309.2.01D Durability

The material from which the aggregates are produced and the crushed aggregates shall meet the following test requirements.

|  |   | Maximum Values       |                 |  |
|--|---|----------------------|-----------------|--|
| Test   | Test Method                               | Course<br>Aggregates | Fine Aggregates |  |
| Soundness (5 cycles)   | AASHTO T<br>104                           | 12%                  | 12%             |  |
| Degradation<br>Passing No. 20 Sieve<br>Sediment Height<br>Los Angeles Abrasion | ODOT TM 208<br>ODOT TM 208<br>AASHTO T 96 | 30%<br>3"<br>30%     | 30%<br>4"<br>-  |  |

### Table 2 - Durability

### 309.2.01E Deleterious Substances

The amount of deleterious substances in each test fraction of the crushed aggregate material shall not exceed the following values.

| Table 3             | – Deleterious Substance | s           |
|---------------------|-------------------------|-------------|
|                     |                         | Maximum     |
|                     |                         | Percentages |
| Test                | Test Method             | (By Weight) |
| Light Weight Pieces | AASHTO T 113            | 1.0         |
| Wood Particles      | TM 225                  | 0.1         |
| Friable Particles   |                         |             |
| Coarse              | AASHTO T 112            | 1.0         |
| Aggregate           |                         |             |
| Fine Aggregate      | AASHTO T 112            | 1.5         |
| Flat and Elongated  |                         |             |
| Pieces              |                         |             |
| Coarse              | TM 229                  | 10.0        |
| Aggregate           |                         |             |
| Plasticity Index    | AASHTO T 89             | 0 or NP     |
| -                   | AASHTO T 90             |             |

The aggregates shall be free from all other deleterious substances such as soft or disintegrated pieces, clay, loam, or vegetative matter, either in a free state or adherent to the aggregate.

### 309.2.01F Coarse Aggregate Grading

That portion of the aggregate retained on a 1/4-inch sieve with allowable undersize will be known as coarse aggregate and shall be crushed rock or crushed gravel.

The grading of the separated sizes of coarse aggregate shall conform to the following target values:

|                          |                 | Se        | eparate Sizes   | (Percentage of W | /eight)         |           |
|--------------------------|-----------------|-----------|-----------------|------------------|-----------------|-----------|
|                          | 3/4             | " - 1/4"  | . 3/4           | ·" - 1/2"        | 1/2             | " - 1/4"  |
| Sieve<br>Size<br>Passing | Target<br>Value | Tolerance | Target<br>Value | Tolerance        | Target<br>Value | Tolerance |
| 1"                       | 100             | 0         | 100             | 0                | -               | -         |
| 3/4"                     | 90              | +/- 5     | 75              | +/- 7            | 100             | - 1       |
| 1/2"                     | 60              | +/- 8     | 8               | +/- 8            | 95              | +/- 5     |
| 1/4"                     | 8               | +/- 8     | 7               | +/- 7            | 8               | +/- 8     |
| #10                      | 5               | +/- 5     | 5               | +/- 5            | 5               | +/- 5     |
| #40                      | 3               | +/- 3     | 3               | +/- 3            | 3               | +/- 3     |
| #200                     | 1               | +/- 1     | 1               | +/- 1            | 1               | +/- 1     |

# Table 4 – Coarse Aggregate Grading

# 309.2.01G Fine Aggregate Grading

That portion of the aggregate passing the 1/4-inch sieve with allowable oversize shall be known as fine aggregate and shall consist of finely crushed rock or finely crushed gravel and fine sand. No more than 15 percent by weight of natural or uncrushed material passing the #10 sieve shall be re-blended into the total fine aggregate.

The grading of the fine aggregate shall conform to the following target values.

| Table 5 – | Fine Aggregate | Grading |
|-----------|----------------|---------|
|-----------|----------------|---------|

|                          | Separate Sizes (Percentage of Weight) |           |                 |           |                 |           |  |
|--------------------------|---------------------------------------|-----------|-----------------|-----------|-----------------|-----------|--|
|                          | 1/-                                   | 4" - 0    | 1/4             | -" - #10  | #′              | #10 - 0   |  |
| Sieve<br>Size<br>Passing | Target<br>Value                       | Tolerance | Target<br>Value | Tolerance | Target<br>Value | Tolerance |  |
| 3/8"                     | 100                                   | -1        | 100             | -1        | -               | -         |  |
| 1/4"                     | 93                                    | +/- 7     | 90              | +/- 10    | 100             | - 1       |  |
| #10                      | 52                                    | +/- 4     | 10              | +/- 7     | 90              | +/- 10    |  |
| #40*                     | 42                                    | +/- 10    | 5               | +/- 5     | 37              | +/- 8     |  |
| #200                     | 14                                    | +/- 5     | 2               | +/- 2     | 12              | +/- 4     |  |

\* Not required for Class "E" and "F" mix aggregates.

# 309.2.01H Aggregate Treatment

When specified or directed, new aggregates shall be treated with lime in the following proportions to undergo an aging process.

| Separated Sizes                     | Percent Hydrated Lime<br>(by Weight of Aggregate) | Tolerance<br>(Percent) |
|-------------------------------------|---|------------------------|
| 3/4"-1/4", 3/4"-1/2", 1/2"-<br>1/4" | 0.35  | +0.15                  |
| 1/4"-0                              | 1.5   | +0.15                  |
| 1/4"-#10                            | 1.0   | +0.15                  |
| #10-0                               | 2.0   | +0.15                  |

| Table 6 | _ | Lime | Treatment |
|---------|---|------|-----------|
|         |   |      |           |

Each size of aggregate shall be stockpiled separately. One of the following treatment procedures shall be used.

- 1) Dry Hydrated Lime Added to Wet Aggregates At the time of mixing the aggregate and hydrated lime, the minimum moisture content of the coarse and fine aggregate shall be 2.5 percent and 5.0 percent, respectively. Hydrated lime, water, and aggregate shall be thoroughly mixed in a pug mill or other approved mechanical mixer and shall then be stockpiled. If the aggregate contains free water (water not adhering to the aggregate surface), the excess moisture shall be removed before adding hydrated lime. The mixed material shall remain in the stockpile for a minimum of 24 hours before being used in the production of asphalt concrete mixture.
- 2) Lime Slurry Added to Aggregates The lime shall be added to the aggregate in the form of a slurry. The lime slurry shall contain a minimum of 70 percent water by weight. The slurry and aggregate shall be thoroughly mixed in a pug mill or other approved mechanical mixer and shall then be stockpiled. The mixed material shall remain in the stockpile for a minimum of 24 hours before being used in the production of asphalt concrete mixture.

# 309.2.02 Recycled Aggregates

Recycled material used in the asphalt concrete pavement shall have a maximum size of 1 inch prior to entering the cold feed. Any recycled material larger than 1 inch shall be separated by screening or broken down by mechanical means to pass a l-inch sieve and reincorporated with the balance of the recycled material to form a mixture acceptable to the Engineer.

## 309.2.03 Asphalt Concrete

Asphalt concrete pavement shall be Class B or Class C, as shown on the project plans conforming to and manufactured in accordance with the applicable provisions of this section. The asphalt cement shall be PG64-22.

## 309.2.04 Job Mix Formula (JMF)

The contractor shall submit a complete mix design with material and mix test results to the City Engineer at least 7 days prior to paving. Should a change in source of material be made or should conditions arise which the City Engineer determines to justify, a new complete mix design with associated material tests shall be submitted for approval by the City Engineer.

Class "B" and "C" asphalt concrete shall meet the following qualifying test requirements:

|   |            | Level 2                         | Level 3  |
|---|------------|---------------------------------|--|
| Design Method:  | Base       | 50 Blow Marshall                | 75 Blow Marshall/<br>Hveem or Superpave                                      |
| Air Voids %   | Wearing    | 50 Blow Marshall<br>4.0         | Hveem<br>Base 4.0<br>Wearing 4.0 – 4.5                                       |
| VMA % Minimum   |            | 1⁄2" – 14.0                     | <sup>3</sup> ⁄ <sub>4</sub> " – 13.0<br><sup>1</sup> ⁄ <sub>2</sub> " – 14.0 |
| Pass #200/Effective<br>TSR % Minimum<br>VFA %<br>IRM <sub>R</sub> | e AC Ratio | 0.8 to 1.6<br>80<br>65-78<br>70 | 0.8 to 1.6<br>80<br>65-75<br>70  |

| Table 7 – | Qualifying | Test Requirements |
|-----------|------------|-------------------|
|           |            |                   |

Prior to producing any asphalt concrete pavement, the Contractor shall use a job mix formula according to one of the following options:

# 309.2.04A Previously Approved

The job mix formula has been approved within the previous year by the City Engineer, for the material sources to be used.

# 309.2.04B Contractor Provided

The Contractor may submit to the City Engineer for approval, a mix formula developed by an approved laboratory. Upon written request, plant adjustments to the JMF to establish a new JMF without a new mix design may be approved within the following tolerances:

| Aggregate Passing<br>Sieve Size | % from JMF |
|---------------------------------|------------|
| 1⁄4"                            | ±2         |
| No. 10                          | ±1         |
| No. 200                         | ±0.5       |

A new JMF is required if the asphalt cement grade, additives (if any), or the source of the aggregate or RAP, change during production.

Table 8 – Allowable JMF Variation

# 309.2.05 Composition and Proportion of Mixtures

The class of asphalt concrete to be used shall be as shown and shall conform to the following requirements:

| Sieve Size       | В         | roadband Limits | 8         |
|------------------|-----------|-----------------|-----------|
| Passing          | Class "B" | Class "C"       | Class "D" |
| 1"               | 99 - 100  |                 |           |
| 3/4"             | 92 - 100  | 99 - 100        |           |
| 1/2"             | 75 - 91   | 90 - 100        | 99 - 100  |
| 1/4"             | 50 - 70   | 52 - 80         | 85 - 100  |
| No. 10           | 21 - 41   | 21 - 46         | 37 - 57   |
| No. 40           | 6 - 24    | 8 - 25          | 13 - 29   |
| No. 200*         | 2 - 7     | 3-8             | 4 - 9     |
| Asphalt Cement** | 4 - 8     | 4 - 8           | 4 - 8     |

|--|

\* Including Lime or Cement Filler.

\*\* Percent of total mix by weight.

Aggregate proportions are given in percentages by weight.

# 309.2.06 Reclaimed Asphalt Pavement Material

The use of processed reclaimed asphalt pavement (RAP) material in the production of new asphalt concrete is optional. A maximum of 30 percent material will be allowed and the asphalt content when blended with new material shall provide properties equivalent to the asphalt specifications of this section.

The aggregates shall be hard, sound and durable and no larger than 1 inch before entering the cold feed. Blend the RAP material with new aggregate, asphalt and other constituents to provide a mix conforming to the job mix formula within the tolerances specified.

# 309.2.07 <u>Tolerances</u>

After the JMF is determined, the mixture shall conform to the formula within the following tolerances:

|  | Narrow Band          | d Tolerance         |
|--|----------------------|---------------------|
|  | (from job m          | ix formula)         |
|  |                      | Base and            |
| Constituents of Mixture                    | Leveling Courses     | Surface Course      |
| Aggregate passing 1", 3/4", and 1/2"       | Within the broadband | ranges specified in |
| sieves specified in subsection 309.2.03    | subsection           | 309.2.03            |
|  |                      |                     |
| Aggregate passing 1/4" sieve               | ± 7.0%               | $\pm 6.0\%$         |
| Aggregate passing #10 sieve                | $\pm$ 5.0%           | $\pm$ 4.0%          |
| Aggregate passing #40 sieve                | $\pm$ 5.0%           | $\pm$ 4.0%          |
| Aggregate passing #200 sieve               | ± 2.0%               | $\pm 2.0\%$         |
| Asphalt cement                             | ± 0.6%               | $\pm 0.5\%$         |
| Moisture content at time of discharge from |                      |                     |
| the mixing plant (upper limit)             | 0.6% max.            | 0.6% max.           |
|  |                      |                     |
| RAP Material (if used in mixture)          |                      | ±2.0%               |
| Temperature of mixture after adjustment    |                      |                     |
| at the time pleased in final position      |                      | ⊥⊃∩∘⊏               |
|  |                      |                     |
| l emperature at mixer                      |                      | 325°F Max           |
| Temperature behind paver                   |                      | 240°F Min           |
|  |                      |                     |

### Table 10 – JMF Tolerances

Compaction Density (lower limit):

- Normal Lift Pavement (asphalt concrete thickness 1 1/2" or greater) - 92 percent of the theoretical maximum density (AASHTO T 209).

- Control Strip Method (asphalt concrete thickness less than 1 1/2" or at Engineer's discretion) - 98 percent of target density or 92 percent of theoretical maximum density, whichever is lower.

# 309.2.07A Modification of Mixes

The City Engineer reserves the right to modify specified mixes for use under various traffic conditions on various segments of the work and for feathering, spot patching, and other special purposes. The Contractor shall provide mixes proportioned as directed by the City Engineer for such purposes.

Modifications of the mix as directed may require changes in the Contractor's plan and sequence of operations. Such changes shall be allowed for by the Contractor. Upon written request from the Contractor, the City Engineer may approve field adjustments to the JMF of up to 2 percent of the aggregate passing the 1/4-inch sieve, 1 percent for the aggregate passing the #10 sieve, and 0.5 percent for the aggregate passing the #200 sieve. These field adjustments to the JMF may be made by the City Engineer provided the change will produce material of equal or better quality. The above adjustments, or any further adjustments ordered by the City Engineer, will be considered the JMF. Adjustments beyond these limits will require development of a new JMF. The adjusted JMF, plus or minus the allowed tolerances, shall be within the broadband limits.

# 309.2.08 Asphalt Tack Coat

Tack coat shall be cationic emulsified asphalt type CSS-1 or CSS-1h.

# 309.2.09 Overlay Fabric

The fabric shall be a non-woven polypropylene fabric which conforms to the following properties (AASHTO M 288:

Grab Strength, min. Elongation at Break, min. Asphalt Retention by Fabric, min. Melting Point, min. 80 lbs. 50% 0.20 gal./yd<sup>2</sup> 300°F

# 309.2.10 Warm Mix Asphalt Cement Additives

If WMAC is proposed for use, only Warm Mixed Asphalt Concrete (WMAC) additives or processes listed on the approved list below may be used.

| WMAC Technology               | Process Type      | Supplier                         |
|-------------------------------|-------------------|----------------------------------|
| Advera (Synthetic Zeolite)    | Foaming Process   | PQ Corporation                   |
| Aspha-Min (Synthetic Zeolite) | Foaming Process   | Aspha-Min                        |
| Evotherm                      | Chemical Additive | MeadWestvaco Asphalt Innovations |
| Redi-Set WMX                  | Chemical Additive | Akzo Nobel Surfactants, Inc.     |
| Sasobit                       | Organic Additive  | Sasol Wax Americans, Inc.        |
| Plant Foaming Equipment       | Foaming Process   | Various Suppliers                |

If WMAC is proposed the Contractor shall submit the proposed WMAC technology to be used and a plan for its implementation at the preconstruction conference.

## 309.3.00 <u>Workmanship</u>

### 309.3.01 <u>Reinforcing Fabric</u>

At the discretion of the Engineer, reinforcing fabric may be used as a remedial treatment to correct distress of existing pavement surfaces scheduled for Asphaltic Concrete overlay. Subsequent to this determination, reinforcing fabric shall be placed in the proper sequences of the paving operation over the designated areas.

The fabric shall be placed with equipment recommended by the fabric manufacturer and specifically designed for the purpose of laying pavement reinforcing fabric. The fabric shall be placed in an asphalt sealant without wrinkles prior to the asphalt sealant's cooling and loss of tackiness. The fabric shall be unrolled so that the bearded (fuzzy) side is down. Wrinkles ½-inch or larger in height and/or 3 inches or larger in length shall be split, laid flat, and additional tack coat applied to ensure fabric saturation.

The fabric shall be overlapped 4 to 6 inches at all joints. No joints shall be lapped with more than two (2) layers of fabric. Transverse joints shall be shingled in the direction of the paving to prevent edge pick-up by the paver. The paving operation shall closely follow fabric placement and no more fabric than can be covered up with the hot mix that working day shall be placed.

Utility covers, such as manhole lids and valve covers shall have the fabric neatly cut around to cover to allow for smooth transition of the cover to finish grade.

# 309.3.02 Hauling Equipment

Vehicles used for hauling asphalt concrete mixtures shall have tight, clean, and smooth metal beds equipped with covers.

Provide a 3/8-inch diameter hole near the middle of the left sidewall of the bed for temperature testing.

Coat the beds with a minimum amount of an approved material to prevent the mixture from adhering to the beds. 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 conveyor belt as appropriate.

Do not use diesel oil unless approved by the City Engineer. Its use will be terminated by the City Engineer if it is not being used as specified or is a source of contamination of the asphalt mix.

Vehicles which cause excessive segregation, which leak badly, or which the City Engineer has determined delay normal operations, shall not be used.

## 309.3.03 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 auguring 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.

Pavers shall be equipped with a paver control system which shall automatically control the laying of the mixture to specified slope and grade. The control system shall be automatically actuated from independent line and grade control references through a system of mechanical sensors and sensor directed devices which shall automatically maintain the paver screed in proper position to provide specified results.

The screed or strike-off assembly shall produce a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture.

# 309.3.04 Compactors

Rollers shall be steel wheel, pneumatic tire, vibratory or a combination of these types as specified. They shall be in good condition, capable of reversing without backlash, and shall be operated at speeds slow enough to avoid displacement of the asphalt concrete mixture.

Rollers shall be operated at speeds recommended by the roller manufacturer. The type, number and weight of rollers shall be sufficient to compact the mixture to the required density while it is still within the specified temperature requirement. The use of equipment which crushes the aggregate to an appreciable extent will not be permitted.

## 309.3.04A Steel Wheel Rollers

Breakdown or intermediate 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 roller with a 6 ton minimum gross static weight is acceptable and the 250 pounds per inch of width will not be required.

## 309.3.04B Vibratory Rollers

Vibratory rollers shall be equipped with amplitude and frequency controls capable of, and operated at, not less than 2,000 vibrations per minute and shall be specifically designed for the compaction of asphalt concrete mixtures.

## 309.3.04C Pneumatic Rollers

Pneumatic 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. Ground pressures shall be at least 80 pounds per square inch of tire contact area with a minimum total load of 2,800 pounds per tire. The maximum rate of travel of pneumatic-tired rollers shall not exceed 5 MPH.

Pneumatic-tired rollers shall be fully skirted to insulate the tires from significant heat loss during compaction.

### 309.3.05 Weather Limitations

Asphalt cement concrete shall be placed on an approved, dry, prepared surface, when the air temperature in the shade and the surface to be paved is not less than:

Table 11 – Ambient/Base Temperature Requirements

| Individual Nominal       | Air/Base T     | emperature   |
|--------------------------|----------------|--------------|
| Compacted Thickness      | Wearing Course | Other Course |
| Less than 1-1/2 inch     | 60°F           | 55°F         |
| 1-1/2 inch to 2-1/2 inch | 50°F           | 45°F         |
| 2-1/2 inch and over      | 40°F           | 40°F         |

Minimum ambient temperatures encountered must be ascending or forecasted to remain above the minimum for the duration of the placement.

Do not place asphalt cement concrete during rain or other adverse weather conditions, when the underlying layer is frozen, or when existing weather conditions will prevent its proper handling, finishing or compacting.

Asphalt cement concrete in transit at the time adverse conditions occur may be placed if it has been covered during transit, its temperature is satisfactory, and it will be placed on a surface free from pools or flow of water.

## 309.3.06 <u>Tack Coat</u>

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. Normally, asphalt shall be applied to the prepared surface at a rate within a range of 0.05 to 0.20 gallons per square yard of surface. The actual rate shall be as directed with a variation of not more than 10% from the specified rate.

Immediately before applying the tack coat, the surface shall be clean and dry. Clean all loose material by brooming, flushing with water, or other approved method. The tack coat shall not be applied during wet or cold weather, or during darkness, and shall be applied only so far in advance as is appropriate to maintain a tacky, sticky condition of the asphalt. Apply tack coat only when the air temperature in the shade is not less than the minimum air temperature for the appropriate temperature requirements in Section 309.3.04. The temperature of the emulsified asphalt shall be from 125°F to 165°F when applied. 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.

The Contractor shall take care during the application of the tack coat so that no excess tack coat is applied to the gutter or curb face. Any tack coat inadvertently or inappropriately applied to the gutter or curb face shall be promptly removed.

# 309.3.07 Control of Line and Grade

The Contractor shall either manually or automatically control line and grade. If automatically controlled, use a floating beam device of adequate length and sensitivity to control the grade of the paver.

# 309.3.08 Hauling, Spreading, and Placing

### 309.3.08A <u>Hauling</u>

Hauling vehicles shall be so constructed and equipped with covers to protect against moisture and heat loss which would allow the mixture to drop below specified laydown temperatures or cause solidifying, crusting or excess moisture to occur. If rain or cold air temperatures are encountered during any period between loading and laydown, covers shall be used to protect the mixture.

Whenever the mixture prior to laydown is found to be:

(a) below specified laydown temperature limit, or

(b) solidifying or crusting, or

(c) absorbing moisture,

the mixture will be subject to rejection until corrective action has been taken.

Except for unavoidable delay or breakdown, delivery of the mixture to the paving machines shall be at a rate sufficient to provide continuous operation of the paving machines. If paving operations result in excessive stopping of the paving machine, as determined by the City Engineer, paving operations shall be suspended until the Contractor can synchronize the rate of delivery of the mixture with the capacity of the paving machines.

No loads of mixture shall be transported from the mixing plant to the point of use so late in the day as to prevent the spreading and compacting of the mixture during daylight, unless adequate lighting is provided and the work is otherwise approved by the City Engineer.

## 309.3.08B Spreading

The mixture shall be laid on an approved surface, spread and struck off to established grade and elevation.

The hauling or loading equipment shall be self-supporting and shall not exert any vertical load on the paving machine nor cause vibrations or other motions which could have a detrimental effect on the riding quality of the completed pavement.

In areas where patching, irregularities or unavoidable obstacles make the use of specified equipment impracticable, the mixture may be spread with special hopper equipment with adjustable strike-off or by other equipment and means approved by the City Engineer, provided the surface finish is within a tolerance of 0.01 foot of that hereinafter set forth.

# 309.3.08C Placing

Asphalt shall not be placed against concrete, curb or gutter, or other structures, until seven days after the concrete has been placed, adequate strength of the concrete has been achieved, and they have been backfilled to provide lateral support. compacted thickness per lift shown on the plans. The nominal compacted thickness for any lift other than irregular leveling shall not exceed 3 inches.

When leveling irregular surfaces and raising low areas, the actual compacted thickness of any one lift shall not exceed 2 inches. The actual compacted thickness of intermittent areas of 1,000 square feet or less may exceed 2 inches, but not more than 4 inches. This may require portions of the mixture to be laid in two or more lifts.

When more than one lift of asphalt is required, no subsequent lifts shall be placed until the prior lift has adequately cooled and set sufficiently to prevent marking and has achieved minimum compaction requirements. Generally, the Contractor shall sequence his operations so that each lift of asphalt is placed on different days.

## 309.3.09 Compaction

## 309.3.09A General

## 309.3.09A-1 Rolling and Surface Repair

Immediately after the asphalt concrete mixture has been spread, struck off and surface irregularities and other defects remedied, it shall be thoroughly and uniformly rolled until the mixture is compacted as hereinafter set forth.

Any displacement of any course, regardless of thickness, 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 of fresh mixture when required. Care shall be exercised not to displace the line and grade of edges. Steel roller wheels shall be moistened with water or other approved material to the least extent necessary to prevent pickup of mixture and not cause spotting or defacement of the surface of the mixture.

Any mixture that becomes loose and broken, mixed with dirt or is any way defective shall be subject to removal and to replacement with fresh hot mixture, which shall be compacted to conform to the surrounding area. Any area showing an excess or deficiency of asphalt cement shall be subject to removal and to replacement. Removal and replacement under these provisions shall be at the expense of the Contractor.
#### 309.3.09A-2 <u>Temperature</u>

The surface of each layer and of each course shall be rolled when the mixture is in proper condition. All breakdown and intermediate compaction shall normally be performed while the temperature of the mixture is above 180°F.

For WMAC, complete breakdown and intermediate compaction before the WMAC temperature drops below the threshold recommended by the additive supplier or equipment manufacturer.

When the rolling causes undue tearing, displacement, cracking or shoving the Contractor shall, with approval of the City Engineer, make changes in compaction temperature, type of compaction equipment and/or rolling procedures necessary to achieve the applicable density requirements.

No additional compactive effort with rollers in the vibratory mode shall be undertaken when the temperature of the mixture has dropped below 180°F. Finish rolling shall continue until all roller marks are eliminated.

Unless otherwise directed by the City Engineer, compaction shall be completed before the temperature of the mixture has fallen below 180°F.

#### 309.3.09A-3 <u>Rollers</u>

Rollers shall move at a slow but uniform speed with the drive rolls or wheels nearest the paver. Normally rolling shall begin at the sides and proceed longitudinally parallel to the road centerline, each trip overlapping one-half the roller width, gradually progressing to the center. On superelevated curves the rolling shall begin at the low side and progress to the high side, each trip overlapping one-half the roller width. When paving is in echelon or when abutting a previously placed lane, the longitudinal joint shall be rolled first followed by the regular rolling procedure. Rollers shall not make sharp turns on the course being compacted and they shall not be parked on the hot asphalt mixture. Alternate trips of a roller shall terminate in stops at least five feet distant longitudinally from adjacent preceding stops.

The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option provided specified densities are attained.

Finish rolling shall be performed with tandem steel-wheeled rollers and shall continue until all roller marks are eliminated.

#### 309.3.10 Density Requirements

#### 309.3.10A Normal Lift Density Requirements

For a specified lift thickness of 1 1/2" or greater, the mixture shall be compacted to at least 92 percent of the theoretical maximum density as determined by AASHTO T 209.

### 309.3.10B Control Strip Density Requirements

For a specified thickness of less than 1 1/2", or at the Engineer's discretion, the asphalt concrete shall be compacted to 98 percent of the target density established by the control strip procedures described below, or compacted to 92 percent of the theoretical maximum density as determined by AASHTO T 209, whichever is the lower value.

Complete breakdown and intermediate compaction of each layer and each course by applying the established rolling procedure (pattern and equipment) before the temperature of the asphalt concrete has fallen below 180 degrees F, unless otherwise specified or directed by the Engineer.

Compaction shall be performed with steel-wheeled vibratory and/or pneumatic tired rollers. It is recommended at least one pneumatic-tired roller be used in the breakdown or intermediate compaction sequence.

At the beginning of the work on each course of pavement, construct a control strip at least 200 feet long that is:

- part of the roadway;
- placed to the specified width and thickness;
- composed of the same materials as the rest of that course;
- compacted with the same equipment as the rest of that course.
  The control strip shall be compacted with at least four coverages by the rollers, excluding finish rolling. The density obtained during the compaction process will be monitored by testing the compacted surface with a nuclear gauge.
  Roller coverages shall be continued until the density tests indicate that maximum density has been achieved. Once maximum density has been achieved, five density tests will be taken at randomly selected sites within the control strip. The average of these five tests will be established as the Target Density. The equipment and roller pattern used to obtain the maximum density in the control strip shall be designated as the established rolling procedure and thereafter be used for compaction until a new procedure is established by another control strip.

A new control strip shall be constructed when:

- there is a new job mix formula;
- a change in equipment or roller pattern is proposed;
- a new lift of pavement is started;
- the Engineer determines that the target density being used is suspect.

#### 309.3.10C Modification of Compacting Requirements

On detours and in areas of restricted width or limited length where the City Engineer determines that it is impracticable to achieve compaction to a specified density, compaction shall be achieved in conformance with the following:

#### 309.3.10C-1 Restricted Areas

Compacting of restricted width or limited length areas with sufficient width (normally 8 feet or more) shall be performed with a steelwheeled roller having a minimum gross static weight of 8 tons and a minimum static weight on the drive wheel of 250 pounds per inch width, or with a pneumatic tired roller. The mixture shall be compacted with at least four coverages by the roller and such additional coverages as the City Engineer may elect.

#### 309.3.10C-2 Irregular Areas

Along curbs and walls, on walks, irregular areas, and other areas not practicably accessible to specified rollers, the mixture shall be compacted with small self-propelled rollers, mechanical tampers, hot hand tampers or heavy hand rollers. 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.

#### 309.3.10C-3 Detours

On temporary detours, compaction shall be performed as set forth in 309.3.08B-1 above.

### 309.3.11 Quality Control/Quality Assurance

The Contractor is responsible for process control and shall conduct sampling, testing, measurement and inspection as necessary. The Engineer will determine the suitability of the final product through final acceptance testing. Results of these tests will be used to determine payment deductions, if any, to be assessed against the contract. Compliance with the density requirements for pavement courses that have a nominal compacted thickness of 1-1/2 inches or greater will be determined by random testing of the compacted road surface with nuclear gauges, or laboratory analysis of pavement core samples by the City or its appointed representative.

The density of each section of pavement will be determined by random acceptance tests with the nuclear gauge operated in the backscatter or AC mode or laboratory analysis of pavement core samples. Acceptance tests will not be made within one foot from the edges of the panel or from areas where the nominal compacted thickness is less than 1-1/2 inches. Nuclear gauge density testing shall be performed after completion of the finish rolling the same day the section of pavement is placed. The Engineer shall have the right to test any areas that appear defective in compaction. If the areas are found deficient, the Engineer may require the contractor to bring the areas into conformance with the specifications.

#### 309.3.11A Sampling

The samples shall be taken on a random basis at the rate of one sample per 500 tons of production or at least one sample per day of production but not from the first 25 tons of mix produced each day.

The samples shall be taken in accordance with AASHTO T 168. Samples shall be marked with the project name, class of mix, date and time of sampling, and the daily tonnage.

#### 309.3.11B Testing

- Testing to determine aggregate gradation and asphalt cement content shall be conducted for each sample of the mix. Testing shall be conducted in accordance with AASHTO T 308, "Determination of Asphalt Content of Hot Mix Asphalt Concrete Mixtures by the Ignition Method" (calibration in accordance with ODOT TM 323 with a 60 minute burn time).
- 2) Asphalt cement content shall be determined by the nuclear method in accordance with OSHD TM 319.
- 3) Testing to determine the theoretical maximum density of the mix shall be conducted on the initial sample of each day's production for work whose compaction is specified as a percentage of the theoretical maximum density. The theoretical maximum density test shall be conducted in accordance with AASHTO T 209.

#### 309.3.11C <u>Test Results</u>

Results of the testing through the last completed section of pavement will be made known to the Contractor as soon as possible, and indicated on the pavement, with a hard copy of the test results furnished as soon as practical, if the Contractor so desires. 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, all paving operations shall be discontinued and the work shall not be resumed until corrective measures have been taken.

#### 309.3.11D Corrective Actions

In areas with a density lower than 88.0%, remove and replace the deficient course. This work shall be completed within 10 working days following notification from the City Engineer that the pavement does not meet the specified density, unless otherwise directed by the City Engineer. Upon completion of the work, if the City Engineer finds it is still not satisfactory, the Contractor shall repeat the above.

#### 309.3.12 Longitudinal Joints

#### 309.3.12A Dropoffs

At the end of each working day, the Contractor shall construct a wedge of asphalt concrete at a slope of 10:1 or flatter along an exposed longitudinal joint. The wedge shall be removed and disposed of prior to continuing paving operations.

Where abrupt or sloped dropoffs occur within or at the edge of the paved surface, the Contractor shall provide suitable warning signs.

#### 309.3.12B Construction Joints

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; and 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 City Engineer. The longitudinal joints in one layer shall offset those in the layer immediately below by a minimum of 6-inches.

### 309.3.13 Transverse Joints

The following refers to all specified pavement courses but does not apply to leveling courses.

Placing of the mixture shall be as continuous and uniform as possible and pavement depth, line and grade shall be maintained at least 4-feet beyond the selected transverse joint location, then a sloped end section shall be constructed.

If the pavement will be subjected to traffic, the slope shall be no less than 50:1 (horizontal to vertical). If the paved section is not subject to traffic the slope may be less, but must be a minimum of 10:1.

Transverse joints shall be constructed to a vertical face by sawing or cutting to the full lift depth, after the mixture has reached the required density.

After the vertical face is formed, if paving is not expected to continue from the transverse joint until the following day or later, paper or other suitable material shall be placed ahead of the sawed or cut joint and under the 4-foot or longer panel and its sloped end section.

Prior to continuing the permanent paving lift, the 4-foot or longer panel and its end slope shall be removed and the base shall be cleaned of all debris. A tack coat shall then be applied to vertical edge and surface of the area.

After placement and finishing of the new asphalt concrete, both sides of the joint shall be dense and the joint shall be well sealed. The surface in the area of the joint shall conform to the requirements hereinafter specified for surface tolerances when tested with the straightedge placed across the joint.

At bridge ends or at ends of other rigid type structures, compacting shall be in the transverse direction as well as longitudinally; all as directed by the City Engineer.

### 309.3.14 Temperature

For HMAC, the temperature of the mixture at the time it is placed in final position will be established by the City Engineer and shall be within 20 degrees of 280°F for Class "B" and "C" mixes. The City Engineer may, however, adjust this temperature in 10°F increments upwards if the aggregate coating, moisture content, workability or compaction requirements are not attained. Similar adjustments may be made downward by the City Engineer if the aggregate coating, moisture content, workability and compaction requirements are attained. In no case shall the lay-down temperature of the mixture be less than 240°F.

For WMAC, the maximum temperature at the mixer shall be 275<sup>o</sup>F. The minimum temperature shall be 215<sup>o</sup>F.

### 309.3.15 Finishing and Details

Special care shall be taken at longitudinal joints to provide positive bond and to provide density and finish of the new mixture equal in all respects to the mixture against which it is placed.

Segregation of materials, non-uniform texture, fouled surfaces preventing full bond between successive spreads of mixture and other defects in material and workmanship, determined by the City Engineer as detrimental, shall be corrected by the Contractor as directed by the City Engineer.

The plan of the work, order of paving and other details of performance shall meet with the approval of the City Engineer.

## 309.3.16 Pavement Smoothness

The Contractor shall furnish and operate a 12-foot straightedge or a 12-foot rolling straightedge and test parallel and perpendicular to the centerline. The City Engineer may observe this testing or may require additional testing to be done under his supervision. Areas not meeting surface tolerances shall be marked, and corrective action on the deficiencies, specified herein and approved by the City Engineer, shall be taken by the Contractor.

When tests show the pavement is not within the below tolerances, the Contractor shall take immediate action to correct equipment or procedures in his paving operation to eliminate further unacceptable pavement roughness.

### 309.3.16A Single Lift Construction

The pavement surface shall not vary by more than 0.02 feet.

## 309.3.16B Multiple Lift Construction

Where two or more lifts of pavement are being placed, the surface of the top lift of the asphalt concrete pavement shall not vary by more than 0.015 feet. The surface of base lifts shall not vary by more than 0.02 feet.

### 309.3.16C Utility Appurtenances

When utility appurtenances such as manhole covers are located in the traveled way and they cannot be adjusted during paving operations or are required to be adjusted before paving, these tolerances will not apply.

These tolerances shall apply when water valve boxes and other utility appurtenances can be adjusted during paving operations.

### 309.3.16D Corrective Action

Corrective measures by the Contractor requiring one or more of the following actions approved by the City Engineer shall be performed on deficient areas:

(a) Remove and replace the surface course.

(b) Grind the pavement surface up to a maximum depth of 0.3 inch and apply an emulsion fog seal coat as directed by the Engineer.

(c) On coarse, open textured areas, apply "resurfacer" (produced by Special Asphalt Products, Inc., Portland, OR), or a like product, per the manufacturer's specifications.

All corrective work shall be completed within 10 working days following notification from the City Engineer that the pavement does not meet the specified tolerances, unless otherwise directed by the City Engineer.

After completion of the corrective work, if the City Engineer finds it is still not satisfactory, the Contractor shall perform additional corrective work on areas still not meeting the above tolerances.

## 309.3.17 Pavement Samples

The City Engineer shall be permitted to take samples from the truck or paver, cut samples or take cores from the separate layers and courses or full depth of compacted mixture, for testing purposes at such locations and at such frequencies as the City Engineer determines as required for proper representation. Where samples have been taken and when directed by the City Engineer, the Contractor shall furnish new like material and fill the holes as directed with no compensation beyond the unit price for asphalt concrete in place.

### 309.3.17A Pavement Thickness

The Engineer will select locations for non-destructive measurement or core samples to determine pavement thickness.

If non-destructive measurement indicates a pavement section is less than the thickness shown on the Plans, or is otherwise out of specification, the Contractor may take cores at the same location to verify the Engineer's measurements. If the pavement section is found to comply with the specifications, the coring and restoration will be paid for as extra work. Pavement found to be out of specification shall be subject to replacement or to payment adjusted prices.

In determining deficient or excessive thickness in asphalt concrete overlays, the Engineer shall adjust the cross section measurement sequence, average series of measurements, or take other appropriate steps to allow for the desirable leveling of low or high areas on the existing pavement.

Where a deficiency is found and the Engineer determines the deficiency serious enough to impair the traffic service expected from the pavement, the area of such deficiency shall be removed by the Contractor and shall be replaced with pavement meeting the specifications. The cost of the deficient pavement and of the removal shall be borne by the Contractor.

## 309.3.18 Special Protection Under Traffic

In addition to other required provisions for traffic, the following shall apply to pavement construction:

(a) No traffic or equipment shall come in contact with the compacted mixture until it has cooled and set sufficiently to prevent marking.

(b) Edges shall be protected from being broken down; and edge dropoffs 1" or more in height shall be marked with adequate warning devices visible by day and night to the traveling public.

## 309.3.19 Joint Seal Coat

Immediately after the new paving is compacted, all joints between new and original asphalt pavement shall be either:

(a) Painted with hot asphalt or asphalt emulsion and be covered with dry paving sand before the asphalt solidifies. The width of joint seal coat shall be 6-inches.

(b) Sealed with 4-inch wide Asphalt Crack Repair Tape manufactured by QuikJoint or approved equal joint seal tape. When used to over band cracks; the cracks must be filled prior to applying QuikJoint. Cracks must be filled using QuikFill or other approved crack fillers. An optional method is to cut strips of QuikJoint and position these strips over the crack to be filled and apply heat to flow material into the opening. Fill crack to surface level with approved crack filler.

### 309.3.20 <u>Clean-Up</u>

After the paving has been completed, the Contractor shall collect and remove from the site all debris resulting from his operations. Graded areas along the streets or driveways that have been disturbed by the paving operation shall be regraded to the satisfaction of the City Engineer.

All facilities including, but not limited to, manhole covers, valve boxes, catch basins, gutter and curb faces shall be cleaned, and all excess asphalt, debris, and tack shall be removed.

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## 310.1.00 <u>General</u>

## 310.1.01 <u>Scope</u>

This work shall consist of constructing Portland cement concrete (P.C.C.) pavement in accordance with Standard Drawing 481, Concrete Roadway, composed of Portland cement, water, fine aggregate, coarse aggregate, and special purpose additives when required or permitted. The P.C.C. pavement shall be constructed on a prepared base in accordance with these specifications and in conformity to the lines, grades, thicknesses and cross sections shown on the plans or established by the City Engineer. P.C.C. paving construction shall be in accordance with these specifications, ACI 318 (Building Code Requirements for Structural Concrete) and ACI 325.9R (Guide for Construction of Concrete Pavements and Concrete Bases). All concrete, unless otherwise specified, shall be mixed and deposited in accordance with ASTM C 94 (Specifications for Ready-Mixed Concrete). Concrete placed during hot weather or cold weather shall be mixed, placed, cured, and tested in accordance with the recommendations of ACI 305R or ACI 306, respectively. When a conflict exists between various governing codes, the more stringent code requirement shall be followed.

## 310.1.02 Prepaving Conference

The Contractor and the Contractor's supervisory personnel, testing personnel, plus any subcontractors and their supervisory personnel who are to be involved in the P.C.C. paving work, including P.C.C. aggregate production, shall meet with the Engineer 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 including placement methods, techniques, equipment, consolidation, fresh properties, finishing, curing, etc. The plan of the work, order of paving and other details of performance shall meet with the approval of the City Engineer.

### 310.2.00 <u>Materials</u>

Materials shall meet the requirements of the applicable sections of the City of Tualatin Public Works Construction Code, applicable provisions of ASTM, as well as modifications and additions given in this Specification and the Special Provisions, Section 201.0.00.

#### 310.2.01 Portland Cement

The Portland cement shall be Type I, IA, II, IIA, III, or IIIA, conforming to the requirements of ASTM C 150 for low alkali cement (total equivalent alkali content not exceeding 0.6%, sodium and potassium oxide calculated as Na<sub>2</sub>O + 0.658K<sub>2</sub>O) and shall contain a maximum of 8% tricalcium aluminate (15% type III and IIIA).

#### 310.2.02 Aggregates

Aggregates shall conform to the requirements of Section 308.0.00 of the City of Tualatin Public Works Code, ASTM C 33 and the following:

#### 310.2.02A Fine Aggregates

Must be graded coarse to fine within the following limits:

#### **GRADING REQUIREMENTS**

| Sieve Size Passing | Percentages by Weight |
|--------------------|-----------------------|
| 3/8"               | 100                   |
| # 4                | 95 - 100              |
| # 8                | 80 - 100              |
| # 16               | 50 - 85               |
| # 30               | 25 - 60               |
| # 50               | 10 - 30               |
| # 100              | 2 - 10                |

Shall have a sand equivalent of not less than 68.

The fineness modulus as determined according to ASTM C136 shall not show a variation greater than 0.20 from the fineness modulus used in the Contractor's mix design, at the option of the City Engineer, who may accept a change in mix proportions, necessary by reason of such variation.

## 310.2.02B Coarse Aggregates

|            | GRADING REQUIREMENTS |                         |
|------------|----------------------|-------------------------|
| Sieve Size | Separated Sizes      | (Percentages by Weight) |
| Passing    | 1-1/2" to 3/4"       | 3/4" to #4              |
| 2"         | 100                  |                         |
| 11⁄2"      | 90 – 100             |                         |
| 1"         | 20 - 55              |                         |
| 3/4"       | 0- 15                | 100                     |
| 1⁄2"       |                      | 90 – 100                |
| 3/8"       | 0-5                  | 40 - 70                 |
| No. 4      |                      | 0 – 15                  |
| No. 8      |                      | 0 – 5                   |

The size of coarse aggregate to be used shall be 1-1/2" to # 4.

### 310.2.03 <u>Air Entraining Admixtures</u>

Shall conform to the requirements of ASTM C 260 using one or another of the several tests as the City Engineer may consider pertinent. Chloride content of the admixture shall not exceed 0.5% by weight.

#### 310.2.04 Fly Ash

Furnish fly ash conforming to AASHTO M 295 (ASTM C618).

### 310.2.05 Steel Reinforcement

#### 310.2.05A Dowels

Dowels must conform to the requirements of AASHTO M 31 (ASTM A615) for Grades 40 and 60, or AASHTO M 227 (ASTM A663) for Grades 70, 75, and 80. Unless otherwise specified or shown, all dowel bars must be Grade 60.

### 310.2.05B Tie Bars

Tie bars must conform to the requirements of ASTM A706, AASHTO M 31 (ASTM A615), or AASHTO MP 18 (ASTM A1035). Unless otherwise specified or shown, all tie bars must be Grade 60.

#### 310.2.05C Welded Wire Reinforcement

Welded wire reinforcement and deformed welded wire reinforcement must conform to the requirements of ASTM A1064. Epoxy-coated welded wire reinforcement must conform to the requirements of ASTM A884.

#### 310.2.05D Bar Mats

Bar mats must conform to the requirements of ASTM A184.

#### 310.2.06 Joint Filler

Shall be rubber-asphalt poured filler or other suitable materials as approved by the Engineer conforming to ASTM D 1751 or D 994.

#### 310.2.07 Concrete Mixture Limits and Tolerances

The Portland cement concrete shall be a workable mixture uniform in composition and consistency, having the following properties and limits:

| Test        |  |
|-------------|--|
| Method      | Quantity   |
| ASTM C 138  | 6% ± 1.5   |
| ASTM C 173  |  |
| ASTM C 231  |  |
| ASTM C 143  | 3" max except slip form  |
|             | Paving 1½" max   |
| ASTM C 78   | 650 psi min. @ 28-day  |
| ASTM C 39   | 4,500 psi min @ 28-day   |
|             | 0.45 max   |
| ASTM C 1064 | 50 - 90  |
|             | Test<br><u>Method</u><br>ASTM C 138<br>ASTM C 173<br>ASTM C 231<br>ASTM C 143<br>ASTM C 78<br>ASTM C 39<br>ASTM C 1064 |

If the 650 psi flexural strength specification requires a compressive strength in excess of 4,500 psi, the higher compressive value shall be used as a minimum for all compressive strength cylinder tests taken during construction.

The relationship between compressive strength  $f^\prime_{\rm c}$  and modulus of rupture  $f_r$  shall be:

 $f_r = k(f'_c)^{1/2}$ with k derived from the test results.

### 310.2.08 Proportioning of Concrete

The proportions of any P.C.C. mix proposed for use shall be determined by a qualified Technician. This shall include the proportions by weight of cement, water, fine aggregate, coarse aggregate, air-entraining admixture, and any other materials or admixtures needed to produce a workable and durable concrete which conforms to the contract specifications.

Each design shall be prepared and computed in accordance with the requirements of ACI 211.1 or a modification of that method employing the "absolute volume" theory.

Each mix design calculation proposed for use shall be identified by a unique mix design number and submitted to the City Engineer for review.

The Contractor may proceed with P.C.C. placement after the City Engineer determines the mix design, materials and tests comply with the specifications.

Review of P.C.C. mixes, materials, and production procedures by the City Engineer will not relieve the Contractor of responsibility to provide P.C.C. conforming to the specifications.

Proportions of materials for concrete shall be established to provide:

- Workability and consistency to permit concrete to be worked readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding;
- (b) Resistance to special exposures as required;
- (c) Conformance with strength test.

### 310.2.08A <u>Proportioning on the basis of field experience or trial</u> <u>mixtures, or both</u>

### 310.2.08A1 Standard deviation

- 1. Where a concrete production facility has test records, a standard deviation shall be established. Test records from which a standard deviation is calculated:
  - Shall represent materials, quality control procedures, and conditions similar to those expected and changes in materials and proportions within the test records shall not have been more restricted than those for proposed work;
  - (b) Shall represent concrete produced to meet a specified strength for strengths f'c within 1000 psi of that specified for proposed work;

- (c) Shall consist of at least 30 consecutive tests or two groups of consecutive tests totaling at least 30 tests
- 2. Where a concrete production facility does not have test records of 30 consecutive tests, but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and modification factor of table 1. The test record shall represent only a single record of consecutive tests that span a period of not less than 45 calendar days.

| TABLE 1<br>MODIFICATION FACTOR FOR STANDARD DEVIATION WHEN LESS THAN<br>30 TESTS ARE AVAILABLE |  |  |
|--|--|--|
| No. of tests   | Modification factor for standard deviation |  |
| Less than 15   | Use table 2                                |  |
| 15   | 1.16                                       |  |
| 20   | 1.08                                       |  |
| 25   | 1.03                                       |  |
| 30 or more   | 1.00                                       |  |

## 310.2.08A2 <u>Required average strength (f'cr)</u>

1. Required average compressive strength f'<sub>cr</sub> used as the basis for selection of concrete proportions shall be the larger of Eq. (1) or (2) using a standard deviation calculated in accordance with the previous section.

$$f'_{cr} = f'_{c} + 1.34s$$
 (1)

 $f'_{cr} = f'_{c} + 2.33s - 500$  (2)

# TABLE 2 REQUIRED AVERAGE COMPRESSIVE STRENGTH WHEN DATA IS NOT AVAILABLE TO ESTABLISH A STANDARD DEVIATION

| Specified compressive strength, f'c, psi | Required average compressive strength, f'cr, psi |
|--|--|
| Less than 3000                           | f' <sub>c</sub> + 1000                           |
| 3000 - 5000                              | f' <sub>c</sub> + 1200                           |
| Over 5000                                | f' <sub>c</sub> + 1400                           |

### 310.3.00 <u>Workmanship</u>

### 310.3.01 Batching Plant

Bins shall have adequate separate compartments for fine aggregate, each separate size of coarse aggregate, and cement. Bins and compartments shall be tight and ample to prevent spilling from one bin to another. Separate compartments, including weighing hoppers, shall discharge freely and efficiently with minimum segregation into the weighing hopper.

Scales for weighing aggregates and cement may be either the beam type or the springless dial type. They shall be accurate within 0.5% under operating conditions throughout the range of use and shall be tested and adjusted at the Contractor's expense as often as the City Engineer may deem necessary to assure their continued accuracy.

Equipment for dispensing water and admixtures shall provide a separate feed, accurate quantity measurement, and shall inject the water and admixture at the time in the mixing process to insure thorough and complete mixing throughout the batch of P.C.C.

Automatically controlled batchers shall have automatically interlocked mechanisms providing the following:

1) Positive weighing and discharge of cement, and of each separate size of aggregate.

2) Interlocking between weighing hoppers to prevent any part of the batch from being discharged until each separate hopper has been filled with the correct proportion.

- 3) Simultaneous discharge of all hoppers.
- 4) A lockable compartment containing the time setting controls.

### 310.3.02 <u>Mixers</u>

Each mixer shall carry a clearly visible manufacturer's plate showing the capacity of the mixer and other pertinent operating rates and limits. Provision shall be made at the mixer for the controlled addition of air-entraining admixtures or other special components of the mix, when such items are required.

Central plant mixers shall be equipped with a timing device that will not permit the batch to be discharged until the specified mixing time has elapsed.

#### 310.3.03 Handling, Measuring, and Batching of Materials

The plant site, layout, equipment, and provisions for transporting materials shall be adequate to assure a continuous supply of material to the work site.

The aggregate shall be stockpiled and removed from stockpiles in a manner that will hold segregation to a minimum. Aggregates from different sources and of different gradings shall not be stockpiled together.

Aggregates that become segregated or mixed with earth or foreign material shall not be used. Frozen aggregates or aggregates containing frozen lumps shall not be used.

The fine aggregate, each separated size of coarse aggregate, and cement shall be separately weighed into the hoppers in the respective amounts set by the mix design. A device to indicate positively that the full amount of cement was discharged into the batch box or container shall be provided. Water may be measured either by volume or by weight.

Batching shall be conducted so that the individual weights of each material required are within tolerances of 1 percent for cement and water, 2 percent for aggregates, and 3 percent for admixtures.

The use of wash water as a portion of the mixing water for succeeding batches should not be permitted unless the quantity of wash water is accurately measured .

### 310.3.04 Mixing Portland Cement Concrete

The P.C.C. shall be mixed at a central plant meeting the standards of the Concrete Plant Manufacturers Bureau as follows, except as provided in 310.3.02.

- 1) Material containing frost or lumps of hardened material shall not be used.
- The batch shall be charged into the receiving drum so that some water will enter before the solids and continue to flow uniformly for a portion of the mixing time.
- 3) Intermixing of batches shall not be permitted.
- 4) The skip and the throats of drums shall be kept free of accumulations.
- 5) The P.C.C. shall be mixed only in the quantity required for immediate use.
- 6) Retempering P.C.C. by adding water or by other means will not be permitted.

7) The mixing time shall be at least 60 seconds but not more than 90 seconds.

## 310.3.05 Batch Ticket Information

At a minimum, batch tickets shall indicate the following:

- 1) Name of batch plant
- 2) Serial number of ticket
- 3) Date
- 4) Truck number
- 5) Name of purchaser
- 6) Specific designation of job (name and location)
- 7) Specific class or designation of the concrete
- 8) Amount of concrete
- 9) Time loaded or of first mixing of cement and aggregates
- 10) Water added by receiver
- 11) Type and brand, and amount of cement
- 12) Type and brand, and amount of admixtures
- 13) Information necessary to calculate the total mixing water added by the producer. Total mixing water includes free water on the aggregates, water, and ice batched at the plant, and water added by the truck operator from the mixer tank.
- 14) Maximum size of aggregate
- 15) Weights of fine and coarse aggregate

## 310.3.06 <u>Hauling Equipment</u>

P.C.C. may be transported in nonagitating equipment or truck mixers. Hauling equipment shall conform to the Truck Mixer Manufacturer's Bureau of the National Ready Mixed Concrete Association. If non-agitating hauling equipment is used, discharge should be completed within 45 minutes. If truck mixers are used, discharge should be completed within 90 minutes.

# 310.3.07 Paving Equipment

## 310.3.07A Slipform Paver

The P.C.C. shall be placed with two separate machines, one a spreader and one a slipform paver. The machines, when operating in tandem shall spread, consolidate, screed, and float-finish the freshly-placed P.C.C. in one pass with a minimum of hand finishing. Each machine shall be fully selfpropelled and equipped with electronic controls to control line and grade from both sides.

The spreader shall be able to deliver the mix without segregation or displacing the reinforcing steel.

The slipform paver shall be able to vibrate the P.C.C. for the full width and depth of the P.C.C. being placed, and be equipped with vibrating tubes or arms to work in the P.C.C. The sliding forms shall be held together rigidly to prevent them from spreading. The form shall be long enough so that slumping of the P.C.C. will not exceed 1/4-inch, according to 310.3.14.

## 310.3.07B Bridge Deck Finisher/Paver

A bridge or similar finishing/paving machine may be used with the prior approval of the City Engineer, utilizing the previously constructed and cured curb and gutter as side forms, and support for machine rails. Any damage or displacement to the curb or gutter shall be corrected by removal and replacement of the curb and gutter and/or P.C.C. pavement at the discretion of the City Engineer.

## 310.3.08 Concrete Saws

The Contractor shall provide power driven concrete saws for sawing joints, adequate in number of units and power to complete the sawing at the required rate. The saws and related equipment shall be of proven adequacy and design to perform efficiently and shall be subject to immediate replacement if the specified results are not obtained. A standby saw shall be available at the site.

## 310.3.09 Smoothness Testing Equipment

Two 12-foot straightedges for determining smoothness shall be supplied by the Contractor.

## 310.3.10 <u>Weather Limitations</u>

It will be the Contractor's responsibility to protect the pavement from weather damage, and placement of P.C.C. pavement shall not occur when a descending air temperature falls below 40°F, nor shall it resume until an ascending air temperature reaches 35°F. Air temperature shall be measured in the shade and away from artificial heat.

When P.C.C. is being placed during cold weather, or has been in place less then 7 days, and the air temperature is forecast to drop below 35°F, insulating

materials shall be placed on the pavement deep enough to prevent freezing of the P.C.C. Any weather damaged P.C.C. shall be removed and replaced at the Contractor's expense. P.C.C. pavement shall not be placed on frozen bases.

Placing P.C.C. pavement during periods of rain will not be permitted. The Contractor shall protect the unhardened P.C.C. from precipitation with protective material.

During the hours of darkness, work areas shall be illuminated at the Contractor's expense to the satisfaction of the City Engineer.

# 310.3.11 Preparation of Base

Before paving operations begin, the base on which the pavement is to be constructed shall be brought to the finished condition required by the specifications.

The full width and length of the area on which the tracks of the paving equipment is to operate shall be brought to the density and surface tolerance required.

Manholes, inlets, and other such structures shall be completed, adjusted, cured, and otherwise prepared, as applicable, and made clean and ready to have concrete placed in contact with them. Manhole frames and other independent metal structures in the pavement area shall be painted with suitable asphalt material over all concrete contact areas.

# 310.3.12 Construction Widths

When the pavement consists of up to three traffic lanes, the full width shall be constructed monolithically in one strip.

When the pavement consists of more than three traffic lanes, a minimum of two lanes shall be constructed monolithically in one strip except when the plans direct otherwise. The other lanes may be constructed either monolithically with the adjacent lanes or constructed separately in a minimum group of two lanes.

If the Contractor proposes a method of placement other than that shown on the plans and described in the specifications, the Contractor shall bear all costs to implement the change. Any changes must be approved by the City Engineer.

## 310.3.13 Placing Reinforcement

a) At the time concrete is placed, reinforcement shall be free from mud, oil, or other non-metallic coatings that decrease bond. Steel reinforcement with rust or mill scale shall be considered satisfactory provided the minimum dimensions and weight of a hard-wire-brushed specimen complies with applicable ASTM

bar specification.

- b) Reinforcement shall be accurately placed and adequately supported before concrete is placed and shall be secured against displacement. Never lay reinforcing steel on the subgrade and attempt to pull it up into position after concrete is placed.
- c) The width of welded wire fabric or bar mats should be such that, when properly placed in the work, the extreme longitudinal members of the sheet or mat will be located not less than 2 inches (50 mm) or more than 6 inches (150 mm) from the edges of the PCCP slab.
- d) When reinforcing bar assemblies are shown on the plans, the bars should be firmly fastened together at all intersections and adjacent ends should lap not less than 30 bar diameters.
- e) Reinforcement shall have a minimum cover of 2 inches(50 mm) and shall not fall below the mid depth of the PCCP slab, unless otherwise specified or shown on the plans.

## 310.3.14 Placing Portland Cement Concrete

The P.C.C. shall be delivered from the hauling vehicles to the paving machine hopper. The Contractor's equipment hauling P.C.C. or reinforcement will not be permitted on the subgrade but will be allowed on the base, with turns or other maneuvering kept to a minimum. Any damage to the subgrade or base due to the Contractor's operations shall be corrected by the Contractor, at the Contractor's expense, to the satisfaction of the City Engineer.

The P.C.C. shall be placed in final position by the slipform or other approved method, uniformly in one layer, so that a minimum of finishing will be necessary to provide a dense, homogenous pavement conforming to true grade and cross section.

- 1) The spreader shall receive the P.C.C. mixture in its hopper and uniformly spread and strike it off at the proper thickness for the full width of the area being paved.
- 2) The paver shall vibrate, consolidate, and finish the slab to the proper grade and cross section.

The paver shall be operated with as nearly continuous forward movement as possible, and all operations of mixing, delivering, and spreading P.C.C. shall be coordinated to provide uniform progress. Stopping and starting the paver shall be held to an absolute minimum. If, for any reason, it is necessary to stop the forward motion of the paver, the vibratory and tamping elements shall also be stopped immediately. No external force shall be applied to the paver except with the approval of the City Engineer.

While placing P.C.C., provision shall be made for constructing joints, placing dowels, tie bars, and other devises as required by Standard Drawing 481, Concrete

Roadway, called for by the plans, as directed by the City Engineer, and as provided in 310.3.13.

P.C.C. will be rejected if it:

- 1) Has exceeded the batch to discharge time requirements of 310.3.05,
- 2) Has begun to take an initial set prior to placement,
- 3) Has been retempered with water, or
- 4) The surface finish is unacceptable to the City Engineer.

Supports for the paver, and other equipment which ride on previously placed pavement which meets the requirements of 310.3.06, shall be equipped to prevent marring, edge breaking, or chipping of the previously placed pavement.

Hand spreading and distributing shall be with shovels, not rakes. The P.C.C. shall not be fouled with foreign matter. The Contractor shall furnish hand operated mechanical vibrators satisfactory to the City Engineer. These vibrators shall be used to consolidate the P.C.C. pavement at least 6 feet each side of construction and expansion joints, or when using bridge finishing or other approved machines.

## 310.3.15 Joints

Joints shall be the type called for by the plans, shown on Standard Drawing 481, Concrete Roadway, or otherwise directed by the City Engineer. Joints in the P.C.C. pavement will be referred to as contraction or construction either of which may be transverse or longitudinal, as called for by the plans or as directed by the City Engineer. All joints and joint filler shall extend to pavement edges or to each other, as the case may be, and shall be constructed normal to the surface of the pavement. Joints shall not vary from specified or indicated line by more than 1/4-inch.

The Contractor shall submit to the City Engineer for approval, a jointing plan, 7days before placement of any concrete street. The Contractor shall take into consideration the placement of joints in curb and gutter, at catch basins, and the position of manholes and other structures, as well as the other limitations herein mentioned.

Compensation for jointing and fillers shall be incidental to paving.

# 310.3.15A Contraction Joints

Contraction joints shall be of the sawed type with poured rubber-asphalt filler, or as shown on Standard Drawing 481, Concrete Roadway. All joints must include dowels or tie bars. Sawing shall be to a depth of 1/4 the thickness of

the P.C.C. with a maximum width of 1/4-inch and a minimum width of 1/8-inch, in straight lines as shown or directed. Saw-cuts shall be performed as soon as the P.C.C. has set enough to permit sawing without tearing or raveling, before uncontrolled cracking results, and within 24-hours of placing the P.C.C. Saws may be single or tandem, as the Contractor may elect, and shall be controlled by guides to true line. The Contractor is wholly responsible for the timing of sawed concrete joints. The joints shall be thoroughly cleaned of all foreign matter before pouring the approved rubber-asphalt filler. The tops of joint filler shall be true to pavement cross section within 1/8-inch and shall be protected from damage by P.C.C. operations. Any area containing uncontrolled cracks shall be removed and replaced by the Contractor, at the Contractor's expense, at the direction of the City Engineer. Curing agents broken or damaged by the sawing operations shall be restored.

Longitudinal joints shall be spaced as shown on the plans at the interface between lanes, normally at intervals between 10 to 14-feet. All longitudinal joints must include tie bars per Standard Drawing 481, Concrete Roadway.

Transverse joints shall be perpendicular to the direction of traffic, as shown on the plans or as approved by the City Engineer, with intervals of 12 to 15-feet. A transverse type joint shall also be placed radial to and at the 1/2-angle point of a curb return, extended to meet a transverse or longitudinal contraction joint.

### 310.3.15B Construction Joints

Construction joints shall be constructed when there is an interruption of longer than 45 minutes in the P.C.C. placing operations or where herein specified. Both free edges of joints shall be tooled with 1/8-inch radius rounder to remove lattice and mortar resulting from finishing operations and to provide a clean rounded edge. Tooling shall not form ridges on the surface of the concrete.

The new P.C.C. placed contiguous to the joint shall conform closely to the proportions and consistency of the previously placed concrete and shall be vibrated and consolidated to a greater degree, with more care and to a closer surface tolerance than is usual in normal construction.

No transverse construction joint shall be constructed within 3-feet of a transverse contraction joint. If sufficient P.C.C. has not been mixed at the time of interruption to place a construction joint at least 3-feet from a planned contraction joint, remove excess P.C.C. back to a position to satisfactorily meet these criteria to the satisfaction of the City Engineer. Transverse construction joints shall be of the doweled type using 18-inch dowels of the diameter shown on Standard Drawing 481, Concrete Roadway, at 12-inch centers and coated with plastic, grease, heavy oil or other approved material that will neither bond with nor be harmful to the P.C.C.. Support dowels and maintain in position during the P.C.C. placing operation at a depth of 1/2 the pavement thickness

parallel to the street centerline. Fill all transverse construction joints that have opened to a width of 1/8-inch or greater, during the construction or maintenance periods with approved poured rubber-asphalt filler.

Longitudinal construction joints shall include 36-inch long #5 deformed tie bars at 36-inch centers and shall be placed at all radiused sections of a curb return with a P.C.C. gutter as well as a normal longitudinal construction joint. Tie bars shall not be required at the construction joint between the P.C.C. pavement and gutter except where shown on the plans and mentioned above. Tie bars shall be placed by:

- 1) Inserting the tie bars into the plastic P.C.C. before vibrating and finishing the P.C.C.
- 2) Drilling the hardened concrete section and then inserting and grouting the tie bars into place. The holes shall be drilled large and deep enough to allow the tie bars to be inserted with adequate approved grout and shall be performed any time after the P.C.C. has attained enough strength to resist any damage caused by drilling. Tie bars shall be grouted a maximum of 3hours prior to placement of adjacent P.C.C.

All loose tie bars shall be replaced by drilling and grouting as described, at the Contractor's expense.

# 310.3.16 Surface Finishing

After the P.C.C. has been given a preliminary finish by means of the finishing devices incorporated in the slipform paving or other approved equipment, the surface of the fresh P.C.C. shall be checked by the Contractor with a straightedge device. Deviations indicated by the straightedge more than 0.01 foot shall be corrected. Each successive check with the straightedge device shall lap the previous check path by at least half the length of the straightedge.

1) Any edge slump of the concrete in excess of 1/4-inch shall be corrected before the concrete has hardened. Low spots exceeding 1/4-inch in depth, if in hardened concrete, may be filled with an approved epoxy grout provided the filling is neat and blends inconspicuously with adjoining concrete.

2) Upon completion of the machine floating, straightedge testing, and, if necessary, hand floating, but before any required edge tooling or joint tooling, and before initial set of the surface P.C.C., the surface of the P.C.C. shall be given a textured finish.

The textured finish shall be accomplished by an automatic machine finisher with a steel-tine tool, or approved alternate, that will mark the finished P.C.C. to a depth of  $1/8 \pm 1/16$ -inch. The markings shall be about 1/8-inch in width spaced about 3/4-inch on centers without overlaps. Markings shall be transverse to the roadway center line and full roadway width in straight parallel lines.

## 310.3.17 Stationary Side Form Construction

Where the width of pavement is narrow, tapering, or of irregular pattern not lending itself to being constructed by prescribed machine methods, the Contractor will be permitted to perform the strike-off, consolidation, final floating, and surface finishing with equipment, tools, means, labor, and methods other than those specified, provided the work meets with the approval of the City Engineer and the following requirements:

1) Striking-off and consolidating the P.C.C. shall be done without causing segregation of material and include thorough vibration uniformly throughout the mass as the concrete is being placed until it is uniformly compacted.

2) The P.C.C. shall be struck-off by means of templates or screeds designed and manipulated to shape the P.C.C. to specified cross section between the forms, carrying a slight excess of P.C.C. in front of the leading edge of templates or screeds at all times. The P.C.C. shall be tamped to reduce voids to a minimum.

3) Floating shall follow the vibrating, striking-off and tamping operations and shall include transverse floating or other smoothing and finishing action. This shall provide a surface and evenness within a 12-foot straightedge tolerance of 0.01-foot. Testing of the hardened surface will be done by the Contractor in the presence of the Engineer. The surface shall be free from laitance, soupy mortar, marks, or irregularities.

4) The surface shall be finished as set forth in 310.3.14.

Any areas of minor honeycomb or other minor defect in composition of the P.C.C. along the exposed edges of P.C.C. shall be filled with a stiff mortar of cement and fine aggregate and applied to the moistened P.C.C. to the satisfaction of the Engineer. Areas showing serious defects in composition of the concrete shall be removed and replaced with pavement of specified quality for full width of strip between longitudinal joints or edges and for a length not less than between the nearest transverse joints.

# 310.3.18 Curing of Portland Cement Concrete

Concrete (other than high-early-strength) shall be maintained above 50°F and in a moist condition for at least the first 7 days after placement. High-early-strength concrete shall be maintained above 50°F and in a moist condition for at least the first 3 days after placement.

Immediately after the finishing operations have been completed and the water film has evaporated from the surface or as soon as marring of the concrete will not occur, the entire surface of the newly placed concrete should be covered and cured for at least 72 hours in accordance with one of the following methods:

a) Membrane curing – Immediately after the water film has disappeared from the surface of the pavement, the surface should be uniformly

coated with liquid membrane curing material conforming to ASTM C 309 type 2 white pigmented curing compound) by a suitable means of an approved mechanical spray machine at the rate of not less than 1 gal. Per 150 ft<sup>2</sup> of surface (one L per 2 m<sup>2</sup>), or as recommended by the manufacturer. To insure uniform consistency and dispersion of the pigment in the curing material, is should be agitated in the supply container immediately before transfer to the distributor and kept thoroughly agitated during application.

Irregular areas or sections of pavement where the use of a mechanical spraying machine is impracticable may be sprayed with approved hand spraying equipment. The sides of the pavement slab should be coated within 60 minutes after the removal of forms. Any areas of the coating which are damaged within the specified curing period should be immediately repaired.

- b) Mono-molecular coatings This type of membrane coating material may be desirable under adverse drying construction conditions to retard surface evaporation. This is not a substitute for curing.
- c) Cotton mats or burlap The surface and edges of the pavement should be entirely covered with mats. Prior to being placed, the mats should be saturated thoroughly with water. The mats should be so placed as to cause them to remain in intimate contact with the surface, but these should not be placed until the surface has hardened sufficiently to prevent marring. They should be maintained fully wetted and in position for the specified curing period. The material should be in good condition, free from holes, dirt or any other substance which interferes with its absorptive quality. Burlap should be made of jute or kenaf. Burlap that will not absorb water readily when dipped or sprayed and that weighs less than 7 oz/yd<sup>2</sup> (240 g/m<sup>2</sup>) when clean and dry should not be used.
- d) Waterproof paper As soon as the pavement has hardened sufficiently to prevent marring of the surface, the pavement should be entirely covered with waterproof paper (ASTM C 171). The paper units should be lapped 12 in (300 mm). The waterproof paper should be sufficiently wide to overlap and completely cover the sides of the slab after the forms have been removed unless additional strips of paper are furnished for curing the sides. The curing paper should be placed and maintained in intimate contact with the surface and sides of the pavement during the curing period. Damaged curing paper which cannot be effectively patched or repaired should be discarded. Curing paper should be placed only on a moist surface. If the surface appears dry, it should be wetted by a spray fine enough to prevent damage to the fresh concrete.
- e) White polyethylene sheeting The surface and sides of the pavement should be entirely covered with white polyethylene sheeting. It should be placed while the surface of the concrete is still moist. If the surface

appears dry it should be wetted with a fine spray before the sheeting is placed. Adjacent sheets should be lapped 18 in (460 mm). The sheeting should be weighted to keep it in contact with the pavement surface and it should be large enough to extend beyond the pavement edge and completely cover the sides of the slab after the forms have been removed. The polyethylene sheeting should remain in place for the duration of the curing period. A minimum polyethylene thickness of 4 mils (1 mm) should be specified.

## 310.3.19 Protection of Concrete

The Contractor shall erect and maintain suitable barriers to protect the concrete from traffic or other detrimental trespass until the pavement is opened to traffic. The Contractor shall maintain watchmen after normal working hours for at least a 24-hour period to insure that these barriers are not removed or destroyed, that trespass and vandalism upon the pavement does not occur.

Wherever it is necessary that traffic (including Contractor's vehicles and equipment) be carried from one side of the pavement to the other, the Contractor shall construct suitable bridges over the pavement, and shall maintain them in good condition as long as they may be required. Leaving gaps in the pavement to facilitate movement of traffic will not be allowed unless prior written permission is obtained from the City Engineer.

All joints that have been constructed in the concrete surface shall be protected from impact and the infiltration of foreign matter before the installation of joint filler, in a manner satisfactory to the City Engineer.

The Contractor shall not operate construction equipment or allow traffic on newly placed P.C.C. until the following requirements are met:

1) The joints have been filled as per 310.3.13.

2) The concrete shall have attained a compressive strength of at least 4,000 pounds per square inch (corrected  $f_c$  as per 310.2.07).

3) The concrete shall have been in place at least 14 days.

If the Contractor desires to allow traffic on the P.C.C. before 14 days have elapsed, but no earlier than 7 days, the Contractor shall have requested the Engineer prior to pouring the pavement that the City designated test facility retrieve sufficient material for an extra five compressive strength tests for each 1,500 square yard increment in pavement, which extra cost shall be paid to the City by the Contractor.

4) The surface of the concrete shall be protected from scarring or abrasion and shall be free of stones, loose mortar and other matter apt to be deleterious to the concrete in the paths of equipment. All equipment shall be operated without damage to the new concrete.

Any part of the pavement damaged by traffic or damaged from any other cause, prior to its official acceptance, shall be repaired or replaced by the Contractor, at the Contractor's expense, to the satisfaction of the Engineer.

### 310.4.00 Quality Assurance

Samples for flexural strength tests of each class of concrete placed each day shall be taken not less than once a day. Flexural strength tests shall consist of one set of four laboratory-cured specimens with one seven-day break, two twenty-eight day breaks and one sample to be retained as a hold specimen. Samples for flexural strength tests shall be taken in accordance with ASTM C 172. Beams shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 78. The strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:

- (a) Every arithmetic average of any three consecutive flexural strength tests equals or exceeds the specified modulus of rupture;
- (b) No individual flexural strength test (average of two beams) falls below the specified modulus of rupture by 75 psi.

In addition, samples for compressive strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 100 yd<sup>3</sup> of concrete. Compressive strength tests shall consist of one set of four laboratory-cured specimens with one seven-day break, two twenty-eight day breaks and one sample to be retained as a hold specimen. Samples for compressive strength tests shall be taken in accordance with ASTM C 172. Cylinders for strength tests shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:

- (a) Every arithmetic average of any three consecutive compressive strength tests equals or exceeds f'c;
- (b) No individual compressive strength test (average of two cylinders) falls below f'c by more than 500 psi.

Slump (test method ASTM C 143), air content (test method ASTM C 138, C 1730, or C 231) and temperature tests shall be taken when strength specimens are made and at the option of the inspector as often as is necessary for control checks.

Prior to concreting, compliance of the reinforcing steel placement with the contract documents shall be verified. The inspector shall be present continuously during concrete placement. The inspection agency shall promptly notify the contractor and the Engineer of observed irregularities or deficiencies of work or products.

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## 311 CONCRETE CURB AND GUTTER/STANDARD CURB

## 311.1.00 <u>General</u>

#### 311.1.01 <u>Scope</u>

This section covers the work necessary for the construction of concrete curb and gutter, and standard curb including, but not limited to: furnishing materials; forming, mixing, placing and curing all concrete; placing construction joints; finishing concrete as specified; backfill behind the curbs; and cleanup. References herein to curbs shall also be deemed to mean curb and gutter. Concrete construction shall be in accordance with these specifications and ACI 318 (Building Code Requirements for Structural Concrete). All concrete unless specified, shall be mixed and deposited in accordance with ASTM C 94 (Specifications for Ready-Mixed Concrete). When a conflict exists between various governing codes, the more stringent code requirement shall be followed.

### 311.2.00 Materials

#### 311.2.01 <u>Concrete</u>

Mix design shall be submitted to the Engineer a minimum of 7 calendar days prior to placement of concrete for approval. Concrete shall have a minimum compressive strength of 3300 psi, 28 days after placement. An air-entraining admixture shall be used. It shall be added to the mixer at the time of mixing in such a manner as to insure uniform distribution of the admixture throughout the batch. Entrained air (percent of volume) range shall be 4 percent to 7 percent (ASTM C 138, C 173 or C 231). The maximum water/cement ratio shall be 0.52 and the slump shall be a maximum of 5 inches. Concrete aggregates shall conform to ASTM C 33 requirements.

### 311.2.02 Forms

Prefabricated steel forms may be used. Lumber used in forms shall be of 2inch material free from loose knots or other defects. Forms shall be thoroughly cleaned before being reused. Reuse of forms and form lumber will be permitted only when their condition is approved by the City Engineer.

### 311.2.03 Curing Compound

Liquid curing compound shall meet the requirements of ASTM C 309, Type 2, white pigmented.

## 311.2.04 Polyvinyl Chloride Pipe

Pipe shall conform to ASTM D 1785, Schedule 40.

## 311.3.00 Workmanship

#### 311.3.01 Excavation

Excavation shall be done in conjunction with the excavation of the street. Any portion of the curb subgrade excavated below grade shall be corrected with compacted leveling base rock conforming to Section 308.0.0.

### 311.3.02 Extruded Curb

The machine for extruding Portland cement concrete curb shall be of the selfpropelled type equipped with a material hopper, distributing screw, and adjustable curb forming devices capable of placing and consolidating Portland cement concrete or asphalt concrete to the lines, grades and cross section as shown, in an even homogeneous manner. Portland cement concrete curb shall be free of honeycomb.

Set top of curb grade by an offset guide line. 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 a 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.

Prior to placing the curb on Portland cement or asphaltic concrete pavements, the pavement shall be dry and cleaned of loose and deleterious material. Immediately after cleaning the pavement surface, an epoxy bonding agent meeting the requirements of ASTM C 881, shall be applied to the pavement which will bind the extruded curb to the pavement surface.

### 311.3.03 Forms

Forms shall conform to the shape, lines, grades, and dimensions shown on the Plans. Inside of forms shall be coated with a light, non-staining form oil. Forms shall be braced and supported to permit thorough tamping of the concrete.

#### 311.3.04 Drainage Pipe

Polyvinyl Chloride (PVC) pipe, of 3-inch diameter shall be installed 1/2-inch above the invert of the gutter, at positions shown on the plans or determined by the City Engineer.

#### 311.3.05 <u>Control Joints</u>

Place control joints in curbs, at intervals not exceeding 15 feet. Control joints must be of the open joint type and must 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 must be inserted one-half the depth of the curb. After initial set has occurred in the concrete and prior to removing the front curb form, the steel sheet must be removed with a sawing motion.

### 311.3.06 Concrete Placement

Before depositing concrete, work crews and all equipment and tools shall be on the job site, all forms, string lines and base shall be in place and approved by the City Engineer, all debris shall be removed from the space to be occupied by the concrete, and the subgrade shall not be frozen. The base shall be thoroughly wetted, but no pools of water will be permitted.

Concrete shall be deposited in its proper place without delay in a continuous operation. An interval of more than 45 minutes between any two consecutive batches or loads, or a placing rate of less than 8 cubic yards of concrete per hour, shall constitute cause for a construction joint at the location and of the type directed by the City Engineer in the concrete already placed.

In hot weather, concrete in place shall be protected until final finishing can be completed. With a hot dry breeze, windbreaks may be erected, or fog nozzles may be used. Curing operation should begin as soon as concrete has set enough to avoid surface damage.

Placing concrete during periods of rain will not be permitted. If concrete has been placed and rain commences, it shall be protected by plastic sheeting positioned off the concrete surface, and maintained to prevent ponding.

Concrete shall be placed only when the outside air temperature is 35°F and rising, and is forecast to remain above 35°F.

At time of placement, the temperature of the concrete shall not be less than  $50^{0}$ F nor more than  $90^{0}$ F.

### 311.3.07 Form Removal

The form on the front of formed curbs shall be removed in not less than one hour nor more than six hours after the concrete has been placed. In no event shall the front form be removed if the concrete has not reached its initial set.

## 311.3.08 Finish

After removal of the forms from exposed faces, any holes left shall be patched and finished. The patching mixture shall consist of one part cement and two parts mortar sand. In general, it is not anticipated that patching will be required. Plywood or metal forms shall be used to produce a uniformly smooth surface on the exposed face. The use of form ties buried in the curb wall must have the prior approval of the City Engineer, and then only to suit a special forming problem, or as part of the integral design of a prefabricated and manufactured standard curb and gutter form.

## 311.3.09 Concrete Curing

Protection against loss of moisture shall be accomplished by keeping the surface continuously wet for seven days or by application of an approved curing compound applied immediately after completion of the finishing. Concrete shall be maintained above 50°F for at least the first 7 days after placement.

### 311.3.10 Protection of Concrete

Until the concrete has set and cured, the Contractor shall erect and maintain suitable barriers to protect the concrete from vandalism, traffic, or other detrimental trespass. The Contractor shall remove and replace those sections of concrete upon which vandalism and/or trespass occurs.

## 311.3.11 Backfill

Backfill behind the curb and gutter shall not be started until seven days after the concrete has been placed and a minimum compressive strength has been attained. Backfill shall conform to the lines shown on the Plans. Backfill in planter strip areas shall be clean topsoil free of weeds, debris, rock, concrete, and other detrimental or toxic matter. Care shall be taken to preserve the curb and gutter alignment while backfilling. In no case shall base rock be placed and compacted in the street before the curbs are properly backfilled.

## 311.4.01 <u>Quality Assurance</u>

Samples for compressive strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 100 yd<sup>3</sup> of concrete. Compressive strength tests shall consist of one set of four laboratory-cured specimens with one seven-day break, two twenty-eight day breaks and one sample to be retained as a hold specimen. Samples for compressive strength tests shall be taken in accordance with ASTM C 172. Cylinders for strength tests shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:

- (a) Every arithmetic average of any three consecutive compressive strength tests equals or exceeds f'c;
- (b) No individual compressive strength test (average of two cylinders) falls below f'c by more than 500 psi.

Slump (test method ASTM C 143), air content (test method ASTM C 138, C 1730, or C 231) and temperature tests shall be taken when strength specimens are made and at the option of the inspector as often as is necessary for control checks.

Prior to concreting, compliance of the reinforcing steel placement with the contract documents shall be verified. The inspector shall be present continuously during concrete placement. The inspection agency shall promptly notify the contractor and the Engineer of observed irregularities or deficiencies of work or products.
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### 312 CONCRETE SIDEWALK, PATHWAYS, AND DRIVEWAY APPROACHES

### 312.1.00 <u>General</u>

#### 312.1.01 <u>Scope</u>

This section covers the work necessary for installing and repaving concrete sidewalk, sidewalk ramps, and driveway approaches. Concrete construction shall be in accordance with these specifications and ACI 318 (Building Code Requirements for Structural Concrete). All concrete unless specified, shall be mixed and deposited in accordance with ASTM C 94 (Specifications for Ready-Mixed Concrete). When a conflict exists between various governing codes, the more stringent code requirement shall be followed.

### 312.2.00 Materials

#### 312.2.01 Gravel Base

Gravel base shall conform to the 3/4-inch minus grading and compaction requirements of Section 308.0.00.

#### 312.2.02 <u>Concrete</u>

Mix designs shall be submitted to the Engineer for approval a minimum of 7 calendar days prior to placement of concrete. The concrete shall have a minimum compressive strength of 3300 psi, 28 days after placement. An air-entraining admixture shall be used. It shall be added to the mixer at the time of mixing in such a manner as to insure uniform distribution of the admixture throughout the batch. Entrained air (percent of volume) range shall be 4 percent to 7 percent (ASTM C 138, C 173 or C 231). The maximum water/cement ratio shall be 0.52 and the slump range shall be between 3- and 5-inches (ASTM C 143). Temperature of the concrete at time of placement shall range from 50°F to 90°F (ASTM C 1064). Concrete aggregates shall conform to ASTM C 33 requirements.

### 312.2.03 Forms

Lumber used in forms shall be S4S, free from loose knots or other defects. Form material shall be 2-inches by 6-inches for driveway approaches. Reuse of thoroughly cleaned form lumber must be approved by the City Engineer.

### 312.2.04 Curing Compound

Liquid curing compound shall meet the requirements ASTM C 309, Type 2, white pigmented.

## 312.2.05 Wire Reinforcing

Wire reinforcing shall conform to ASTM A 82, 10 gauge.

### 312.2.06 Polyvinyl Chloride Pipe

PVC pipe shall conform to ASTM D 1785, Schedule 40.

### 312.3.00 Workmanship

### 312.3.01 Excavation, Fill, and Sidewalk Base

Excavate and place fill for sidewalks in conformance with Section 304, Road Excavation and Embankment.

Prepare sidewalk base to the thickness shown on the standard drawings and approved plans, and construct in conformance with Section 308, Base and Leveling Courses.

## 312.3.01A Panel Demolition and Removal

Before removing a sidewalk panel that is to be replaced, sawcut to full depth of existing concrete panel along existing joint on each end of the panel. Remove existing panel carefully to avoid damaging adjacent panels. Replace all sidewalk panels damaged during construction.

### 312.3.02 Line and Grade

Concrete walks shall be constructed so that they do not deviate more than 1/4inch laterally or 1/8-inch vertically from the required line and grade.

### 312.3.03 Forms

Forms shall conform to the shape, lines, grades, and dimensions shown on the Plans, unless the City Engineer requires modifications to conform to existing site or driveway conditions.

### 312.3.04 Drainage Pipe

Polyvinyl Chloride (PVC) pipe, of 3-inch diameter shall be installed from the concrete curb to the right-of-way line, graded to fall to the curb and 1/2-inch above the gutter invert, at positions shown on the plans or determined by the City Engineer.

### 312.3.05 Control Joints

Scoring of sidewalk control joints must be traverse to the centerline of the

sidewalk at a spacing of 5.0 foot on center. All control joints must be straight, 1/4-inch in depth, and finished with a 1/4-inch radius edge.

### 312.3.06 Concrete Placement

Before depositing concrete, work crews and all equipment and tools shall be on the job site, all debris shall be removed from the space to be occupied by the concrete, the subgrade shall not be frozen, and all forms and base shall have been approved by the City Engineer. The base shall be thoroughly wetted, but no pools of water will be permitted.

Concrete shall be deposited in proper place without delay in a continuous operation. An interval of more than 45 minutes between any two consecutive batches or loads, or a placing rate of less than 8 cubic yards of concrete per hour, shall constitute cause for a construction joint at the location and of the type directed by the City Engineer. Concrete shall be spread uniformly between forms and thoroughly consolidated with approved methods.

In hot weather, concrete in place shall be protected until final finishing can be completed. With a hot dry breeze, windbreaks may be erected, or fog nozzles may be used. Curing operation should begin as soon as concrete has set enough to avoid surface damage.

Placing concrete during periods of rain will not be permitted. If concrete has been placed and rain commences, it shall be protected by plastic sheeting positioned off the concrete surface, and maintained to prevent ponding.

Concrete shall be placed only when the outside air temperature is 35<sup>o</sup>F and rising, and is forecast to remain above 35<sup>o</sup>F.

At time of placement, the temperature of the concrete shall not be less than  $50^{0}$ F nor more than  $90^{0}$ F.

## 312.3.07 <u>Finish</u>

Construct concrete sidewalks so longitudinal slope, cross slope, surface, and other features do not exceed maximum allowable slope according to the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG).

If the existing adjacent sidewalk cross slope exceeds PROWAG requirements, construct a transition panel that is at least two feet long between the new sidewalk panel and the existing sidewalk. Extend the transition panel to the nearest control joint if less than 2-feet of the existing panel remains. The intent of transitional segments is to smoothly transition between the PROWAG-compliant replacement sidewalk panels and non-compliant existing sidewalk panels that may be replaced in the future.

After the concrete has been thoroughly consolidated and leveled, float surface with a wood or magnesium float and finish with a steel float at the proper time. Edge joints with 1/4-inch radius edger. Use a fiber hair brush to apply a light broomed finish perpendicular to the centerline of the sidewalk as approved by the City Engineer.

Construct surfaces to be free of humps, sags, or other irregularities. Construct surfaces to within 0.02 feet of the specified line, cross section, and thickness. Grades and slopes may not exceed maximum values required by PROWAG.

## 312.3.08 Concrete Curing

Protection against loss of moisture shall be accomplished by keeping the surface continuously wet for seven days or by application of an approved curing compound applied immediately after completion of the finishing. Concrete shall be maintained above 50°F for at least the first 7 days after placement.

## 312.3.09 Protection of Concrete

Until the concrete has set and cured, the Contractor shall erect and maintain suitable barriers to protect the concrete from vandalism, traffic, weather (including rain and freezing temperatures), or other detrimental trespass. The Contractor shall remove and replace those sections of concrete upon which vandalism, trespass, or weather damage occurs.

## 312.3.10 Backfill

After the concrete has set for at least one day, backfill voids left by edge forms and grade backfill.

Backfill in planter strip areas and behind the sidewalk shall be clean topsoil free of weeds, debris, rock, concrete, and other detrimental or toxic matter.

## 312.4.00 <u>Quality Assurance/Quality Control</u>

Samples for compressive strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 100 yd<sup>3</sup> of concrete. Compressive strength tests shall consist of one set of four laboratory-cured specimens with one seven-day break, two twenty-eight day breaks and one sample to be retained as a hold specimen. Samples for compressive strength tests shall be taken in accordance with ASTM C 172. Cylinders for strength tests shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:

(a) Every arithmetic average of any three consecutive compressive strength tests equals or exceeds f'c;

(b) No individual compressive strength test (average of two cylinders) falls below f'c by more than 500 psi.

Slump (test method ASTM C 143), air content (test method ASTM C 138, C 1730, or C 231) and temperature tests shall be taken when strength specimens are made and at the option of the inspector as often as is necessary for control checks.

Prior to concreting, compliance of the reinforcing steel placement with the contract documents shall be verified. The inspector shall be present continuously during concrete placement. The inspection agency shall promptly notify the contractor and the Engineer of observed irregularities or deficiencies of work or products.

### 312.5.0 Sidewalk Repair

When sidewalk, curb, and gutter require repair, the following requirements apply.

## 312.5.01 Vertical Separation

**General.** Grind sidewalk joints and cracks with vertical discontinuities (offsets) between 1/4-inch and 1-inch to reduce trip hazards. The maximum taper of ground areas shall conform to the Americans with Disabilities Act (ADA) requirements. The minimum width of grind shall be 6".

| Height of vertical offset      | Requirement  |
|--------------------------------|--|
| Less than 1/4-inch             | No grinding is required                                      |
| Between 1/4-inch and 1/2- inch | Bevel with a slope not steeper than 50 percent (1:1)         |
| Between 1/2-inch and 1-inch    | Do not exceed 8.33 percent (1:12) in the direction of travel |

**Finish and Appearance.** Grind vertical offsets to produce a smooth non-skid surface closely resembling the appearance and skid resistance of the adjacent concrete. Perform grinding so the sidewalk surface has essentially the same or slightly rougher texture as the surface adjacent to either side of the joint or crack. Provide a slip-resistant surface for all ground surfaces.

Perform grinding so the shape of grind is approximately rectangular with a straight back line and no stray grinding marks. Grind bevel uniformly across entire length of vertical offset. Smooth sharp edges left by the grinding operations. Do not grind adjacent concrete. Repair all scars or damage caused by the grinding operation. Grind and fill holes and cracks as directed in accordance with Public Works Construction Code Section 312.5.02 – Horizontal Separations.

**Hand Grinding.** Grind areas that are inaccessible to the grinding machine with a hand held grinder to the same standards as required for machine grinding.

**Dust Control.** Control visible dust from grinding operations by equipping grinding machines with a vacuum dust control system to provide a dust free work area or by using small amounts of water as a dust control agent. Size vacuum dust collection system according to the manufacturer's recommendations with minimum suction sufficient to eliminate visible dust and a 2-inch diameter hose. Apply water to work area using an automatic water feed system designed for use with the grinding equipment or apply water to the work area by hand using a spray nozzle.

**Control and Clean up.** Throughout all phases of construction keep the work site clean and free from rubbish and debris. If water is used as a dust control agent, remove slurry using a wet-dry shop vacuum. Do not allow concrete dust or other debris to leave the work area and enter the local storm drainage system including the curb and gutter, roadside ditches, or overland flow.

**Ownership and Disposal of Grinding Residue.** Before moving on to the next vertical offset, sweep work area clean and vacuum all slurry and dust produced during grinding. Grinding residue becomes the property of the Contractor. Dispose of the residual material in accordance with State and Federal laws.

**Public convenience and safety.** Meet requirements of Public Works Construction Code Section 302.0.00. When the work requires a section of sidewalk to be closed and pedestrian traffic prohibited, place Type 1 barricades with "sidewalk closed" signs on the sidewalk facing the direction of travel and cone off the work area as need to maintain a safe environment.

**Payment.** Payment for each "Grind" and "Grind and Fill" shall be made at the unit bid price per each, regardless of the height or horizontal extents of the "Grind" and regardless of the height, horizontal extents, or depth of the "Grind and Fill".

Payment for each item will include full compensation for furnishing all labor, materials, tools, equipment and backup equipment; mobilization, traffic control, transportation and technical competence for performing all work necessary to complete each item as directed and as specified in these Contract Documents, including but not limited to obtaining all applicable certifications necessary for specialty personnel and equipment and all applicable permits; equipment and materials to be used on the job, disposal of waste materials, and restoration of each work area site.

## 312.5.02 Horizontal Separation

Sidewalk shall be repaired when the horizontal separation is  $\frac{1}{2}$ -inch or greater by filling the void with grout.

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### 313 SURFACE RESTORATION

#### 313.1.00 <u>General</u>

#### 313.1.01 <u>Scope</u>

This section covers the work necessary to restore surfacing including driveways, extruded curb, trench repaving, pavement coring, and to adjust miscellaneous structures to grade.

For asphalt roads paved within the last five years, meet the requirements of Section 313.3.03D, Asphalt Repair for Newly Paved Roads.

#### 313.1.02 Surfacing Depths

Provide a minimum pavement thickness of six inches for asphalt restoration and 10 inches for concrete restoration, or match existing pavement thickness, whichever is greater. Exceptions must be approved by the City Engineer.

#### 312.2.00 Materials

#### 312.2.01 Base and Leveling Course Rock

Shall meet the requirements of 308.0.00, Base and Leveling Course Rock.

#### 313.2.02 Asphalt Concrete

#### 313.2.02A Surface Course

Asphalt concrete for the surface course shall be Class C mix as specified in Section 309, Asphalt Concrete.

#### 313.2.02B Base Course

When more than 3 inches of asphalt concrete is required, the asphalt concrete shall be placed in two courses. The base course shall be Class B or C mix as specified in Section 309, Asphalt Concrete.

## 313.2.02C Tack Coat

Tack coat shall be as specified in Section 309, ASPHALT CONCRETE.

### 313.2.02D Cold-Mix Asphalt

Asphalt shall be SC-800 meeting the requirements of specification series No. 2 of the Asphalt Institute. Maximum aggregate size shall be 3/4-inch. Final mixture shall contain from 4 to 6 percent liquid asphalt by weight of total mix.

### 313.2.03 Concrete Pavement

Furnish concrete as specified in the applicable section(s) listed below:

- 1. Section 310, Portland Cement Concrete Pavement
- 2. Section 311, Concrete Curb and Gutter

Section 312, Concrete Sidewalks, Pathways, and Driveway Approaches

### 313.3.00 Workmanship

### 313.3.01 Driveways and Sidewalks

Restore damaged driveways and sidewalks in compliance with Section 312, Concrete Sidewalk, Pathways, and Driveway Approaches. Replace full concrete panels only; partial panel replacement is not allowed. If an existing driveway approach does not meet PROWAG, replace the entire driveway approach.

### 313.3.02 Extruded Curb

Extruded curb shall be placed per Section 311.3.02, Extruded Curb.

### 313.3.03 Trench Repaving

### 313.3.03A Trench Preparation and Backfill

Comply with Section 320, Trench Excavation and Backfill.

### 313.3.03B Base Course and Leveling Course

Obtain approval of the subgrade by the Engineer prior to placing any

base course material on the subgrade. Workmanship in manufacturing, placing, compacting, and maintaining base, or leveling course shall be as specified in Section 308, BASE AND LEVELING COURSES.

## 313.3.03C Tack Coat

Prior to paving, apply an asphalt tack coat, at 0.25 to 0.45 gallon per square yard to the edges of the existing pavement and manhole frames.

### 313.3.03D Asphalt Concrete

Comply with Section 309, Asphalt Concrete.

For all cuts into a road that was paved within the last five years, additional repair is required. Replace existing asphalt with grind and inlay replacement extending from the face of curb or gutter (or edge of asphalt) to the road centerline or other lane striping approved by the City Engineer, and 10 feet beyond the edges of trench cuts in the direction parallel to the road centerline. If a cut is made within two feet of the road centerline, or if the cut crosses the road centerline, extend the grind and inlay across the entire width of the road. The City Engineer may alter the limits of grind and inlay replacement. Perform work in accordance with Section 315, Cold Plane Pavement Removal.

## 313.3.03E Joint Seal Coat

Immediately after the new paving is compacted, all joints between new and original asphalt pavement shall be painted with hot asphalt or asphalt emulsion and be covered with dry paving sand before the asphalt solidifies. Width of joint seal coat shall be no less than 4-inches and no more than 6inches.

### 313.3.03F Contractor's Responsibility

Prior to the end of each workday, permanently resurface all trenches within the Right-of-Way in accordance with these specifications or provide temporary surfacing in accordance with Section 313.3.03G, Temporary Surfacing. Do not leave trenches in a condition that requires traffic to traverse crushed rock or unpaved surface.

Maintain and repair all settlement of pavement over trenches.

Restore all striping, traffic signal loops, and other public works facilities impacted by the work.

## 313.3.03G Temporary Surfacing

Temporary trench surfacing may include the following:

- 1. **Cold-Mix Asphalt:** Backfill the trench in accordance with Section 320, Trench Excavation and Backfill, and finish the trench with at least three inches of compacted cold-mix asphalt. Finish trench so compacted surface is flush with the surrounding surface. Promptly correct any irregularities in the pavement surface that deviate from the proper street grade or cross-section by 1/4-inch or more.
- 2. CLSM: Backfill the trench to the surface with Class E (CLSM) in accordance with Section 320, Trench Excavation and Backfill. Strike off CLSM to provide a smooth surface that is flush with the surrounding surface. Allow a minimum of 24-hours for CLSM to set. Open to traffic only after CLSM has hardened sufficiently to prevent rutting. Promptly correct any irregularities in the pavement surface that deviate from the proper street grade or cross-section by 1/4-inch or more.
- 3. Steel Plates: In special cases, if approved by the City Engineer, steel plates over the excavation may be used. Before steel plates are installed, the excavation must be adequately shored to support the bridging and traffic loads. Use steel plates that meet ASTM A36 Steel Requirements, and are able to withstand H-20 traffic loading without any movement. Use flat steel plates that do not deviate more than 1/4-inch when measured with a 10-foot long straight edge along the length of the plate. Install steel plates to resist bending and vibrations, and anchor securely to prevent movement. Use leveling shims as needed to reduce plate movement. When more than one plate is used, tack weld plates together at each corner. Place a "Steel Plate Ahead" warning sign (MUTCD W8-24) a distance in feet of four times the posted speed limit or 100 feet, whichever is greater, in advance of steel plate location. Perform and document daily inspections of steel plates and take immediate corrective action as needed to ensure public safety. Do not use steel plates for more than 30 consecutive days, unless otherwise approved by the City Engineer. Use one of the following installation methods as required:

Asphalt Roadways Below 35 MPH: Use steel plates that are a minimum of one inch thick. Install steel plates to provide a minimum of 12 inches overlap onto undisturbed pavement. Install compacted cold-mix asphalt transition taper a minimum of 12 inches wide around all edges of steel plates.

**Asphalt Roadways 35 MPH and Greater:** Use steel plates that are a minimum of 1 1/4-inch thick. Mill a minimum of 14

inches of undisturbed asphalt surface around the edges of the trench and install steel plates to overlap a minimum of 12 inches on top of the milled asphalt surface, and to be flush with the existing surface. The gap between the edge of steel plate and undisturbed asphalt must be at least two inches wide. Fill the gap with compacted cold-mix asphalt.

All Concrete Roadways: Use steel plates that are 1 1/4-inch thick minimum. Install steel plates to provide a minimum of 12 inches overlap onto undisturbed pavement. Install compacted cold-mix asphalt transition taper a minimum of 12 inches wide around all edges of steel plates.

## 313.3.03H Portland Cement Concrete

Comply with Section 310, Portland Cement Concrete Pavement. Replace damaged panels entirely. Place new dowels and tie bars between all cut dowels and tie bars. Provide a minimum pavement thickness of 10 inches or match existing.

## 313.3.04 Manhole Frame Adjustment

The height and position of manhole frames (including cone position) of existing manholes shall be adjusted to conform to new grades and cross sections, and to avoid conflict with any new curb and gutter that may be shown on the Plans.

The Contractor shall remove the material around the manhole without disturbing a greater area than necessary, rotate the cone or adjust riser, and raise or lower the manhole frame until the top surface is at the correct elevation and position. If the cone is rotated, new steps shall be provided in the lower section of the manhole, aligned with the existing steps in the cone. The manhole frame, grade rings, steps and cone shall be mortared or gasketted to provide a watertight seal. The excavation shall be backfilled with approved material in 6-inch layers, and each layer shall be thoroughly compacted with a mechanical tamper before the next layer is placed, until the backfill is up to the subgrade elevation.

# 313.3.05 Pavement Coring Repair

This section covers the repair of pavement coring. If multiple pavement cores are made within three feet of each other, repair in accordance with Section 313.3.03, Trench Repaving. All other excavations are covered under Section 313.3.03, Trench Repaving.

# 313.3.05A Asphalt Concrete Pavement Coring Repair

Backfill with CLSM to a depth six inches minimum below pavement surface or to bottom of existing asphalt, whichever is greater. Swab the hole with tack coat and fill with hot mix asphalt in three-inch maximum lifts, compacting each lift individually. Seal with tack coat and sand layer.

Use CLSM in compliance with Section 320.2.04, Controlled Low Strength Material (CLSM). Use tack coat in compliance with Section 309.2.08, Asphalt Tack Coat.

If pavement coring in a bike lane, repair in compliance with Section 313.3.03, Trench Repaving.

#### 313.3.05B Portland Cement Pavement Coring Repair

Backfill with CLSM and repair with 10 inches minimum Portland Cement Concrete or match existing pavement thickness, whichever is greater.

Finish new concrete surface to match existing surrounding surface.

Use CLSM in compliance with Section 320.2.04, Controlled Low Strength Material (CLSM). Use concrete in compliance Section 310, Portland Cement Concrete Pavement.

If the edge of the pavement coring is within 18 inches of the edge of the panel, replace the entire panel in compliance with Section 313.3.03, Trench Repaving.

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### 314 HYDROSEEDING AND MULCHING

#### 314.1.00 <u>General</u>

#### 314.1.01 <u>Scope</u>

This work shall consist of surface preparation, and the supply and application by hydraulic means, of fertilizer, seed and/or mulch, to develop plant growth for erosion control. The work and type of seeding shall be performed as indicated by the plans, and specifications or as directed by the City Engineer.

#### 314.1.02 Construction Season

Unless otherwise specified or approved, this work is to be performed during either the spring season, between February 1st and May 15th, or the fall season, between August 1st and November 15th. Areas may be seeded between November 1st and March 31st, with the approval of the Engineer, but must be protected by clear polyethylene sheet of a minimum thickness of 6 mil., which is to remain in position until the vegetation is firmly established.

The work shall be performed in the presence of the City Engineer, only at times when local weather and the soil surface are in a condition favorable for the germination of seed and the growth of grass, otherwise the surface shall be maintained in a manner acceptable to the City Engineer until the following construction season.

#### 314.2.00 Materials

#### 314.2.01 Fertilizer

Fertilizer shall be of standard commercial manufacture and grade and be furnished in standard, unopened, moisture proof containers in a dry condition. The fertilizer shall be inorganic 22-16-8, which shall analyze at 22% nitrogen, 16% available phosphoric acid and 8% soluble potash, and include a minimum 2% sulfur. The fertilizer shall contain not less than 30% available water insoluble nitrogen derived by incorporating one of the following:

1) A minimum 800 lbs., of urea formaldehyde per ton of fertilizer which has a minimum Activity Index (AI) of 40. The AI shall be determined by the Association of Official Agricultural Chemists method. 2) A minimum of 500 lbs. of Isobutylidene Diurea (IBDU) per ton of fertilizer. The application rate shall be 400 lbs per acre.

### 314.2.02 <u>Seed</u>

All seed shall be delivered in standard, sealed containers labeled with the variety and percentages of seed and date of test. Tests in accordance with Oregon Laws and Department of Agriculture regulations shall have been performed within 9 months of the delivery date and the seed shall not be moldy or show evidence of having been wet or otherwise damaged.

Seed variety type shall be as specified on the approved plans. Seed types and application rates are as follows:

#### Grass Seed

Grass seed, as a mixture, shall be applied at the following minimum rates:

| Kind of Seed         | Lbs Per Surface Acre |
|----------------------|----------------------|
| *Creeping Red Fescue | 25                   |
| *Chewings Fescue     | 25                   |
| *Perennial Ryegrass  | <u>50</u>            |
| TOTAL:               | 100                  |
|                      |                      |

\*Acceptable varieties:

| Creeping Red Fescue  | e - Common, Ensylva, Estica, Flyer, Fortress, Illahee,   |
|----------------------|--|
|                      | and Pennlawn.  |
| Chewings Fescue      | - Banner, Cascade, Enjoy, Epsom, Highlight,  |
|                      | Jamestown, Mary, Shadow, Victory, and Waldorf.   |
| Perennial Ryegrass - | All Star, Belle, Blazer, Caravelle, Citation II, Dasher,<br>Derby, Diplomat, Fiesta, Manhattan II, Omega,<br>Palmer, Pennant, Pennfine, Regal, Tara, and<br>Yorktown II. |

### Wildflower Mix

| Valley Native Wildflow | ers, Pro-Time #420<br>Application rate: | 1 oz./1000 sq. ft. |
|------------------------|---|--------------------|
| Blue Wild Rye "Elymu   | s Glaucus"<br>Application rate:         | 20 lb./acre        |

If the specified seed is not available, the Contractor shall submit other kinds of seeds and/or seed mixtures to the City Engineer for approval.

### 314.2.03 Wood Cellulose Fiber Mulch

The mulch material shall be free of noxious weed seeds and plants and shall contain no substance detrimental to plant life. It shall be processed so that the wood or straw fibers will remain uniformly suspended under agitation in water. The mulch shall also blend with seed, fertilizer and tackifier additive of a hydroseeding mixture to form a homogeneous slurry. The processed mulch shall have the ability to cover and hold grass seed in contact with the soil and have moisture-absorption and percolation properties to form a blotter-like ground cover. The cellulose fiber shall be colored green with a non-toxic dye to visibly aid uniform application.

Mulch shall be used as a tracer at the rate of 250 lbs., dry weight per acre in the application of a mixture of fertilizer and seed.

The application of mulch only, shall be at the rate of 2,000 lbs., dry weight per acre, but if used after the application of seed and fertilizer (within 48-hours), the 250 lbs., of mulch used as a tracer may be included as part of the required 2,000 lbs., per acre.

The following mulch materials are approved for use:

1) Grass Mulch, a grass straw cellulose fiber manufactured by Grass Fiber Inc., 520 E. 2nd Street, Junction City, Oregon 97448.

2) Silva-Fiber, a wood cellulose fiber manufactured by Weyerhaeuser, Tacoma, Washington 98447.

3) Spray Mulch X-80, a wood cellulose fiber manufactured by Pacific Wood Fibers, P.O. Box 2109, Redmond, Washington 98052.

4) Any mulch supplier approved by the Oregon State Highway Division.

## 314.2.04 Tackifier Additive

J-tac, an active hydrocolloid, manufactured by the Reclamare Company, 20727 7th Avenue South, Seattle, WA 98198, (206) 824 2385; shall be used with fertilizer, seed and mulch tracer, at a tackifier application rate of 80 lbs/acre. Add J-tac to the water, with agitation, before other ingredients to permit maximum gelling.

### 314.3.00 <u>Workmanship</u>

### 314.3.01 Preparation of Areas

The areas on which earthwork has been performed shall be at established grades, cross sections and finish, and any which have been misshapen or eroded, shall be restored just prior to seeding. All weeds, debris and other matter detrimental or toxic, shall be removed and a minimum of 1/2-inch of surface soil shall be in a loose condition, with no dirt clods larger than 1-inch.

### 314.3.02 Equipment

The hydraulic equipment shall continuously mix and agitate the slurry and apply the mixture uniformly through a pressure spray system, using a sweeping, horizontal motion of a nozzle.

### 314.3.03 Protective Measures

Care shall be exercised to prevent damage to prepared areas. Material which falls on plants, roadways, drainage ditches and areas where hydroseeding is not specified, or which collects at the ends of culverts, or accumulates to excessive depths shall be removed and redistributed as the City Engineer directs. Protective coverings shall be used on structures and objects where coverage and stains would be objectionable. Care should be taken to protect vehicles and persons from damage by drifting spray.

### 314.3.04 Application

The work, including the mixing of materials, shall be undertaken in the presence of the City Engineer who shall be notified at least two day's in advance, of the time and place of operations. If wind velocities would prevent uniform application or drift the materials the work shall be postponed.

Fertilizer, grass seed, tackifier and/or mulch shall be applied in one continuous application by means of hydraulic pressure equipment.

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#### 315 COLD PLANE PAVEMENT REMOVAL

#### 315.1.00 <u>General</u>

#### 315.1.01 <u>Scope</u>

This work shall consist of preparing a foundation for placement of new surfacing by the removal of existing surfacing to the depth, width and cross section shown on the plans, or by the City Engineer.

#### 315.2.00 Equipment

#### 315.2.01 <u>General</u>

The existing surfacing shall be removed with a self-propelled planing 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 and 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.

#### 315.3.00 <u>Workmanship</u>

#### 315.3.01 Pavement Removal

Remove two inches minimum of existing asphalt surface for the entire area shown on the plans or as directed by the City Engineer. Sawcut the edges of the grind area to a depth of two inches to provide a vertical edge along the perimeter. An inspection will be required before paving may commence. Apply new pavement true to the grade and cross slope shown on the plans or as directed by the City Engineer. Conform to Section 309, Asphalt Concrete Pavement. Restore all striping in accordance with Section 317, Pavement Marking.

If the grind area is required to be open to traffic prior to final asphalt paving is complete, place asphalt joint paper on all edges and construct cold-mix asphalt transition ramps, a minimum of 12 inches long. Do not remove the existing surfacing more than five days prior to construction of new surfacing, except where samples are taken to establish a job mix formula or otherwise approved by the City Engineer.

## 315.3.02 Surface Tolerance

The new surface resulting from the pavement removal will be tested by the City 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 feet.

## 315.3.03 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 City Engineer. ( BLANK PAGE )

#### 316 MAILBOX INSTALLATIONS

#### 316.1.00 <u>General</u>

#### 316.1.01 <u>Scope</u>

This section covers the work necessary for relocating existing mailboxes and the installation of new mailboxes.

#### 316.2.00 Materials

#### 316.2.01 Mailboxes

Contractor shall utilize existing mailboxes for relocated installations. Damaged mailboxes shall be replaced with materials equal to or better than original.

New installations shall incorporate mailboxes conforming to the requirements of the United States Postal Service.

#### 316.2.02 Posts

Posts shall be of adequate strength and size to support the proposed installation.

#### 316.3.00 <u>Workmanship</u>

#### 316.3.01 Location and Position

Mailbox locations shall be as directed by the Post Master and the City Engineer, and shall be located outside the vision clearance areas specified in the TDC.

All mailbox installations shall be vertically plumb and at right angles to the street. Bury depth and spacing in relation to the curb shall be as specified on the Standard Drawing, and mounting height shall be as directed by the mail carrier and City Engineer.

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### 317 PAVEMENT MARKING

#### 317.1.00 <u>General</u>

This section covers the work necessary for the installation or removal of pavement markers, markings, and paint.

Striping paint shall be allowed for line striping only. All other pavement markings, including arrows, stop bars, railroad crossing legends, and word legends, shall be preformed thermoplastic material.

The Design Engineer shall layout the configuration of all striping, markers, and pavement markings for review and approval by the City Engineer prior to any installation.

### 317.2.00 Materials

### 317.2.01 Permanent Pavement Markers

Pavement markers shall conform to OSHD specification 02840.60

### 317.2.01A Type I Reflectorized

Reflectorized markers shall have one or two reflective faces as required to reflect incident light in the specified directions. Reflective pavement markers shall be of the following types:

(a-1) **Type la** - Prismatic reflector lens (approximately 3 sq.in.) set in a 4" x 4" base.

(a-2) **Type lb** - Acrylic rod lens reflector (approximately 0.55 sq.in.) set in a 4-inch diameter base or  $4" \times 4-3/4"$  oval base for bidirectional reflectors.

(a-3) **Type Ic** - Prismatic reflector lens (approximately 2 sq.in.) set in a base approximately 2" x 4".

## 317.2.01B Type II Nonreflectorized

Nonreflectorized markers shall be polyester binder 4-inch diameter.

## 317.2.01C Adhesive

The adhesive shall be a two-component epoxy conforming to the requirements of AASHTO M 237, Class II, except that the viscosity of the individual components at 77±1°F shall be 1000 to 5000 poises. Delete the average viscosity requirement. Type I, or II shall be used.

### 317.2.02 <u>Temporary Pavement Markers</u>

Temporary flexible raised pavement markers shall be made from 0.060-inch thick amber polyurethane with a minimum tensile strength of 4600 psi (ASTM D412), 4-inches wide, 2-inches upstanding with 4-inch long by 0.25-inch wide metalized polycarbonate microprism retroreflective tape on both sides, 1-inch base with factory applied solid butyl rubber adhesive protected by release paper.

### 317.2.03 Striping Paint

Striping paint and glass beads shall conform to the requirements of the OSHD standard specifications.

### 317.2.04 <u>Preformed Thermoplastic Pavement Markings</u>

Preformed thermoplastic pavement markings shall be "Premark" markings, or approved equal.

## 317.3.00 <u>Workmanship</u>

### 317.3.01 Permanent Pavement Markers

Pavement markers shall be installed as shown on the plans by means of an epoxy adhesive. Reflectorized markers shall be placed so that future painting, if required, will not cover the marker.

The portion of the roadway surface to which the marker is affixed shall be free of dirt, curing compound, paint, grease, oil, moisture, loose or unsound layers and any other material which would adversely affect the bond of the adhesive. Cleaning shall be accomplished by one of the following methods:

1) The pavement surface shall be sandblasted for a sufficient length of time to remove all surface contaminants but not so long as to expose buried aggregate. A blast of clean air shall be used to ensure removal of all loose particles from the surface.

2) The pavement surface shall be cleaned with a pavement grinder. The area cleaned shall not exceed 5-inches wide by 6-inches long, nor shall it be deeper than 1/8-inch below the surrounding pavement. A blast of clean air shall be used to ensure removal of all loose particles from the surface.

Markers shall be placed on dry pavement surfaces free of visible moisture.

Markers shall not be installed straddling a joint or crack in the pavement. Alignment of a full pattern of markers may be adjusted away from existing lane line to avoid installation of markers straddled across the longitudinal construction joint or crack. For any such deviation in the line of pavement markers, a gradual taper of pleasing appearance shall be constructed. Spacing between the markers may be adjusted to avoid installation of the markers straddled across a crack or joint, however, in this instance, the alignment shall be maintained.

If epoxy adhesive is used it shall be placed uniformly on the cleaned pavement surface or on the bottom of the marker in a quantity sufficient to result in a complete coverage of the area of contact of the marker. No voids will be present and there shall be a slight excess of material after the marker has been pressed in place. The marker shall be placed in position and pressure applied until firm contact is made with the pavement. A small bead approximately 1/8-inch thick shall form around all edges and corners to insure visually that the marker is fully supported on a pad of adhesive. Excessive adhesive on the pavement, and adhesive on the exposed surfaces of the markers shall be immediately removed. The use of mineral spirits will be permitted for removing adhesive from the surfaces of pavement markers. Cleaning shall effectively remove the adhesive so that no loss in the reflective characteristic will result.

The marker shall be protected against impact until the adhesive has hardened to the degree designated by the City Engineer.

### 317.3.02 <u>Temporary Pavement Markers</u>

Unless shown on the plans, or otherwise directed by the City Engineer, markers shall be placed on dry pavement to simulate permanent markings as follows:

- Three single markers spaced 3 feet apart to simulate a 6-foot line with a gap of 34 feet between simulated lines for skip lines.

- Single markers spaced 5 feet apart for solid, no passing lines.

- Double markers spaced 5 feet apart for double solid, no passing lines.

Temporary pavement markers shall be installed as soon as practical following the paving operation, and shall be in place prior to the opening of the roadway to traffic.

The Contractor shall maintain the temporary pavement markers until such time as the permanent pavement markings are completed.

### 317.3.03 Painted Stripes

The area to be painted shall be dry, clean and free of loose particles. The paint machine shall be of the spray type capable of satisfactorily applying the paint under pressure with a uniformity of feed through nozzles spraying directly upon the pavement. Each machine shall be capable of applying two separate stripes, either solid or skip, at the same time. Each paint tank shall be equipped with a mechanical agitator. Each nozzle shall be equipped with satisfactory cutoff valves which will apply broken or skip lines automatically. Each nozzle shall have a mechanical bead dispenser that is located directly behind and synchronized with the spray nozzle which will distribute the beads in a uniform pattern at the rate specified. Each nozzle shall also be equipped with suitable line guides consisting of metallic shrouds or air blasts.

The Permittee shall be responsible for preliminary spotting of the lines to be painted and approval of the City Engineer must be obtained before striping may begin.

Stripes shall be as shown on the drawings.

The paint shall be thoroughly mixed prior to application and shall be applied when the air temperature is above 40 degrees F., at the following application rates:

(a) **Premixed Beads in Paint:** Apply at a rate of 100 square feet per gallon of paint with beads premixed at the rate of 4-1/2 pounds per gallon.

(b) **Drop-on Beads on Paint:** Apply on wet paint at the rate of 6 pounds per gallon of paint.

(c) **Drop-on Beads on Premixed Beads and Paint:** Apply drop-on beads at the rate of 2-1/2 pounds per gallon of premixed paint and beads.

### 317.3.04 <u>Preformed Thermoplastic Pavement Markings</u>

The area of application shall be dry and free of dirt, dust, chemicals or significant oily substances. The pavement markings shall not be applied on top of existing paint or thermoplastic.

The preformed markings shall be installed according to the manufacturer's recommendation in a manner which provides a uniform surface free of defects. Splices shall be installed without overlap or gaps.

Application generally consists of cleaning the installation area; preheating the installation area; placement of the preformed marking; and heating of the marking to melting point.

## 317.3.05 Stripe and Marker Removal

Remove painted and thermoplastic stripe, and marker epoxy or butyl rubber adhesive, by abrasion, sandblasting, hydroblasting or surface grinding, so that the pavement surface is not damaged and has a surface texture similar to the surrounding area. Obliteration with paint or other substance shall not be permitted.

All debris collected by stripe and marker removal shall be removed from the site and disposed of at the Permittee's expense.

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## 318 PERMANENT TRAFFIC CONTROL

### 318.1.00 <u>General</u>

#### 318.1.01 Traffic Signals

This section covers the removal and installation of traffic signals.

#### 318.1.02 Signs and Traffic Control Devices

This section covers all work necessary to remove and reinstall existing traffic signs or install new traffic control signs as required on a construction project. Traffic control provisions are contained in Section 104.13.00 and Section 106.9.00 of the General Specifications.

#### 318.2.00 Materials

#### 318.2.01 Traffic Signals

Materials shall meet all requirements of the English-unit equivalent of the 1996 Oregon Department of Transportation Standard Specifications for Highway Construction.

### 318.2.02 Signs and Traffic Control Devices

#### 318.2.02A Uniform Traffic Control Devices

Provide signs and traffic control devices built in conformance with the Manual of Uniform Traffic Control Devices (current edition), and the Oregon Supplements to the Manual published by the Oregon Department of Transportation.

### 318.2.02B Signs

Use aluminum only for traffic control signs. The aluminum sheet must meet ASTM B 209 requirements and be fabricated from aluminum alloy 6061-T6, 5154-H38, or approved equal. The minimum sign thickness shall be 0.063" when the sign is to be mounted more than 6-feet above the ground. If the sign is to be mounted 6-feet or less above the ground, the minimum sign thickness

shall be 0.125". Sign height is measured from the ground to the lowest portion of the sign.

### 318.2.02C Sign Posts

A minimum of 2" x 2" x 10' galvanized quick-punch post, or approved equivalent shall be used. When the sign, or combination of signs, is more than 36" in height, a 2" x 2" x 12' galvanized quick-punch post shall be used. Wood or round metal posts will not be permitted.

### 318.2.02D Post Base

The base shall consist of one galvanized quick-punch piece of square tubing, with dimensions of 2-1/4" x 2-1/4" x 30".

### 318.2.02E Fastening

The sign shall be fastened onto the post with drive rivets. To prevent vandalism, no nuts or bolts will be permitted to fasten any sign to the posts.

### 318.2.02F Reflective Material

Signs shall be diamond sheet reflectorized as per OSHD specification 02910.20.

### 318.2.02G Date

All traffic control signs shall have the date of installation stamped, in a permanent manner, on the back of the sign.

### 318.2.02H Certification

Furnish certification that signs, posts, brackets, and hardware delivered to the project site are as specified.

#### 318.3.00 <u>Workmanship</u>

#### 318.3.01 Traffic Signals

The removal and installation of traffic signals shall meet all requirements of the 1991 Oregon Department of Transportation Standard Specifications for Highway Construction.

### 318.3.02 Signs and Traffic Control Devices

### 318.3.02A Existing Signing

Remove existing traffic signing as required on the plans. Signs that are to be reused on the project will be stored by the Contractor until needed. The Contractor will be responsible for the replacement of any signs that are damaged while being stored. Signs, posts, and hardware not to be reused on the project will be removed from the project by the Contractor. When reinstalling traffic signing, use materials specified in Section 318.2.02 Signs and Traffic Control Devices (above).

Relocate existing signs to the position shown on the plans. Improperly relocated signs shall be relocated.

Reset all signs plumb with, or at right angles to the street.

#### 318.3.02B New Signing and Traffic Devices

Provide and install all new signing as required. New signs must be of new manufacture.

#### 318.3.02C Street Name Signs

Street name signs will be handled in the same manner as traffic control signs as provided in Section 318.3.02A, Existing Signing.

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# 319 TREE PRESERVATION AND PROTECTION

# 319.1.00 <u>General</u>

# 319.1.01 <u>Scope</u>

# 319.1.01A General Requirements

Preservation and protection of existing trees indicated on the plans to remain.

# 319.1.02 Project Conditions

**319.1.02A** Protect and preserve all trees on-site indicated to remain.

**319.1.02B** Comply with the requirements of the plans and specifications for protection and preservation of existing trees to remain.

**319.1.02C** Provide temporary construction fencing, minimum 4' high on steel fence posts (no more than 10 foot center to center spacing), as directed by the City Engineer, to protect and preserve trees which are to remain. Erect prior to commencement of clearing and demolition work and remove only after all work potentially injurious to trees is complete, or at the direction of the City Engineer.

**319.1.02D** Protect all trees from stockpiling, material storage, vehicle parking and driving within the drip line.

**319.1.02E** Protect the root systems of all trees from:

- 1) Dumping of refuse.
- 2) Chemically injurious materials and liquids.
- 3) Noxious materials in solution caused by runoff and spillage during mixing and placement of construction materials, and drainage from stored materials.
- 4) Continual puddling of water.

**319.1.02F** Restrict vehicular and foot traffic to prevent compaction of soil within the root zone.

### 319.2.00 Workmanship

### 319.2.01 <u>General</u>

**319.2.01A** Protect root systems of all trees to remain from damage due to noxious materials in solution caused by runoff and spillage during mixing and placement of construction materials and drainage from stored materials.

**319.2.01B** Protect all trees to remain from flooding, erosion, excessive wetting and drying resulting from dewatering and other operations.

**319.2.01C** Protect all trees to remain against cutting, breaking and skinning of roots and branches, skinning and bruising of bark.

**319.2.01D** Do not allow fires to be placed under or adjacent to trees to remain.

**319.2.01E** Removal of branches from trees which are to remain, if required for construction, tree root pruning and relocation work is to be performed under the direction of the City Engineer.

**319.2.01F** Cut branches and roots with sharp pruning instruments and do not break, chop, and/or mutilate.

**319.2.01G** Water trees which are to remain as necessary to maintain their health during the course of the project. Maintain a water schedule and documentation.

### 319.3.02 Excavation Around Trees

**319.3.02A** Excavate within the drip line of trees to remain only where indicated on the plans and as construction staked.

**319.3.02B** Excavate around tree roots within the drip line of the tree only under the direction of the City Engineer.

**319.3.02C** When trenching is required within the drip line of the trees, tunnel under and around roots by hand digging. Do not cut main lateral roots. Cut smaller roots acceptable to the consulting arborist only if they interfere with installation of new work and only with sharp pruning tools.

**319.3.02D** Where excavating for new construction is required within the drip line of trees, hand excavate to minimize damage to the root system. Use narrow tine spading forks and comb soil to expose roots. Relocate roots in backfill areas whenever possible. If large main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking.

**319.3.02E** If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 6-inches back from new construction.

**319.3.02F** Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover, pack with peat moss or four (4) layers of wet, untreated burlap and temporarily support and protect from damage until permanently relocated and covered with backfill.

# 319.3.03 Grading and Filling Around Trees

**319.3.03A** Maintain existing grade within drip line of trees unless otherwise indicated on the plans or acceptable to the City Engineer.

# 319.3.03B Lowering Grades

Where existing grade is above new finish grade shown around tree, carefully hand excavate within drip line to the new grade under the direction of the City Engineer. Cut roots exposed by excavation to approximately 3-inches below elevation of new finish grade.

# 319.3.04 Repair and Removal of Trees

**319.3.04A** If required by the City Engineer, engage a qualified arborist, acceptable to the City Engineer, to perform tree repair work. Repair trees damaged by construction operations promptly after damage occurs to prevent progressive deterioration of damaged trees.

**319.3.04B** Remove dead and damaged trees which are determined by the consulting arborist to be incapable of restoration to normal growth pattern.

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# 320 TRENCH EXCAVATION AND BACKFILL

### 320.1.00 <u>General</u>

#### 320.1.01 <u>Scope</u>

This section covers the work necessary for trench excavation and backfill, complete except for pipe base and pipe zone backfill which are included under other sections.

### 320.1.03 Excavation

Excavation covers, but is not limited to, work necessary to remove and dispose of all material encountered in the trench excavation to the depths and widths as shown on the Plans and as specified herein. Excavation shall include the removal of material for the installation of all valves, fittings, manholes, and other appurtenances along its length. Shoring, bracing, dewatering, drainage and all other appurtenances are incidental to this item.

#### 320.2.00 <u>Materials</u>

### 320.2.01 <u>Trench Excavation</u>

Trench excavation is unclassified. Excavate all materials regardless of formation encountered. Contractor shall make his own estimate of the kind and extent of the various materials that may be encountered.

## 320.2.02 Foundation Stabilization

Use approved gravel or crushed aggregate ranging in size from 4-inch minus to 1-1/2 inch minus, well graded from coarse to fine, free of clay or organic material.

### 320.2.03 Gravel for Trench Backfill

Granular material conforming to the 1-1/2 inch-minus or 3/4 inch-minus requirements of Section 308 Base and Leveling Courses.

### 320.2.04 Controlled Low Strength Material (CLSM)

# 320.2.04A Materials

Furnish materials meeting the following requirements:

| Section 310.2.01  |
|-------------------|
| Section 310.2.02A |
| Section 310.2.03  |
| Section 310.2.04  |
|                   |

# 320.2.04B Proportioning of CLSM Mixture

Provide the City Engineer a written certification of proposed CLSM materials with proportions and compressive strength and 28-Day cylinder reports from a trial CLSM batch based on submitted certification. Include evidence that compressive strength requirements for specific applications are met.

# 320.2.04C Compressive Strength

CLSM must attain a 28-Day compressive strength between 100 and 200 psi.

## 320.3.00 Workmanship

### 320.3.01 <u>Clearing</u>

Where clearing is necessary, complete prior to the start of trenching. Cut trees and brush as near to the surface of the ground as practicable. Stumps within 4 feet of the trench centerline shall be removed. Prior to trenching all trees, brush, and other flammable debris from the clearing shall be disposed of off the construction site in an approved location.

Do not remove existing trees or tree limbs over 2 inches in diameter on public property unless they are within 4 feet of the trench centerline, without permission from the City Engineer. Protect from damage, unless otherwise marked by the City Engineer, all trees, shrubs, or plants within the limits of the easement on private property.

# 320.3.02 Pavement Removal

Saw cut existing permanent pavement along trench sides prior to excavating. Width of pavement cut shall be 12 inches wider than the width of trench excavation. Cuts shall be continuous and for full depth of pavement. Pavement removal shall be of sufficient width to insure that excavating equipment can function without disturbing remaining pavement. Under no circumstances shall the remaining pavement be subject to a lifting force, either by direct contact with the excavating equipment or by inadequate pavement precutting. Any pavement beyond the trench line that is lifted shall be removed and replaced. If asphalt is removed by means of a mechanical chipper, the saw cut may be waived by the City Engineer if a clean edge can be produced.

All strips of pavement 3 feet wide or less, which are outside the limits of the pavement removal for trench excavation, shall be removed and repaved in accordance with Section 313, Surface Restoration.

# 320.3.03 Trench Width

Minimum width of the trench in the pipe zone shall be 18 inches greater than the inside diameter of the pipe, except by permission of the City Engineer.

Maximum width of the trench below the top of pipe shall be 1.5 times the nominal pipe diameter plus 18 inches. Trenches wider than maximum width may cause a greater backfill load than normally allowed, for the class of pipe shown on the plans. If maximum trench width is exceeded without authorization from the City Engineer, the Contractor may be required to provide pipe of higher strength classification.

# 320.3.04 Grade and Pipe Zone

Excavate the bottom of the trench to the trench subgrade. Trench subgrade shall be at least 4 inches below the outside bottom of the pipe barrel. If the trench is excavated below the required grade, correct with pipe base material, as directed. Place the material over the full width of the trench in compacted layers not exceeding six (6) inches deep to the established trench subgrade. Pipe zone material placed along the sides and above pipes shall also be compacted in layers not exceeding six (6) inches in thickness utilizing hand operated mechanical tampers.

# 320.3.05 Shoring

Whenever necessary to prevent caving during excavation, or to protect adjacent structures, property, workmen, or the public, adequately shore the trench. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the Federal, State or local public agency having jurisdiction.

# 320.3.06 Excavated Materials

During trench excavation, the Contractor shall locate the excavated material so it will not completely obstruct a traveled roadway or street; and, unless otherwise approved by the City Engineer, all streets and roadways shall be kept open to at least one-way traffic. The Contractor shall place excavated material away from the trench to minimize risk of side wall failure.

When excavating trenches inside a public utility easement and/or construction easement, take care to ensure all excavated materials and construction activity are contained within the easement limits.

# 320.3.07 Dewatering

Excavations and trenches shall be kept free of water by dewatering equipment furnished and operated by the Contractor. Water shall be disposed of so as not to cause injury to public or private property or to cause a nuisance or menace to the public. Sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage, and competent workmen for the operation of the pumping equipment, shall be available at all times. Dewatering equipment shall operate at all times unless written authorization is received from the City Engineer.

At all times, provide and maintain ample means and devices to promptly remove and dispose of all water entering the trench excavation during the time the pipe is being prepared for the pipe laying, during the laying of the pipe, and until the backfill at the pipe zone has been completed. Surface runoff shall be controlled to prevent entry or collection of water in excavations.

# 320.3.08 Foundation Stabilization

When, in the opinion of the City Engineer, the existing material in the bottom of the trench is unsuitable for supporting the pipe, excavate below the subgrade of the pipe base, as directed by the City Engineer, and backfill the trench to subgrade of pipe base with foundation stabilization material specified hereinbefore. Foundation stabilization material shall be compacted by mechanical means in lifts not exceeding twelve (12) inches in thickness.

# 320.3.09 Trench Backfill Above Pipe Zone

When trench width is two feet or less, backfill with Class E. Use Class D backfill when trench width is more than two feet. Use Class C backfill when trench surface is unpaved, regardless of trench width.

Do not allow backfill material to freefall into the open trench until at least 2 feet of cover is provided over the pipe. Do not allow sharp or heavy pieces of material to drop directly onto or near the pipe. Do not use backfill material of consolidated masses. Flooding and jetting are not allowed.

Promptly repair all subsequent settlement of the finished surfacing during the warranty period.

Use the following types of backfill as described above, as shown on the Plans, or as directed by the City Engineer:

# 320.3.09A Class "C"

Following backfilling the pipe zone, the excavated material shall be pushed back into the trench. After the backfill has been completed, the entire working area, including the trench, shall be graded. The Contractor shall make his own estimate of the amount of settlement that will occur and shall windrow enough material over the trench to compensate for settlement. During the warranty period, if in the opinion of the City Engineer, excessive settlement occurs placing the windowed material below normal grade, the Contractor shall correct the problem, to the City Engineer's satisfaction.

# 320.3.09B Class "D"

Backfill with 3/4-0 inch crushed aggregate in lifts not exceeding eightinch loose depth. Compact each lift to a minimum of 92 percent relative compaction per AASHTO T 180. Moisture-condition backfill materials to near optimum moisture content prior to placement in the trench. Use mechanical vibrating or impact tampers.

# 320.3.09C Class "E"

Backfill trench above pipe zone with CLSM. Allow a minimum of 24 hours for CLSM to set prior to paving.

# 320.3.10 Maintenance of Trench Backfill

Maintain the backfilled trench surfacing until pipe section has been tested and accepted, utilities have been restored, surface restoration has been completed and all work required along the pipe section has been accomplished.

This maintenance shall include, but not be limited to, the addition of surfacing rock and a minimum of 2-inches of cold-mix asphalt to keep the surface of the backfilled trenches reasonably smooth and suitable for normal traffic flow. Temporary pavement replacement of cold-mix asphalt shall be installed on the same day as backfilling, above all trenches that cross paved streets. Trenches that run approximately parallel with streets or roads shall be maintained with cold-mix asphalt.

# 320.4.10 Excess Excavated Material

The Contractor shall dispose of all excess excavated materials at approved disposal sites.

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## 321 STORM DRAIN PIPE

### 321.1.00 General

#### 321.1.01 <u>Scope</u>

This section and CWS's Design and Construction Standards June 2007, Chapter 8 covers the work necessary for the installation of storm drain pipe and fittings of the sizes and classes indicated, including, but not limited to, furnishing materials; laying and jointing the pipe, and connections to existing drainage structures. The standards that are more restrictive shall govern.

#### 321.1.02 Pipe Base

For pipes 27 inches in diameter and less, the area of pipe base extends for the full width of the trench, with a minimum depth from the outside of the pipe barrel to the bottom of the trench of 4 inches. For pipes larger than 27 inches in diameter the depth is a minimum of 6 inches.

#### 321.1.03 <u>Pipe Zone</u>

The area of the pipe zone extends for the full width of the trench, from the bottom of the pipe barrel to 12 inches above the outside top of the pipe barrel.

### 321.2.00 Materials

#### 321.2.01 Pipe

Unless a specific material is designated, pipe material shall be one of the following:

### 321.2.01A Concrete Pipe

Pipe 18 inches in diameter and larger shall be Class 3 reinforced concrete pipe conforming to ASTM C 76, and pipe 15 inches in diameter and smaller shall be Class 2 nonreinforced concrete pipe conforming to ASTM C 14.

Pipe ends shall normally be bell and spigot, or tongue and groove.

## 321.2.01B Ductile Iron Pipe

Pipe shall be push-on joint ductile iron pipe, centrifugally cast of 60-42-10 iron and shall conform to AWWA C151. Thickness class shall be determined by the methods detailed in AWWA C150.

## 321.2.01C Polyvinyl Chloride Pipe

Conforming to ASTM D 3034, SDR 35 for diameters from 4-inch to 15inch, and ASTM F 679 (wall thickness T-1) with minimum pipe stiffness of 46 PSI according to ASTM D 2412 for diameters from 18-inch to 36-inch; with integral bell rubber gasket joints to ASTM F 477, PVC plastic shall have a cell classification of 12364C or 12454C as defined in ASTM D 1784. Pipe shall be laid in the longest commercially available lengths.

## 321.2.01D Corrugated Polyethylene Perforated Tubing

Pipe shall be double-wall, smooth interior; manufactured of high density polyethylene compounds which conform with the requirements of ASTM D 1248, Type II, Category 3, 4, or 5, Grade P33 or P34, Class C. Pipe shall be 10-inch diameter and smaller and shall meet the requirements of AASHTO M 252, Type S.

# 321.2.01E Aluminum Spiral Rib

Pipe shall conform to the material, fabrication, and inspection requirements of AASHTO M196, M197, M211, and M219.

### 321.2.02 <u>Fittings</u>

Pipe fittings shall be shop fabricated of the same material as the pipe and as recommended by the pipe manufacturer.

When approved by the City Engineer, concrete pipe fittings may be field fabricated in a workmanlike manner, with all holes machine cut and no protrusions, including grout, allowed to project into the pipe.

### 321.2.03 <u>Pipe Base</u>

Pipe base shall conform to the 3/4-inch-minus requirements of Section 308 Base and Leveling Courses.

# 321.2.04 Pipe Zone

Same as Pipe Base as specified hereinbefore.

## 321.2.05 Service Connection Markers

Markers shall be 2 x 4 utility grade or better, full length with no splices to the relevant pipe or fitting and projecting 4-feet above finished ground surface.

## 321.3.00 Workmanship

## 321.3.01 Line and Grade

Maximum deviation shall be 1/2-inch from line and 1/4-inch from grade.

## 321.3.02 Dewatering

Provide and maintain equipment, promptly remove all water entering the trench during the time the trench is being prepared for pipe laying, during the laying of the pipe, until mortar joints have set, and until the pipe zone backfill has been completed. Dispose of water in an approved manner without damage to adjacent property.

### 321.3.03 Pipe Bedding

Level trench and compact at subgrade elevation. Place and compact Pipe Base material and then excavate bell holes at each joint of sufficient depth that bells do not touch base material. Pipe base shall be fine graded by hand to give uniform, even support to the bottom of the pipe. Pipes shall not be laid on blocking or any material other than Pipe Base material.

# 321.3.04 Pipe Installation

Inspect all pipe immediately prior to installation to insure that no defective materials are being used. Clean ends of pipe and remove foreign material from inside of pipe.

After pipe joint has been made, check pipe for alignment and grade. Place sufficient Pipe Zone material around the pipe to assure that the pipe has continuous and uniform support along the barrel to assure that the pipe section will not move.

# 321.3.05 Pipe Zone Backfill

Install Pipe Zone material in compacted lifts, not exceeding 6 inches, up to the horizontal centerline of the pipe.

Above the horizontal centerline of the pipe, Pipe Zone material shall be placed to the top of the pipe zone.

# 321.3.06 Service Connection Marker

At the ends of mains, laterals, or building sewers, plug or cap, block end of pipe and install service connection marker. Extend marker 4-feet above the ground surface and paint with **white** enamel. Then, using black quick drying enamel, neatly indicate the distance from a horizontal line on the marker to the top of the 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, replace the marker.

# 321.3.07 Testing

# 321.3.07A Televiewing Inspections

Provide televiewing inspections following NASSCO-PACP Standards in the presence of the City Engineer, with a written inspection report, videotaping (DVD format, in color), audio commentary and video lineal distance indication from a manhole of all tees, fittings, or deficiencies on all storm sewer lines. The original DVD(s) shall become the property of the City.

The complete televiewing inspections shall be conducted immediately prior to paving (if applicable) and final acceptance of the work.

Any visual deficiencies in the storm sewer line shall be corrected and the defective line shall be reinspected by televiewing. Inspection and correction shall be repeated until all storm sewer lines have been shown to be free of defects.

# 321.3.07B Deflection Test

The maximum deflection of a flexible pipe shall be limited to 5% of the pipe diameter.

Acceptance shall be determined by the insertion throughout the length of

the sewer of a ball, double-tapered mandrel or other approved gonogo gauge, with a diameter of 95% of the nominal pipe diameter. Any abnormal force required to move the gauge shall be taken to indicate noncompliance with this test.

Expose all pipe failing this test, correct any deficiency and recompact the pipe zone, and retest after placing backfill. The use of a vibrating type "rerounder", or similar device shall not be allowed.

# 321.3.08 Cleaning

Remove all construction debris, rocks, gravel, sand, silt and other foreign material from storm drains, catch basins and manholes prior to televiewing inspection and acceptance. The cleaning shall be done in such a manner so as to prevent debris, etc. from being flushed into existing downstream storm sewer facilities. ( BLANK PAGE )

# 322 SANITARY SEWER GRAVITY PIPE

## 322.1.00 <u>General</u>

#### 322.1.01 <u>Scope</u>

This section and CWS's Design and Construction Standards June 2007, Chapter 8 cover all work necessary for the installation of gravity sewer pipe. The standards that are more restrictive shall govern.

#### 322.1.02 Pipe Base

For pipes 27 inches in diameter and less, the area of pipe base extends for the full width of the trench, with a minimum depth from the outside bottom of the pipe barrel to the trench invert of 4 inches. For pipes larger than 27 inches in diameter the depth is a minimum of 6 inches.

#### 322.1.03 <u>Pipe Zone</u>

The area of the pipe zone extends for the full width of the trench, from the bottom of the pipe barrel to 12 inches above the outside top of the pipe barrel.

### 322.2.00 Materials

#### 322.2.01 Pipe

Unless a specified material is designated, pipe material shall be any one of the following:

### 322.2.01A Ductile Iron Pipe

Pipe shall be push-on joint ductile iron pipe, centrifugally cast of 60-42-10 iron and shall conform to AWWA C151, thickness Class 50. The pipe shall be cement-mortar lined in accordance with AWWA C104. Rubber gaskets and lubricant conforming to AWWA C111, are to be supplied by the pipe manufacturer, suitable for the specified pipe size, and in sufficient quantity for installing the pipe.

# 322.2.01B Polyvinyl Chloride Pipe

Conforming to ASTM D 3034, SDR 35 for diameters from 4-inch to 15inch, and ASTM F 679 (wall thickness T-1) with minimum pipe stiffness of 46 PSI according to ASTM D-2412 for diameters from 18-inch to 36-inch; with integral bell rubber gasket joints to ASTM F 477. P.V.C. plastic shall have a cell classification of 12364C or 12454C as defined in ASTM D 1784. Pipe shall be laid in the longest commercially available lengths.

Higher strength AWWA C-900 pipe is allowed in applications approved by the City Engineer.

## 322.2.02 Pipe Base

Pipe base shall conform to the <sup>3</sup>/<sub>4</sub> inch-minus requirements of Section 308 Base and Leveling Courses.

## 322.2.03 Pipe Zone Backfill

Same as Pipe Base as specified hereinbefore.

# 322.2.04 <u>Tee Fittings</u>

### 322.2.04A Ductile Iron Pipe

Fittings shall be ductile or gray iron mechanical joint or where shown on the plans flanged joint, conforming to AWWA C110 with a pressure rating of 250 psi, cement mortar lined as per AWWA C104, with rubber gaskets meeting AWWA C111.

# 322.2.04B P.V.C.

Factory manufactured gasketed sewer fittings shall be installed. Saddle tees may be approved by the City Engineer, when factory manufactured gasketed fittings are not available.

### 322.2.05 Service Connection Markers

Shall be 2 x 4 utility grade or better, full length with no splices to the relevant pipe or fitting and projecting 4 feet above finished ground surface.

# 322.2.06 Pipe Location Tape

Shall consist of a 3 inch width of 2 mil clear film permanently reverse printed, laminated to 1 mil aluminum foil, laminated to 2 mil clear film permanently reverseprinted, for a total minimum thickness of 5 mil, materials to be specially formulated for prolonged use underground. Minimum tensile strength shall be 60-lbs per inch of width. The words "CAUTION: SEWER LINE BURIED BELOW" in black letters on APWA color code green background shall be boldly printed on both sides of the tape, repeated continuously at least every 36-inches. Must be suitable for both conductive and inductive detection by normal pipe location equipment, and be supplied in the longest practical length commercially available.

# 322.3.00 Workmanship

# 322.3.01 Line and Grade

Maximum deviation shall be 1/2 inch from line and 1/4 inch from grade.

# 322.3.02 Dewatering

Provide and maintain equipment, promptly remove all water entering the trench during the time the trench is being prepared for pipe laying, during the laying of the pipe, and until the pipe zone backfill has been completed. Dispose of water in an approved manner without damage to adjacent property.

# 322.3.03 <u>Base</u>

Pipe shall be laid on pipe base material as specified in 322.1.02. Excavate bell holes at each joint of sufficient depth that bells do not touch base material. Pipe base shall be fine graded by hand to give uniform even support to the barrel of the pipe. Pipes shall not be laid on blocking or any material other than pipe base material.

# 322.3.04 Pipe Installation

Inspect all pipe immediately prior to installation to insure that no defective materials are being used. Clean ends of pipe, remove foreign material from inside pipe, and use proper tools and lubricants to join pipe sections.

After pipe joint has been made, check pipe for alignment and grade. Place sufficient pipe zone backfill material around the pipe to assure that the pipe has continuous and uniform support along the barrel and to assure that the pipe section will not move.

At any time that laying operations are not in progress, close and block the open end of the last laid section of pipe.

For shorter than standard pipe lengths, ends shall be cut square and perpendicular to the pipe axis, and beveled. Mark insertion/stop lengths as per manufacturers instructions.

# 322.3.05 Pipe Zone Backfill

Install pipe zone backfill material uniformly on both sides of the pipe up to the horizontal centerline of the pipe. Material shall be placed in lifts not exceeding 6 inches, extending outward to the trench walls. Each lift shall be carefully worked under the pipe haunches and compacted, from the pipe to the trench wall or 2.5 pipe diameters on each side of the pipe.

Above the horizontal centerline of the pipe, pipe zone material shall be placed without compacting to the top of the pipe zone.

# 322.3.06 Service Connection Marker

At the ends of mains, laterals or building sewers, plug or cap, block end of pipe and install service connection marker. Extend marker, 4 feet above the ground surface and paint with **green** enamel. Then, using black quick-drying enamel, neatly indicate the distance from a horizontal line on the marker to the top of the 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, replace the marker.

# 322.3.07 Anchor Block

Where specified, anchor blocks shall be placed immediately downhill from bells to prevent downward movement of concrete pipe.

# 322.3.08 Service Lateral

Shall consist of the main line pipe tee, bend, lateral pipe, plug, marker and pipe location tape. The angle of the bend and the final invert elevation or depth shall be shown on the plans.

Pipe location tape shall be installed loosely, laid flat, at a depth of 15-inches from the designed finished surface, vertically above the pipe. Tape shall be joined with a loose "clove-hitch" or similar knot with the ends laid closely parallel for a

distance of at least 3-feet. Install over all building sewers, from the main or lateral to the service connection marker.

# 322.3.09 Final Sewer Cleaning

Prior to the acceptance tests and final manhole-to-manhole inspection of the sewer system by the City Engineer, flush and clean all parts of the system using a flushing ball that is the same size as the inside of the pipe. 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. Under no circumstances shall any material enter the treatment plant or downstream pump stations as a result of flushing the sewer system.

Upon the City Engineer's final 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.

# 322.3.10 Acceptance Tests

All sewers shall pass the following:

- A) Deflection test (PVC pipe only).
- B) Air and Infiltration test.
- C) Televiewing inspections.

Acceptance shall initially be performed in the order above, and only after all building sewers, manholes and backfilling are complete. Do not proceed to the next test without correcting deficiencies, and the City Engineer's approval, or it shall be deemed not acceptable.

# 322.3.10A Deflection Test

The maximum defection of a flexible pipe shall be limited to 5% of the pipe diameter or as otherwise shown on the Plans.

Acceptance shall be determined by the insertion throughout the length of the sewer of a ball, double-tapered mandrel or other approved gonogo gauge, with a diameter of 95% of the nominal pipe diameter. Any abnormal force required to move the gauge shall be taken to indicate noncompliance with this test.

Expose all pipe failing this test, correct any deficiency and recompact the pipe zone and retest after placing backfill. The use of a vibrating type "rerounder", or similar device shall not be allowed.

## 322.3.10B Air and Infiltration Test

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 0.05 psi. All air used shall pass through a single control panel.

All plugs used to close the sewer for the test must be capable of resisting the internal pressures and must be securely braced. Place all air testing equipment above ground and allow no person to enter a manhole or trench where a plugged sewer is under pressure. Release all pressure before the plugs are removed. The testing equipment must include a pressure relief device designed to reduce pressure in the sewer under test to 9 psi and must allow continuous monitoring of the pressure in order to avoid excessive pressure. Use only qualified personnel to conduct the test.

The presence of ground water will affect the results of the test, therefore determine the average height of ground water over the sewer, by an approved method; immediately before starting the test.

Use the Time-Pressure Drop Method for all air testing. The test procedures are as follows:

- 1) Plug all upstream openings.
- 2) Plug the downstream opening, when infiltration flow from upstream sections of the sewer has ceased. Brace all plugs securely.
- 3) Check the average height of the ground water over the sewer. The test pressure required below shall be shall be increased 0.433 psi for each foot of average water depth over the sewer.
- 4) Add air slowly to the section of sewer being tested until the internal air pressure is raised to 4.00 psig greater than the calculated pressure of the ground water above the sewer.
- 5) After the internal test pressure is reached, allow at least 2 minutes for the air temperature to stabilize, adding or releasing only the air required to maintain pressure.
- 6) After the temperature stabilization period, disconnect the air supply.
- 7) Determine and record the time in seconds that is required for the internal air pressure to drop from 3.5 psig to 3.00 psig; greater than the calculated ground water pressure.
- 8) Compare the time recorded in step 7 with the test time determined as hereinafter.
- 9) Upon the successful completion of the air test and release of pressure, remove the downstream plug only. If there is any accumulation of water upstream of the plug, measure the subsequent rate of infiltration, which shall not exceed 0.05 fluid ounces per inch pipe diameter per foot per hour.

When the flow exceeds the allowable, reduce the infiltration to at least this rate and air test this section again. If a flexible pipe has to be

re-excavated and backfilled, retest the deflection. A "total" infiltration test at the downstream end of the project will not be conducted nor considered.

If the sewer fails to meet these air test requirements, determine the reason for leakage and repair and/or replace as required.

The test time shall be calculated using the following criteria:

where T = 28.3 D K, shortest time, in seconds, allowed for the air pressure to drop 0.5 psig. D = Pipe nominal diameter in inches. K = 0.000419 D L, but not less than 1.00 L = Length of pipe in feet.

For the purposes of this air test computation ignore any branch, lateral or house sewer, on the sewer under test.

# 322.3.10C <u>Televiewing Inspections</u>

The Contractor shall provide televiewing inspections following NASSCO-PACP Standards in the presence of the City Engineer, with a written Inspection Report, videotaping (DVD format, in color), audio commentary and video lineal distance indication from a manhole of all tees, fittings, or deficiencies on all sewer lines. The original DVD(s) shall be become the property of the City.

The televiewing inspection shall be conducted immediately prior to paving and final acceptance of work. Two complete televiewing inspections shall be conducted:

- 1) Prior to the acceptance of the work and the beginning of the one year maintenance period.
- 2) During a period of wet weather which would significantly raise the water table, within the maintenance and warranty period.

Any visual deficiencies in the sewer line shall be corrected and the defective line shall be reinspected by televiewing. Inspection and correction shall be paid for by the Permittee and repeated until all sewer lines have been shown to be free of defects.

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# 323 WATER QUALITY FACILITIES

## 323.1.0 <u>General</u>

## 323.1.01 <u>Scope</u>

This section covers the work necessary for construction of water quality facilities.

# <u>323.2.00</u> <u>Materials</u>

### 323.2.01 Jute Matting

Jute matting shall be Geojute Plus in treatment area, Econojute for all other areas or equal.

# 323.2.02 <u>Sun Mix</u>

Freeboard area seed mix shall consist of:

| Dwarf Tall Fescue   | 40% |
|---------------------|-----|
| Dwarf Perennial Rye | 30% |
| Creeping Red Fescue | 25% |
| Colonial Bent Grass | 5%  |

# 323.2.03 River Rock

River rock shall be 2" - 3/4" rock.

# 323.2.04 <u>Topsoil</u>

Topsoil shall conform to Appendix A CWS Design and Construction Standards June 2007.

## 323.3.0 Workmanship

## 323.3.01 Preparation of Area

1. Water quality facility shall be over-excavated and filled to final grade with 12inch amended topsoil. Topsoil amendments shall be garden compost, not conventional fertilizer amendments.

2. A biodegradable erosion control matting shall be placed over the topsoil throughout the swale cross section, fabric shall be held in place in accordance with the manufacturer's installation requirements. Anchor spacing shall be based on 3 fps flow over the fabric.

a. Treatment area – high-density jute matting (Geojute Plus or other approved equal)
b. All other areas – low-density jute matting (Econojute or other approved equal)

3. 2.5 - 3 inches of 2"-3/4" river run rock shall be placed over the matting evenly throughout the length and width of the swale.

### 323.3.02 Plantings

Plant materials shall be placed in accordance with the plan and plant table as shown on approved plans.

### 323.3.03 Application

The seed mix shall be applied at a rate of .044 ounces per square foot.

### 323.4.00 Inspections

The Contractor will need to call for inspections at these milestones:

- 1. Prior to placement of topsoil.
- 2. Prior to placement of seed mix.
- 3. Prior to placement of erosion control matting.
- 4. Prior to placement of river rock.
- 5. Prior to placement of plants.
- 6. After plants have been installed.

# 323.5.0 <u>Timing</u>

The facility shall be substantially complete prior to paving.

- 1. The water quality swale treatment area plantings can be deemed "substantially complete" once active green growth has occurred to an average growth of 3" and plant density is an average of approximately 6 plants (minimum 1-inch plugs or equivalent) per square foot.
- 2. The facility shall be deemed acceptable to begin the maintenance period when plant growth and density matches the engineer's design as shown on the approved plans and all other requirements have been met. The engineer must certify the facility to be functional, in accordance with the approved plan design to begin the two-year maintenance period.

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## 324 MANHOLES

## 324.1.00 <u>General</u>

#### 324.1.01 <u>Scope</u>

This section and CWS's Design and Construction Standards June 2007, Chapter 8 cover the work necessary for construction of manholes. The standards that are most restrictive shall govern.

#### 324.2.00 Materials

#### 324.2.01 <u>Base Rock</u>

Base rock shall conform to the 3/4 inch-minus requirements of Section 308 Base and Leveling Courses.

#### 324.2.02 Precast Section

Conform to ASTM C 478. Minimum 48 inches in diameter with eccentric cones and steps cast in section by manufacturer.

### 324.2.03 Manhole Steps

Manhole steps shall be plastic conforming to the following requirements:

#4 (1/2-inch diameter) steel reinforcing bar conforming with ASTM A 615 Grade 60, encapsulated with injection molded copolymer polypropylene with serrated top surfaces.

### 324.2.04 Frame and Cover

Frame and cover shall conform to the standard drawings and be manufactured of gray cast iron conforming to ASTM A 48, Class 30. Bearing surfaces shall be planed or ground to provide flat and true surfaces.

Cover shall have the letter "S" cast into the center and shall have two holes of 3/4 inch diameter cast through the top plate in a symmetrical pattern for sanitary sewer or 16 holes of 3/4-inch diameter cast through the top plate in a symmetrical pattern for storm sewer.

Watertight manhole frames and covers shall be provided where specified with a continuous rubber gasket along the horizontal face between the frame and cover with the manhole frame grooved to receive and retain the rubber gasket. The frame and cover shall be secured with three stainless steel 1/2-inch NC hexagonal head cap screws.

# 324.2.05 Plastic Gaskets

Preformed plastic gaskets may be used in lieu of mortar to connect precast manhole sections. Gaskets shall be Ram-Nek or Kent-Seal #2 conforming to Federal Specifications SS-5-00210.

# 324.2.06 Pipe Stubout

Pipe stubout shall be the bell or hub section of the gravity sewer pipe specified, or a PVC manhole adapter, pipe, stop coupling and plug. Each stubout shall include a rubber gasketed watertight plug.

# 324.2.07 P.V.C. Manhole Adapter

Polyvinyl Chloride pipe shall be connected to the manhole with a City Engineer approved, manufactured P.V.C. gasketed manhole adapter with an abrasive exterior, to be grouted into the manhole base or wall.

### 324.2.08 Manhole Marker

Shall be flexible plastic Type 2 delineators, with W-1 reflectors, conforming to OSHD specification 02850.

# 324.3.00 Workmanship

# 324.3.01 Excavation and Backfill

Conform to applicable portions of Section 320, Trench Excavation and backfill. Backfill of manholes shall conform to highest trench class immediately adjacent.

# 324.3.02 Base Rock

Remove water from excavation, and place 12 inch minimum layer of compacted base rock.

If material in bottom of trench is unsuitable for supporting manhole, excavate below the manhole subgrade as directed by City Engineer, and backfill to required grade with foundation stabilization material as specified in Section 320, Trench Excavation and Backfill.

# 324.3.03 Precast Manhole Sections

Clean ends of sections of foreign materials. Place preformed plastic gasket on groove of lower section and then set next section in place. Completed manholes shall be rigid and watertight.

## 324.3.04 Manhole Invert

Construct manhole inverts with smooth transitions to insure an unobstructed flow through manhole. Remove all sharp edges or rough sections which tend to obstruct flow. Trowel all mortar surfaces smooth.

# 324.3.05 Manhole Extensions

Install watertight extensions as shown on Plans. Lay risers and/or grade rings (12 inch maximum) in mortar with sides plumb and tops level.

# 324.3.06 Manhole Frame and Cover

Install frame and cover on top of manholes to positively prevent all infiltration of surface or groundwater into manholes. Frame shall be set in a bed of non-shrink grout under the flange of the frame. Set frame so tops of covers are flush with surface of adjoining pavement or 6-inches above ground surface in areas outside the pavement, unless otherwise shown on Plans or directed by City Engineer.

# 324.3.07 Manhole Over Existing Pipe Line

Excavate around existing sewer pipe as required to provide for base rock and concrete base. Contractor shall take care not to disturb existing pipe and shall provide such bracing or other protection as may be required to maintain the function of the existing pipe during construction.

Place base rock and construct concrete base as specified in this section. Cut

out top half of existing pipe within new manhole and construct new vertical channel walls to same height as top of pipe with smooth transitions to the existing pipe entrance and exit.

Soften the exterior of PVC pipe with PVC solvent cement and cover with sand in the area of the manhole, for maximum adhesion of the concrete or grout.

# 324.3.08 Drop Assembly

Construct drop assemblies at locations shown on the Plans, using either PVC ASTM 3034 SDR 35 or Class 150 MJ cast iron pipe and fittings. The sewer run of cast iron pipe shall extend beyond the area of manhole excavation and the lower cast iron elbow shall be cast into the concrete manhole base.

If the sewer is PVC, the pipe and fittings for the assembly shall be PVC manufactured gasketed sewer fittings encased within a minimum of 4 inches of concrete from the manhole base to the bottom of the tee. Use PVC manhole adapters at manhole wall and base penetrations. Use a secured but removable, gasketed cap or plug, in lieu of a mortar dam.

# 324.3.09 Pipe Stubouts

Install pipe stubouts as shown on the Plans to a length of 1.0 pipe length outside the manhole wall. Install stubouts integrally with manhole base and construct base channel for stubout.

Install a rubber gasketed water tight plug in stubouts and secure the plug to withstand internal or external hydrostatic test pressures without leakage. Plugs shall not be grouted into place or otherwise secured by cast-in place concrete.

If stubout invert elevations are not shown on the Plans, match the elevation of the inside top of pipe stubout to the elevation of the inside top of the outlet pipe, unless otherwise directed by the City Engineer.

# 324.3.10 Manhole Marker

Install manhole markers adjacent to manholes in all areas outside of the paved roadway. Extend marker, 4 feet above the ground surface. Replace the marker if it is broken or bent out of vertical alignment during the driving operation.

# 324.3.11 Testing of Sanitary Manholes

After backfilling and compacting to finished grade, completed manholes selected by the City Engineer shall be either hydrostatically tested with water or vacuum tested. On projects with 20 or more manholes, fifteen percent (15%) shall be tested; otherwise a minimum of three, or all manholes on projects of 3 or less, shall be tested. Each manhole which fails the test, shall obligate the Contractor to test additional manholes selected at random by the City Engineer, on a one-to-one basis. All defects in manholes shall be corrected prior to paving streets.

# 324.3.11A Hydrostatic Testing

Plug all inlets and outlets and fill the manhole to the rim. Leakage in each manhole shall be determined by refilling to the rim, using a calibrated or known volume container, and shall not exceed 0.20 gallons per hour per foot of head above the invert.

# 324.3.11B Vacuum Testing

The test head shall be placed at the inside of the top of the cone, so placed as to test the grade rings and casting and shall be inflated in accordance with the manufacturers instructions. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off and valves closed, and the time shall be then measured for the vacuum to drop to 9 inches. The time shall not be less than the values indicated in the following table.

| Depth of Manhole | Allow able Time<br>( seconds) |         |         |
|------------------|-------------------------------|---------|---------|
| ( feet)          | 48 inch `                     | 60 inch | 72 inch |
| 8                | 20                            | 26      | 33      |
| 10               | 25                            | 33      | 41      |
| 12               | 30                            | 39      | 49      |
| 14               | 35                            | 46      | 57      |
| 16               | 40                            | 52      | 65      |
| 18               | 45                            | 59      | 73      |
| 20               | 50                            | 65      | 81      |
| 22               | 55                            | 72      | 89      |
| 24               | 59                            | 78      | 97      |
| 26               | 64                            | 85      | 105     |
| 28               | 69                            | 91      | 113     |
| 30               | 74                            | 98      | 121     |

# MANHOLE VACUUM TEST TIME

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## 325 CATCH BASINS AND INLETS

#### 325.1.00 General

#### 325.1.01 Scope

This section covers the work necessary for constructing catch basins and ditch inlets complete at locations and of the type shown on the Plans.

#### 325.2.00 Materials

#### 325.2.01 Base Gravel

Base gravel shall conform to the <sup>3</sup>/<sub>4</sub> inch-minus requirements of Section 308 Base and Leveling Courses.

#### 325.2.02 <u>Concrete</u>

Concrete shall have a minimum compressive strength of 3300 psi, 28 days after placement, using minimum 6-sack mix. An air-entraining admixture shall be used. It shall be added to the mixer at the time of mixing in such a manner as to insure uniform distribution of the admixture throughout the batch. Entrained air (percent of volume) range shall be 4 percent to 7 percent. The maximum water added per sack of cement shall be 6 gallons and the slump range shall be between 4 and 7 inches. Concrete obtained from other than standard ready-mix plants shall be subject to approval of the City Engineer for mix design, materials, batching and mixing.

#### 325.2.03 Grate and Frame

Frames and grates for catch basins and storm drain inlets shall be fabricated of steel conforming to ASTM A 7, A 36, or 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 with the other and there shall be no more than 1/16-inch rock. When checked by a test jig, the bearings of either component shall have no more than 1/16-inch rock.

### 325.3.00 <u>Workmanship</u>

#### 325.3.01 Excavation

Excavation shall be to neat finish lines. When concrete curb is adjacent to catch basin, excavation shall follow curb construction by at least seven days.

#### 325.3.02 Backfill

In general, catch basins and ditch inlets shall be poured against excavated earth and backfill will not be required. When exterior forms are used and backfill is required, backfill shall be compacted, 3/4-inch minus crushed rock.

#### 325.3.03 Forms

Interior forms shall be either prefabricated steel or smooth plywood. If excavation is to neat lines, exterior forms may not be required. Interior forms shall be constructed to insure that the inlet frame is embedded precisely as shown on the details. All forms shall be thoroughly cleaned before reuse.

#### 325.3.04 Concrete Placement

Before depositing concrete, work crews and all equipment and tools shall be on the job site, all debris shall be removed from the space to be occupied by the concrete, and the subgrade shall not be frozen. The base shall be thoroughly wetted, but no pools of water will be permitted.

Concrete shall be deposited in its proper place without delay in a continuous operation. No construction joints will be allowed in catch basins and inlets.

In hot weather, concrete in place shall be protected until final finishing can be completed. With a hot dry breeze, windbreaks may be erected, or fog nozzles may be used. Curing operation should begin as soon as concrete has set enough to avoid surface damage.

Placing concrete during period of rain will not be permitted. If concrete has been placed and rain commences, it shall be protected by plastic sheeting positioned off the concrete surface, and maintained to prevent ponding.

Concrete shall be placed only when the outside air temperature is 35°F and rising, and is forecast to remain above 35°F.

## 325.3.05 Frame and Grate

The frame and grate must be installed level, transverse to the curb line.

## 325.3.06 <u>Finish</u>

After removal of the interior forms, holes shall be patched and finished. The patching mixture shall consist of one part cement and two parts mortar sand. The outside edges of the top of the catch basin shall be finished with an edging tool with 1/4-inch radius.

# 325.3.07 Subgrade Drains

Subgrade drains or weep holes shall be installed as shown on the details or as specified by the City Engineer.

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## 326 WATER PIPE AND FITTINGS

### 326.1.00 <u>General</u>

#### 326.1.01 <u>Scope</u>

This section covers all work necessary to furnish and install main line water pipe and fittings.

### 326.1.02 Pipe Bedding, Pipe Zone and Trench Backfill

All work and materials required for trench excavation and backfill to facilitate waterline install shall be according to section 320 of these Technical Specification and the current Oregon Standard Specifications for Construction, Section 00330.43 a, b, and c and Section 00405 for backfill classifications, unless mentioned otherwise herein.

Related Standard Drawings: 241

### 326.2.00 <u>Material</u>

#### 326.2.01 Pipe

Pipe shall be push-on joint ductile iron pipe, centrifugally cast and minimum Class 52 thickness, conforming to the latest revision of ANSI/AWWA C151/A21.51. Heavier special thickness classes may be required, per AWWA C150, where shown on the plans.

The pipe shall be lined with a shop-applied NSF 61 cement mortar lining, smoothed finish, in accordance with AWWA C104. An asphaltic exterior coating shall be applied in accordance with AWWA Standard C151. Rubber gaskets and lubricant conforming to AWWA C111, are to be supplied by the pipe manufacturer, suitable for the specified pipe size and pressure, and in sufficient quantity for installing the pipe.

## 326.2.02 Casing Pipe, Spacers, and Seals

Casing pipe shall be smooth steel conforming to ASTM A36. The minimum wall thickness shall be as required by the jurisdiction governing the highway, railway, or waterway crossed. Casing pipe shall not have a wall thickness less than 1/4-inch.

Casing spacers shall be used to support the carrier pipe within the casing and help resist movement of the pipeline. Casing spacers and hardware shall be

manufactured from stainless steel, be of 2-piece construction, and a minimum 12 inches wide. The spacer shall have a minimum of four (4) runners for carrier pipe sizes up to 12-inch, and six (6) runners for carrier pipe sizes through 24-inch. Skids are to be manufactured out of polyethylene for insulation and abrasion resistance.

Casing seals are to be either a slip-on boot style or split wrap-around style. Slipon boot style seals are to be manufactured out of 1/8-inch synthetic neoprene rubber and be secured by two (2) stainless steel bands and clamps. Split wrap-around style seals are to be manufactured from 1/8-inch flexible coal tar, reinforced with fiberglass and include two (2) stainless steel bands and clamps.

# 326.2.03 <u>Fittings</u>

All fittings shall be ductile iron conforming to ANSI/AWWA C110/A21.10 and ANSI/AWWA C153/A21.53. Fittings shall have cast upon them the manufacturer's identification, pressure rating, nominal diameters of openings, and the number of degrees or fractions of a circle for all bends.

Fittings shall be mechanical joint (MJ) or flange joint (FLG) conforming to AWWA C110 and C153, cement-mortar lined with an asphaltic seal coat as per AWWA C104. Fittings shall be coated outside with an approved epoxy or a bituminous coating at least 1 mil thick, as specified in Section 4.4 of AWWA C110. Rubber gaskets shall conform to AWWA C111 and C115. Fittings for pipe sizes 4-inch to 24-inch shall be rated for 350 psi working pressure.

Specialized fittings may be required by the City Engineer when involving bridge infrastructure, pipes determined to be at significant seismic risk, casing pipe or pipes with high vibration exposure.

# 326.2.03A Thrust Blocks

Concrete for thrust blocks shall be ready-mix, conforming to ASTM C 94, Alternate 2, maximum aggregate size 1-1/2 inch, compressive strength 3,300 psi at 28 days.

Related Standard Drawings: 620, 621, 622

## 326.2.03B Mechanical Joint Restraint

All mechanical joint fittings shall include mechanical restraints. Ductile iron mechanical joint fittings and accessories shall conform to ANSI/AWWA C111/A21.11, ANSI/AWWA C110/A21.20, and ANSI/AWWA C153/A21.53. Mechanical joint restraints shall be an integral part of the follower gland, and shall include a restraining mechanism which when actuated, imparts wedging action against the pipe, increasing its resistance as the pressure increases and maintaining the flexibility of the joint after

burial.

Mechanical restraint systems shall have a minimum working pressure rating of 350 psi for sizes up to 16-inch and 250 psi for pipe sizes 18-inch and larger; and must include a minimum safety factor of 2 to 1 in all sizes. The dimensions of the follower gland shall be compatible with joint bells conforming to ANSI/AWWA A21.10/C110 and ANSI/AWWA A21.52/C153.

Joint restraint ring and wedge components shall be constructed of grade 60-42-10 ductile iron, conforming to ASTM A536. Wedges shall be heat-treated to a minimum hardness of 370 BHM.

Bolts and nuts shall be domestic, T-head bolts and nuts, constructed from corrosion-resistant, high-strength low-alloy steel that conforms to ANSI/AWWA C111/A21.11.

The Megalug series 1100 restrained joint system manufactured by EBAA Iron, Inc., and the GripRing system manufactured by Romac Industries, Inc., are approved for use.

### 326.02.03C Flange Joints

Flange fittings are allowed only where shown on the Standard Drawings, or as approved by the City Engineer.

Flange bolt holes and pattern shall conform to ANSI B16.1 for class 125 flanges or ANSI B16.5 for class 150 flanges. Class 250 flanges are not compatible with class 125 and 150 bolt patterns. Bolts for flanged joints shall be the size and quantity shown on Table 15 of AWWA C110.

Flange joints are to have a minimum pressure rating of 250 psi. Where design pressure is 150 psi or less, flanges shall conform to either AWWA C207 Class D or ASME B16.5 150-pound class. Where design pressure is greater than 150 psi, up to a maximum of 275 psi, flanges shall conform to either AWWA C207 Class E or ASME B16.5 150-pound class.

Flanged joint gaskets for pipe sizes between 6-inch and 24-inch diameter and working pressure of 150 psi or greater shall be Garlock 3760-U or equal. Pipe sizes 4-inch diameter and under, service pressure of 150 psi or greater shall be Garlock 3505 or equal. All pipe sizes with service pressures of 150 psi or less shall be Garlock 98206 or equal.

Ductile iron pipe spools with threaded flanges shall conform to AWWA C115 and are to be installed only on pipe with a minimum Class 53 wall thickness. Flanged connections shall not be buried unless shown as such on the Drawings. Buried flanges shall be wrapped with 2 layers of 10 mil tape along edges of flanges.

## 326.02.03D Pipe Push-On Joint Restraint

American "Fast-Grip" or U.S. Pipe "Field Lok" gaskets, or approved equal, shall be utilized in place of thrust blocking as shown on the Drawings or as approved by the City Engineer to fully restrain all pipe. Install restraints in accordance with manufacturer's recommendations.

## 326.02.03E Welded-On Retainer Ring Restraint Type

Single gasket push-on type joint meeting applicable requirements of ANSI/AWWA C111/A21.11, with restraint provided by a welded-on retainer ring. U.S. Pipe "TR Flex" or American "Lok-Ring" are approved for use.

## 326.2.04 Nuts, Bolts and Washers

All bolts shall have heavy hex head with heavy hex nuts.

For operating pressures greater than 150 psi, bolts shall be steel alloy composition, conforming to ASTM A193. Nuts shall comply with ASTM A194, Grade 2H, and washers shall conform to ASTM F436.

For operating pressures of 150 psi or less, bolts shall be low-carbon steel composition, conforming to ASTM A307, Grade B. Nuts shall comply with ASTM A563, Grade A Heavy Hex, and washers shall conform to ASTM F844.

## 326.3.00 Workmanship

The installation of water mains shall generally be in accordance with AWWA C600, unless mentioned otherwise herein.

## 326.3.01 Distribution and Storage

Distribute material on the job no faster than it can be used to good advantage. In general, no more than one week's supply of material shall be distributed in advance of laying, unless otherwise approved. Materials staged onsite shall be stored inside, or in areas protected from weather, moisture, sun exposure and accumulation of dirt to the satisfaction of the City Engineer. Materials shall not be stored directly on ground.

## 326.3.02 Grade

Minimum cover shall be 36-inches for 12-inch diameter pipe and smaller, and 48-inches for 16-inch diameter and larger unless otherwise directed by the City Engineer. Maintain a grade consistent with the position and intended operation of air

valves where shown on the plans. Where changes in grade are brought about by conflicts with other utilities or structures, which would result in a high point, without an air release valve, the City Engineer shall be informed immediately.

Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for pipe bedding. Before each section of the pipe is laid, check grade, and correct any irregularities in trench bottom. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

# 326.3.03 Connection to Existing System

Before exposing the existing pressurized system, the Contractor shall contact and coordinate all work with the City Engineer. Connections shall be made to existing pipe or fittings where shown on the Plans, and the Contractor shall locate the pipe or fittings through exploratory excavation.

# 326.3.04 Operations of Existing Valves

At no time shall the Contractor operate the existing water system valves. The Contractor shall coordinate all work with the City Engineer, who will coordinate Operations Personnel to operate the existing water system valves. The Contractor shall provide a minimum of two working day notice to the City Engineer prior to needing Operations personnel on-site.

# 326.3.05 Dewatering

Provide and maintain equipment, promptly remove all water entering the trench during the time the trench is being prepared for pipe laying, during the laying of the pipe, until concrete has set, and until the pipe zone backfilling has been completed. Dispose of water in an approved manner without damage to adjacent property.

# 326.3.06 Trench Excavation and Backfill

Call Local Utility Line Information Service at 1-800-332-2344 not less than three working days before performing Work. Request underground utilities to be located and marked within and surrounding construction areas. Coordinate with and notify utility companies should it be necessary to remove or relocate facilities. Maintain and protect above and below grade utilities indicated to remain.

Trench excavation for piping, utility vaults and other utilities shall be performed to the alignment and grade as indicated on the Drawings. Do not advance open trench beyond the distance which will be backfilled and compacted the same day. A maximum length of open trench shall not exceed 100 feet at any one time. Temporary resurfacing shall be completed within 300 feet of the associated open trench limit for each main pipe laying operation. Cover or backfill excavations at the end of each day.

Related Standard Drawings: 241, 482, 483

# 326.3.07 Pipe Bedding

Level trench and compact at subgrade elevation. Place and compact pipe zone material and then excavate bell holes at each joint of sufficient depth that bells are not supported on zone material. Pipe bedding shall be fine graded by hand to give uniform, even support to the bottom of the pipe. Pipes shall not be laid on blocking or any material other than pipe zone material.

Related Standard Drawings: 241

## 326.3.08 Pipe Installation

Inspect all pipe and fittings immediately prior to installation to ensure that no defective materials are used. Clean ends of pipe of all lumps, blisters, excess coal-tar coating and foreign matter from the bell and spigot ends of each pipe. Remove foreign material from inside pipe, and use proper tools and approved lubricants to join pipe sections. Use only proper implements, tools, and facilities for the safe and proper protection of materials and workmen. Carefully lower pipe into the trench to prevent damage to the pipe and do not dump or drop pipe onto ground or into trenches. If the pipe cannot be lowered into the trench and placed without earth or foreign material entering it, the City Engineer may require that a heavy, tightly-woven canvas bag of suitable size be placed over each end before lowering and left there until the connection is to be made to the adjacent pipe.

After the pipe has been lowered into the trench, assemble pipe in accordance with the directions of the manufacturer. Unless otherwise directed, lay pipe with bell end facing in the direction of the laying and after the joint has been made, align the pipe and check for grade. The deviation of any section of pipe from the line and grade shown shall not exceed 1 inch. The maximum pipe deflection shall not exceed 75 percent of the manufacturer's stated joint deflection allowance.

Place sufficient pipe zone material around the pipe to assure that the pipe has continuous and uniform support along the barrel and to assure that the pipe section will not move laterally.

At the end of each work day, or any time that laying operations are not in progress, install a cap or plug into the open end of the last laid section of pipe, so no foreign material or animals can enter.

Cut pipe for inserting valves, fittings or closure pieces in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe. Use a milling or rolling pipe cutter, or cutoff wheel and do not flame cut. Dress cut ends of pipe by beveling, and mark insertion/stop lengths as recommended by the manufacturer.

## 326.3.09 Handling and Laying Fittings

Handle fittings carefully and lower into the trench to prevent damage to the coating. Remove all foreign material or dirt from within the fitting before lowering into position and keep fittings clean during and after laying. Provide proper implements, tools and facilities satisfactory to the City Engineer for the safe and convenient prosecution of the work.

Mechanical joint fittings vary slightly with different manufacturers, so install the particular fittings furnished in accordance with the manufacturer's recommendations. In general, the procedure shall be as hereinafter specified. Clean the ends of the fittings of all dirt, mud, and foreign matter, after which slip the gland and gasket on the plain end of the pipe. Lubricate the end of the pipe to facilitate sliding the gasket in place, then guide the fitting onto the spigot of the pipe previously laid.

# 326.3.10 Backfill at the Pipe Zone

After the pipe is in place and ready for backfilling, place pipe zone material at approximately the same rate on each side of the pipe such that the elevation of the backfill on each side of the pipe is approximately equal at all times. Compact the backfill by tamping in 6-inch lifts to the horizontal centerline of the pipe to the City Engineer's satisfaction. Particular attention shall be given to the backfilling and tamping procedures to assure that no unfilled or uncompacted areas occur beneath the haunches of the pipe.

The remainder of the backfill in the pipe zone shall be placed without compacting. After backfilling to the top of the pipe zone, compact type "D" backfill material to a minimum of 92 percent of its maximum density as determined by AASHTO T 180.

Related Standard Drawings: 241

# 326.3.11 Anchorage

# 326.3.11A Location

Securely anchor all tees, plugs, caps, bends, and other locations where unbalanced forces exist, by suitable mechanical joint restraint, bearing thrust or gravity blocks as shown on the plans or hereinafter specified. Flange connect all adjacent fittings and valves, unless otherwise directed by the City Engineer.

## 326.3.11B Reaction Blocking

Place bearing or gravity thrust blocks as shown on Standard Drawing No. 620 and No. 621 respectively. Place bearing thrust blocking between undisturbed native material or compacted granular fill and the fitting to be anchored and arrange all concrete placement so that the fitting joints and bolts will be accessible for repairs.

# 326.11C Mechanical Joint Restraint

The City Engineer shall check restraint length, with trench backfill and soil type information submitted by the Contractor before laying into the restrained joint area. Use pipe with approved restraining gaskets to meet the minimum restrained pipe length requirement. Approved mechanical joint restraint shall be installed in full accordance with the manufacturer's instructions. If reassembly is required, tighten wedges or joint follower with a torque wrench, or as otherwise recommended by the manufacturer.

# 326.3.12 Hydrostatic Test

Make pressurized leakage tests on all newly laid pipe and valved sections of pipe. The maximum length of pipe to be tested at one time shall be the length of pipe between main line valves. Furnish all necessary equipment and material, make all taps, and furnish all closure pieces in the pipe as required. The City Engineer shall be notified a minimum of 48 hours before testing and shall be onsite to monitor the test.

Furnish the following equipment and materials for the tests, unless otherwise directed by the Engineer:

- (2) Approved graduated containers,
- (2) Calibrated test pressure gauges with maximum major increments of 5 psi
- (1) Hydraulic force pump as approved by the Engineer

Suitable hose and suction pipe as required.

Conduct hydrostatic pressure and leakage tests in accordance with OAR 333-061-0050 and AWWA C600 after the trench has been backfilled and compacted, and all services are set and installed. Where any section of pipe is provided with concrete thrust blocking, do not conduct pressure test until at least 5 days have elapsed after the concrete thrust blocking was installed or 90 percent of the concrete compressive strength is reached by concrete cylinder testing.

Slowly fill the line with City of Tualatin water, and ensure that all air release

valves are functioning properly and air is expelled at all high points in the line. Pressurize the line to a test pressure of 150 psi or 1.5 times the operating pressure at the lowest elevation of the segment being tested, whichever is greater, and maintain within  $\pm$  5 psi, after a period of stabilization.

Leakage shall not be measured by a drop in test pressure over a period of time, but by the quantity of water that must be pumped into the pipe section to maintain the test pressure over a period of 30-minutes. The leakage shall not be less than the number of gallons per hour as determined by the following formula:

$$L = \frac{SD}{10,876}$$

where,

L = Allowable leakage, in gallons per <u>hour</u>. S = Length of test pipe, in feet D = Nominal diameter of pipe, in inches.

When testing against closed metal-seated valves an additional amount per valve of 0.0078 gal/<u>hour</u>/inch of nominal valve size shall be added to the above formula.

Where the working pressure is greater than 120 psi, the test pressure shall be not less than 1.25 times the working pressure at the highest point in the test section, and the leakage shall be determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133,200}$$

where, P = Average test pressure, in psi.

# 326.3.12A Correction of Excessive Leakage

Should any test of pipe laid disclose leakage greater than that allowed under the above formula, locate and repair the defective joints, pipe or fittings until the leakage is within the specified allowance as verified by a passing pressure test.

## 326.3.13 <u>Sterilization</u>

Pipelines intended to carry potable water shall be sterilized before placing in service. Sterilizing procedures shall conform to AWWA C651 and be in accordance with OHA regulations as hereinafter modified or expanded.

### 326.3.13A Flushing

Before sterilizing, flush all foreign matter from the pipeline. Provide hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties. Flushing velocities shall be at least 3.0 fps. The City will review flushing requirement for mains greater than 12-inch in diameter.

## 326.3.13B Sterilizing Mixture

Shall be a chlorine-water solution having a free chlorine residual of 40 - 50 ppm. The sterilizing mixture shall be prepared by injecting:

- 1) Liquid chlorine gas-water mixture;
- 2) Dry chlorine gas;
- 3) Calcium or sodium hypochlorite and water mixture;

into the pipeline at a measured rate while fresh water is allowed to flow through the pipeline at a measured rate so that the combined mixture of fresh water and chlorine solution or gas is of the specified strength.

The liquid chlorine gas-water mixture shall be applied by means of an approved solution feed chlorinating device. Dry chlorine gas shall be fed through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine cylinder.

If the calcium hypochlorite procedure is used, first mix the dry powder with water to make a thick paste, then thin to approximately a one percent solution (10,000 ppm chlorine). If the sodium hypochlorite procedure is used, dilute the liquid with water to obtain a one percent solution.

The following proportions of hypochlorite to water will be required:

| Product   | Quantity | Water     |
|---|----------|-----------|
| Calcium Hypochlorite (1)<br>(65 – 70 percent Cl.) | 1 lb.    | 7.50 gal. |
| Sodium Hypochlorite (2)<br>(5.25 percent Cl.)     | 1 gal.   | 4.25 gal. |

- (1) Comparable to commercial products known as HTH, Perchloron, and Pittchlor.
- (2) Liquid laundry bleach known commercially as Clorox, Purex, etc.

# 326.3.13C Point of Application

Inject the chlorine mixture into the pipeline to be treated at the beginning of the line through a corporation stop or suitable tap in the top of the pipeline. Water from the existing system or other approved source shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to water entering the pipe that the combined mixture shall contain 40 - 50 ppm of free available chlorine. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Use check valves if necessary.

Valves on the existing system shall only be operated by City personnel per Section 326.3.04.

# 326.3.13D Retention Period

Chlorinated water shall be retained in the pipeline long enough to destroy all coliform organisms. The retention period shall be 24-hours unless otherwise specified by the City Engineer. At the end of the 24-hour period, the sterilizing mixture shall have a strength of at least 10 ppm of chlorine.

Operate all valves, hydrants, and other appurtenances during sterilization to assure that the sterilizing mixture is disbursed into all parts of the line, including dead ends, new services, and similar areas that otherwise may not receive the treated water.

Do not place concentrated quantities of commercial sterilizers in the line before it is filled with water.

After chlorination, flush the water from the line until the water through the line is equal chemically and bacteriologically to the permanent source of supply.

# 326.3.13E Disposal of Sterilizing Water

Dispose of sterilizing water in an approved manner. Do not allow sterilizing water to flow into a storm drain system without adequate dilution or other satisfactory method of reducing chlorine concentrations to a safe level. Disposal into the sanitary system shall only be allowed upon receipt of prior approval from the City and from the Clean Water Services.

# 326.3.14 Bacteriological Testing

The City Engineer shall arrange for samples to be collected no sooner than 16-hours after final flushing at intervals from the new main, including branches. The main shall not be accepted or placed in service until the tests show the absence of coliform organisms. If a

sample is not acceptable, the main shall be rechlorinated by the continuous feed or slug method, or the source of contamination removed, until satisfactory results are obtained.

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# 327 WATER VALVES AND RELATED EQUIPMENT

### 327.1.00 <u>General</u>

#### 327.1.01 <u>Scope</u>

This section covers all work necessary for furnishing and installing valves, and appurtenances.

#### 327.2.00 <u>Materials</u>

#### 327.2.01 Gate and Butterfly Valves

Valves shall be non-rising stem, have operators suitable for direct burial, fitted with 2-inch square operating nuts, which shall rotate counterclockwise to open. Valves shall be flange connected to fittings, dimensioned, and drilled to ANSI B16.1, class 125 cast-iron flanges.

#### 327.2.01A Gate Valves

Valves 2-inches to 10-inches in diameter size shall be resilient-seated gate valves in accordance with AWWA C509 or C515 and shall be UL listed and FM approved. Minimum pressure rating for gate valves shall be 250 pounds per square inch (gauge) (psig), unless otherwise specified.

American AVK Resilient Seated Ductile Iron Gate Valve with a non-rising stem is a City approved gate valve.

Related Standard Drawings: 600

#### 327.2.01B Butterfly Valves

Valves 12-inches and larger shall be rubber-seated butterfly valves and shall conform in all respects to the physical and performance requirements of AWWA C504, Class 150B, short body type. Minimum pressure rating for butterfly valves shall be 150 psig, unless otherwise specified.

**Related Standard Drawings: 601** 

## 327.2.02 Tapping Valve and Sleeve

Tapping valves shall meet or exceed AWWA C500 gate valves specifications, except that the seat rings are the necessary diameter to permit entry of the tapping machine cutters. Branch side after the gate valve shall be mechanical joint, or as shown on the plans.

Tapping sleeves shall be stainless steel fabricated construction designed to fit the diameter and type of pipe to be tapped. Gaskets shall be of Buna-N rubber and all regular fittings to meet AWWA specifications where applicable

# 327.2.03 Pressure Reducing and Check Valves

This valve shall be a hydraulically operated, diaphragm-actuated, globe valve. The diaphragm assembly shall be the only major moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm assembly valve stem shall be fully guided at both ends, by a bearing in the valve cover with a valve position indicator, and an integral bearing in the valve seat. The diaphragm shall not be used as a seating surface and all normal repairs shall be possible without removing the valve from the line.

The pressure reducing controller shall be capable of maintaining a constant downstream pressure in the range of 30 psi to 100 psi., regardless of fluctuations in demand. The pressure reducing pilot control shall be a direct-acting, adjustable spring loaded, normally open diaphragm valve which closes when downstream pressure exceeds the spring setting. The check valve control assembly shall be capable of positively closing the main valve if a pressure reversal occurs. The control system shall also include a strainer-orifice assembly, closing and opening speed control needle valves, low flow stabilizer assembly and shut-off cocks which isolate the pilot system.

Pressure gauges shall be fitted to both the inlet and outlet and shall be of the Bourdon type with a 4-1/2 inch dial, certified for water use, with a pressure range of 0 to 200 psi. upstream; and 0 to 160 psi., downstream, both with 1/2 percent accuracy. Provide lever-handled isolating cocks and porous metallic element pressure snubbers for each gauge.

# 327.2.04 Pressure Reducing and Sustaining Valve

This valve shall be a hydraulically operated, diaphragm-actuated, globe valve. The diaphragm assembly shall be the only major moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm assembly valve stem shall be fully guided at both ends, by a bearing in the valve cover with a valve position indicator, and an integral bearing in the valve seat. The diaphragm shall not be used as a seating surface and all normal repairs shall be possible without removing the valve from the line. The pressure reducing and the pressure sustaining controllers shall be capable of maintaining constant pressures in the range of 20 psi to 120 psi., regardless of fluctuations in demand. The pressure reducing pilot control shall be a direct-acting, adjustable spring loaded, normally open diaphragm valve which closes when downstream pressure exceeds the spring settings. The pressure sustaining pilot control shall be a direct-acting, adjustable spring loaded, normally closed diaphragm valve which opens when upstream pressure exceeds the spring setting. The control system shall also include a strainer-orifice assembly, closing and opening speed control needle valves, low flow stabilizer assembly and shut-off cocks which isolate the pilot system.

Pressure gauges shall be fitted to both the inlet and outlet and shall be of the Bourdon type with a 4-1/2 inch dial, certified for water use, with a pressure range of 0 to 160 psi., and 1/2 percent accuracy. Provide lever-handled isolating cocks and porous metallic element pressure snubbers for each gauge.

# 327.2.05 Altitude Valve

This valve shall be a hydraulically operated, diaphragm-actuated, globe valve. The diaphragm assembly shall be the only major moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm assembly valve stem shall be fully guided at both ends, by a bearing in the valve cover with a valve position indicator, and an integral bearing in the valve seat. The diaphragm shall not be used as a seating surface and all normal repairs shall be possible without removing the valve from the line.

The pilot control shall be a diaphragm-actuated, 3-way type that operates on the differential force between the height of the water in the reservoir and an adjustable spring load. The entire valve and control system shall be so designed that no surface water can be drawn into the pilot system or main valve at any time. The control system shall also include a strainer-orifice assembly, closing and opening speed control needle valves, and shut-off cocks which isolate the pilot system.

Where one-way flow is also required, the pilot control system shall also incorporate the necessary check valves for positive control.

## 327.2.06 <u>Air Valves</u>

Shall be designed for a working pressure of 150 psi, and test pressure of 300 psi. Valves shall be cast-iron bodied, with stainless trim and mechanisms, removable Buna-N seats, and stainless steel floats capable of withstanding a pressure of 1,000 psi. Materials shall be selected to reduce electrolytic action to a minimum.

Sizes 1/2-inch through 3-inch shall be threaded NPT, and sizes 4-inch and larger shall have flanged 125-pound inlets and plain outlets, with protective hoods to prevent the entry of debris and foreign matter.

Valves shall be the following or an approved equal:

| Valve Type     | Manufacturer                | Model  |
|----------------|-----------------------------|--|
| Air Release    | Val-Matic<br>DeZurik<br>ARI | 154<br>APCO 200A<br>D-040 -C                   |
| Air and Vacuum | Val-Matic<br>DeZurik<br>ARI | 100 to 108<br>APCO 141 to 154<br>D-46          |
| Combination    | Val-matic<br>DeZurik<br>ARI | 201C to 208C<br>APCO143C to 151C<br>D-060      |
| Surge Check    | Val-matic<br>DeZurik<br>ARI | Series 1200<br>APCO Series 1600<br>K-060-HF NS |

Related Standard Drawings: 602 and 603

# 327.2.06A Air Release Valves

Air release valves shall be designed to automatically vent through a small orifice, small pockets of air as they accumulate at high points in a system, while the system is operating and pressurized. The orifice shall be sized for the maximum air flow venting capacity and pipeline pressure.

## 327.2.06B Air and Vacuum Valves

Air and vacuum valves shall be designed with a large orifice to exhaust air during the filling of a pipeline and to admit air during the draining of a pipeline or when a negative pressure occurs, but not to vent air during system operation. The float shall be guided for positive shutoff onto the seat and shall be protected by a baffle from high velocity air and water and thus prevent the float from closing prematurely.

# 327.2.06C Combination Air Valves

Combination air valves shall combine the operating functions of the air release, and air and vacuum valves; with valves 3-inch and smaller being of the single housing type.

Valves 4-inch and larger shall consist of an air and vacuum valve mounted on a surge check valve, with an air release valve connected to the body of the air and vacuum valve.

### 327.2.06D Surge Check Valve

The surge check valve shall allow unrestricted air flow but shall close to a throttling position when high velocity water enters the check valve, which shall return to an open position when the air and vacuum valve has closed.

### 327.2.07 Blowoff Valve Assembly

Shall conform to the details shown on Standard Drawings 605 and 606 and the relevant sections of this specification.

#### 327.2.08 <u>Joints</u>

Mechanical and push-on joints shall conform in all respects to AWWA C111. All fittings shall be flanged connected to adjacent valves and fittings, with all dimensions and drilling to ANSI B16.1, class 125 cast-iron flanges. Bolts and gaskets shall conform to AWWA C207.

## 327.2.09 Valve Boxes

Valve boxes shall be heavy duty, by Olympic Foundry Inc., East Jordan Iron Works, or approved equal, 18-inch top section, slip type with top flange, and recessed handle cover (solid handle) manufactured of cast iron conforming to ASTM A48-76 (tensile strength 30,000 psi) and coated with a G.P.D. asphalt varnish. "W" or the word "WATER" shall be cast into the top of the lid. Valve box extensions shall be fabricated from 6-inch polyvinyl chloride sewer pipe conforming to ASTM D 3034, SDR 35. Valve stem extensions, when required, shall be fiberglass by Pipeline Products or approved equal, and shall include a lower operating nut, extension, and upper operating nut with ring.

## 327.2.10 <u>Concrete</u>

Concrete shall conform to ASTM C 94, Alternate 2, with a 28 day strength of 3300 psi. There shall be a minimum of 6-1/2 sacks of cement per cubic yard of concrete.

## 327.3.00 Workmanship

### 327.3.01 Gate & Butterfly Valves

Before installation, the valve shall be thoroughly cleaned of all foreign material, and shall be inspected for proper operation, both opening and closing, and to verify that the valves are set properly.

Valve shall be installed so that the operating stem is vertical transverse. Under no circumstances shall a valve be installed on its side, even if installed to be nonfunctional. Jointing shall conform to AWWA C600.

Face of flange shall be cleaned thoroughly before flanged joint is assembled. After cleaning, the gasket shall be inserted, and the nuts tightened uniformly around the flange. If flange joint leaks under test, the nuts shall be loosened, the gasket reset or replaced, the nuts retightened, and the valve and/or pipeline retested. Valves shall be flange connected to adjacent fittings.

### 327.3.02 Valve Boxes

Center the valve box and set align with the operating nut of the valve. Set valve box so that they do not transmit shock or stress to the valve. Set the valve box covers flush with the surface of the finished pavement as shown, or such other level as may be required by the City Engineer. Cut extensions to the proper length so that the insertion length is between 4 and 14-inches when set at final grade.

Place backfill around the valve boxes and thoroughly compact to a density equal to that of the undisturbed ground and in such a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be excavated, aligned, and backfilled. ( BLANK PAGE )

### 328 FIRE HYDRANT ASSEMBLIES

#### 328.1.00 <u>General</u>

#### 328.1.01 <u>Scope</u>

This section covers the work necessary for furnishing, installing or relocating fire hydrant assemblies.

#### 328.2.00 Materials

#### 328.2.01 Excavation and Backfill

Trench excavation and backfill shall conform to requirements of Section 320, Trench Excavation and Backfill.

Related Standard Drawings: 241

#### 328.2.02 Pipe

Pipe shall conform to Section 326, Water Pipe and Fittings.

#### 328.2.03 Hydrants

All fire hydrants shall be a dry-barrel, traffic breakaway type, and be UL listed and FM approved conforming to AWWA Standard C502. Hydrants shall be equipped with one 4-1/2-inch pumper nozzle, 5-3/4-inch O.D. with 4 threads per inch; two 2-1/2-inch hose nozzles, 3-1/16-inch O.D. with 7-1/2 threads per inch; operating nut pentagon 1-1/2-inch point to flat, counter clockwise to open 5-1/4-inch compression type main opening valve; factory powder coated red. The hydrant shoe shall be 6-inch mechanical joint having two (2) positive acting bronze drain valves that completely drain the hydrant when the main valve is closed.

All hydrants supplied for the Project shall be of like kind from a single manufacturer, and according to the approved list on standard drawing 610. Fire hydrants shall be permanently marked with the manufacturer's name, size of valve opening, and year of manufacture.

### 328.2.04 Base Block

Solid precast concrete pier block having nominal dimensions of 12" x 8" x 6".

### 328.2.05 Drainage Rock

3/4 -1/4-inch open-graded crushed drain rock, or graded river gravel free of organic matter, sand, loam, clay, and other small particles that will tend to restrict water flow through the gravel.

### 328.2.06 Gate Valve and Valve Box

Gate valves for fire hydrant assemblies shall be 6-inch size with end connections per standard drawing 610. Valve and valve box shall conform to Section 327, Water Valves and Related Equipment.

### 328.2.07 <u>Main Tee</u>

Main tee shall be ductile iron as specified in Section 326, Water Pipe and Fittings. Side outlet of main tee shall be 6-inch flanged.

## 328.2.08 Tapping Tee and Valve

Shall be as specified in Section 327, Water Valves and Related Equipment. Side outlet of tapping tee shall be 6-inch flanged.

## 328.3.00 Workmanship

#### 328.3.01 <u>General</u>

Hydrants shall be configured as shown on Standard Drawing 610, and installation shall conform to Sections 3.7 and 3.8 of AWWA C600, AWWA Manual M17 and the manufacturer's recommendations, except as otherwise specified.

## 328.3.02 Location and Position

Hydrants shall be located as shown on the approved plans or as directed by the fire code official, so as to provide complete accessibility and minimize possibility of damage from vehicles or injury to pedestrians. Improperly located hydrants shall be disconnected and relocated.

All hydrants are to be set plumb with ports parallel or perpendicular to centerline of roadway. Set hydrants so that the mid-point of the safety flange is between 3 and 6 inches above finished grade. Final location of hydrants and position of port orientation to be coordinated with City Engineer.

Related Drawing: 610

# 328.3.03 Excavation

Over-excavated areas shall be filled with gravel, and hand tamped to provide firm foundation. Backfill around hydrant shall be similar to adjacent pipeline as specified in Section 320, Trench Excavation and Backfill.

## 328.3.04 Base Rock

Place on firm, uniform and level grade.

# 328.3.05 <u>Hydrant</u>

Prior to connecting hydrant, adjust position of base block to assure that weight of hydrant will bear on base block and not on the tee or valve. Approved mechanical joint retainer glands shall be used between the gate valve and hydrant.

Test hydrant assembly with main line pressure.

# 328.3.06 Drainage Rock

Place drainage rock around hydrant shoe and base block up to the hydrant drain opening, after hydrant is in place. Top of gravel shall extend not less than 3 inches above hydrant drain opening.

## 328.3.07 Abandoned 6-Inch Service Line

After removing a fire hydrant, the Contractor shall if relevant, plug the existing 6-inch gate valve. Do not place backfill until the City Engineer has inspected the installation of the plug.

## 328.3.08 Location Markers

After installing the final lift of paving, the Contractor shall install a blue bidirectional Type I-A reflective pavement marker. Marker shall be located 18 inches from centerline in the direction of and perpendicular to the hydrant and shall conform to ODOT specification 02840.60.

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## 329 WATER METERS AND BOXES

#### 329.1.00 <u>General</u>

#### 329.1.01 <u>Scope</u>

This section covers the work necessary for water meters; including meter boxes, meters, service connection piping, fittings and other incidental work as required for complete installation.

### 329.1.02 Pipe Bedding, Pipe Zone and Trench Backfill

All work and materials required for trench excavation and backfill to facilitate water meter install shall be according to section 320 of these Technical Specification and the Oregon Standard Specifications for Construction Section 00330.43 a, b, and c, unless mentioned otherwise herein.

#### 329.2.00 Materials

#### 329.2.01 <u>Excavation</u>

Excavation shall conform to the requirements of Section 320, Trench Excavation and Backfill.

#### 329.2.02 <u>Backfill</u>

Backfill within the pipe zone shall be 3/4-inch minus crushed rock. Backfill above the pipe zone below the street structural section shall be crushed rock as stipulated in Section 320, Trench Excavation and Backfill. Backfill above the pipe zone in areas outside the back of curb/sidewalk shall be native material excavated from the trench.

Related Standard Drawings: 241

#### 329.2.03 Copper Tube

Copper tubing shall conform to ASTM B 88, with Type K soft, used on services 1-inch and smaller, and Type K rigid on sizes larger to 2-inch.

### 329.2.04 <u>Fittings</u>

Fittings shall conform to AWWA C 800, designed for connection to the service line by compression.

### 329.2.05 <u>Meters</u>

The City Operations Department will install meters up to 2" in size. The Contractor shall coordinate this work with the City Engineer and provide one week notice prior to needing Operations personnel on-site. Meters larger than 2" shall be installed by the Permittee and shall be as shown on the appropriate standard drawings.

Related Standard Drawings: 630, 631, 632, 633, and 634

## 329.3.00 Workmanship

## 329.3.01 Preparation of Trench

Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid. The trench bottom shall form a continuous and uniform bearing support for the pipe. Provide and maintain ample means to remove water entering the trench during the laying operation to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill above the pipe zone. Do not lay pipe in water. Trench excavation and backfill shall conform to applicable portions of Section 320, Trench Excavation and Backfill.

## 329.3.02 Copper Tubing

The copper tubing shall be cut with square ends, reamed, cleaned, and made up tightly. Care shall be taken to prevent the tube from kinking or buckling on short radius bends. Kinked or buckled section of copper tube shall be cut out and the tube spliced with the proper brass fittings at the Contractor's expense.

## 329.3.03 Installation of Meter Boxes

Meters and meter boxes or vaults shall be installed in a workmanlike manner. Finish grade of completed meter enclosure shall be flush with the top of curb and/or back of sidewalk. Meter boxes or vaults shall be set or constructed plumb, with the top set to conform to the slope of the finish grade. Lightly compacted pipe zone material shall be placed inside of the meter boxes, from the pipe zone above the pipe to the base of the meter. Prior to connection of the meter, the angle meter key valve shall be opened and the service line flushed clean of all foreign materials. ( BLANK PAGE )

# 330 WATER BACKFLOW PREVENTER (PREVENTION) ASSEMBLIES

### 330.1.00 <u>General</u>

#### 330.1.01 <u>Scope</u>

This section covers the work necessary for water backflow preventer (prevention) assemblies; including the boxes or vaults, double check backflow assemblies, reduced pressure backflow assemblies, piping, fittings, and other incidental work as required for complete installation.

A list of backflow prevention assemblies approved for use in Oregon is available from the Drinking Water Section of the Oregon Health Authority.

The type of backflow prevention assembly required is determined by the hazard level, and the potential for back siphonage, backpressure or both. See Section 200.

#### 330.1.02 Pipe Bedding, Pipe Zone and Trench Backfill

All work and materials required for trench excavation and backfill to facilitate water backflow preventer device install shall be according to section 320 of these Technical Specification and the Oregon Standard Specifications for Construction Section 00330.43 a, b, and c, unless mentioned otherwise herein.

#### 330.2.00 Materials

### 330.2.01 Excavation

Excavation shall conform to the requirements of Section 320, Trench Excavation and Backfill.

#### 330.2.02 Backfill

Backfill within the pipe zone shall be 3/4-inch minus crushed rock. Backfill above the pipe zone below the street structural section shall be crushed rock as stipulated in Section 320, Trench Excavation and Backfill. Backfill above the pipe zone in areas outside the back of curb/sidewalk shall be native material excavated from the trench.

Related Standard Drawing: 241

### 330.2.03 Copper Tube

Copper tubing shall conform to ASTM B 88, with Type K soft, used on services 1-inch and smaller, and Type K hard on sizes larger to 2-inch.

### 330.2.04 <u>Pipe</u>

Pipe shall conform to Section 326, Water Pipe and Fittings.

### 330.2.05 <u>Fittings</u>

Fittings shall conform to AWWA C 800, designed for connection to the service line by compression.

### 330.2.06 Double Check Valve Assembly (DCVA)

A DCVA is a complete assembly consisting of two internally loaded, independently operating check valves, located between two tightly closing resilientseated shutoff valves with four properly placed resilient-seated test cocks. This assembly shall only be used to protect against a non-health hazard (i.e., a pollutant).

Related Standard Drawings: 609, 611, 613, and 616

#### 330.2.07 Double Check Detector Assembly (DCDA)

A DCDA is a specially designed backflow assembly consisting of a line-sizeapproved double check valve assembly with a bypass containing a water meter and an approved double check valve assembly. The meter shall register accurately for only very low rates of flow up to 3 GPM and shall show a registration for all rates of flow. This assembly shall only be used to protect against a non-hazard (i.e., pollutant).

Related Standard Drawings: 614 and 615

## 330.2.08 Reduced Pressure Backflow Assembly (RPBA)

Also known as a "Reduced Pressure Principle Backflow Assembly," an RPBA is a complete assembly consisting of a mechanical, independently acting, hydraulically dependent relief valve, located between two independently operating, internally loaded check valves that are located between two tightly closing resilient-seated shutoff valves with four properly placed resilient-seated test cocks. If either check valve leaks, the pressure relief valve maintains a differential pressure of at least 2-psi between the two check valves, by discharging water to the atmosphere. The reduced pressure backflow assembly is designed to prevent backflow caused by backpressure and back-siphonage from low to high health hazards. Related Standard Drawings: 607, 608, 612 and 617

## 330.2.09 <u>Reduced Pressure Detector Assembly (RPDA)</u>

Also known as a "Reduced Pressure Principle Detector Assembly," an RPDA is a specifically designed backflow assembly consisting of a line-sized approved reduced-pressure principle backflow prevention assembly with a bypass containing a water meter and an approved reduced pressure principle backflow prevention assembly. This assembly shall be used to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant). The RPDA is primarily used on fire sprinkler systems.

An RPDA will be required on the fire service line of premises that use foamite, antifreeze, or other chemicals within their fire protection system. Also, if the fire protection system has an unapproved auxiliar water supply that is connected or intended to be connected to the fire system, an RPDA will be required by the City Engineer.

## 330.3.00 Testing of Backflow Prevention Assemblies

State of Oregon Administrative Rules requires backflow prevention assemblies to be tested at the time of installation, when repaired or moved, after any backflow incident, and at least annually thereafter. All testing must be performed by a Statecertified Backflow Tester. Test reports for DCDA's and RPDA's must include the detector meter reading. Results of the test must be provided to the Public Works Department within ten (10) working days\* of the test.

\*The 10-day requirement is based on the State of Oregon Rules and not on financial conditions or payment arrangements between the Tester and the customer.

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# 331 PUBLIC UTILITY INSTALLATION

## 331.1.00 <u>General</u>

### 331.1.01 <u>Scope</u>

This section, in accordance with City of Tualatin Municipal Code 03-06, covers installation and repair of Public Utilities in Rights-of-Way or public easements.

## 331.1.02 <u>Tree Protection</u>

Locate the receiving and insertion point of all utility bores outside the tree drip line, unless otherwise approved by the City Engineer.

### 331.2.00 Workmanship

## 331.2.01 Location of Existing City Utilities

Core and vacuum excavate to verify location of existing utilities prior to construction. All exceptions must be approved by the City Engineer. Repair pavement coring in compliance with Section 313.3.05, Pavement Coring Repair.

## 331.2.02 Directional Boring

Bore all pipes and conduits to true line and grade. Correct any deviation from true line and grade considered excessive, in the judgment of the City Engineer, at no expense to the City.

## 331.2.03 <u>Trench Excavation and Restoration</u>

Repair trench in compliance with Section 313, Surface Restoration, and Section 320, Trench Excavation and Backfill.
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### 332 POLE ATTACHMENTS, SMALL CELL WIRELESS, AND DISTRIBUTED ANTENNA SYSTEMS (DAS)

### 332.1.00 <u>General</u>

### 332.1.01 Scope

This section covers the work necessary for installing small cell wireless facilities or distributed antenna systems on City-owned and third-party street lights and utility poles within City Rights-of-Way. The items listed below are not an exhaustive list and are intended to supplement the National Electrical Safety Code (NESC) and other required engineering standards.

If approved by the City, equipment boxes, antennas, and other small cell wireless related facilities or attachments that exceed the size, quantity, or other limitations in this section may be allowed on a case-by-case basis.

### 332.1.02 Definitions

The definitions in this section supplement the definitions from City of <u>Tualatin</u> <u>Municipal Code</u> 3-06, "Utility Facilities in the Rights-of-Way".

<u>Small Cell Wireless Facility</u>: a type of wireless broadband infrastructure that typically takes the form of small antennas that are placed on existing infrastructure (both indoors and outdoors) and ground mounted equipment.

These facilities help to compliment or stretch tower macro-cellular coverage and add capacity in high demand areas.

<u>Antenna</u>: an apparatus designed for the purpose of emitting radiofrequency (RF) radiation, to be operated or operating from a fixed location pursuant to Federal Communication Commission authorization, for the provision of personal wireless service and any comingled information services.

<u>Antenna Equipment</u>: equipment, switches, wiring, cabling, power sources, shelters or cabinets associated with an antenna, located at the same fixed location as the antenna, and, when colocated on a structure, is mounted or installed at the same time as such antenna.

### 332.1.03 Tualatin Municipal Code (TMC)

Adhere to the requirements of City of Tualatin Municipal Code 03-06, "Utility Facilities in the Rights-of-Way."

# 332.1.04 Submittal Requirements

Obtain Right-of-Way license as required in TMC 3-6-205. Only one license is required per Utility Operator.

Complete Public Utility Permit Application.

Proof that third party utility pole or light pole owner will allow the facility or strand mounted equipment attached to their pole or strand.

Drawings, plans, and specifications as required in TMC 3-6-300 (4).

Performance surety as required in TMC 3-6-305.

Traffic plan, including temporary traffic control for motorized and non- motorized traffic using the current version of MUTCD Section 6.

Pay all required license and application fees.

# 332.1.05 Construction and Restoration Activities

Provide City with detailed as-built plans and elevation schematics of all pole attachments, small cell wireless facilities, and distributed antenna systems.

# 332.1.06 <u>Tree Protection</u>

Obtain written permission from the City before trimming trees. When directed by the City, trim under the supervision of the Parks Division Manager. The City is not liable for any damages, injuries, or claims arising from utility operator's actions under this section.

# 332.1.07 <u>Signage</u>

Post utility operators name, location identifying information, and 24-hour emergency contact information in a location visible by naked eye from the ground. Signs larger than four inches by six inches are not allowed, unless required by law.

Limit signage and labeling on equipment to only what is required by the applicable laws and regulations.

Construct signage from weather, corrosion, and ultra-violet (UV) resistant materials.

# 332.1.08 <u>Locations</u>

Pole attachments, small cell wireless facilities, and distributed antenna systems are not permitted within 50 feet of a signalized intersection measured from the nearest signal equipment as identified by the City, unless otherwise allowed by the City.

In order for the City to allow such equipment to be installed closer than 50- feet from a signalized intersection, the wireless utility provider must provide the City with definitive proof that there will be no interference with any traffic control devices or communications devices necessary to operate the traffic control devices. At the sole discretion of the City, definitive proof must be a current engineering study, stamped by a professional engineer licensed to practice engineering in Oregon, specific to the type of traffic signal and communications equipment installed at the specific location.

Install pole attachments, small cell wireless facilities, and distributed antenna systems only on existing street lights and utility poles. Attachments to traffic signal poles or associated equipment or to other traffic control devices is not allowed, unless otherwise approved by the City.

No later than December 31st of each calendar year, provide City with a geodatabase file containing locations of all facilities within the City Right-of Way.

### 332.2.00 Materials and Equipment

Unless otherwise approved by the City, install only the type, size, quantity, and materials allowed in this section.

Install all pole mounted equipment and materials a minimum of 10 feet above the ground.

Install all pole mounted equipment in accordance with pole owner requirements and the requirements in Section 332.

Utility Provider must obtain mounting requirements from the owner of the pole and provide to the City in the event they conflict with the standards in Section 332.

Paint or construct all equipment, conduit, cabling and ancillary parts with a nonreflective neutral color that matches the pole.

For the total volume of all equipment associated with each pole, do not exceed 21 cubic feet.

### 332.2.01 <u>Antennas</u>

Meet the following requirements for antennas installed within the right-of- way, unless otherwise approved by the City.

### Panel Antennas

For each antenna, do not exceed the following maximum dimensions: 1.6 cubic feet, with no dimension larger than 24 inches.

Install as close to pole as allowed under National Electrical Safety Code (NESC) and pole owner requirements.

Install no more than three panel antennas per street light or utility pole from all utility operators combined.

### Canister Antennas (Omnidirectional / Quasi-Omnidirectional)

For each antenna canister, do not exceed the following maximum dimensions: 4 feet in height (vertical length) and 16 inches in diameter including the canister and the transition shroud if used to transition between the pole diameter and the canister.

Do not extend the top of the antenna more than four feet above the pole it is mounted on.

Install no more than one omnidirectional or quasi-omnidirectional antenna per pole for all utility operators combined.

### Strand Mount Antennas

Install strand mount antennas only between existing utility poles on existing or new cables.

Install stand mount antennas a minimum of 16 feet above ground.

Do not exceed three cubic feet in volume for all required equipment mounted on the cable.

Install no more than one stand mounted attachment between any two utility poles for all Utility Operators combined.

Locate strand mounted antennas as close as possible to the utility pole and no more than six feet from the pole unless a greater distance is technically necessary or required by the pole owner for safety clearance and is approved by the City.

Install strand mounted equipment in a manner that results in the least visual impact. Use the minimum amount of exterior cabling or wires (other than the original strand) necessary to meet the technical needs of the facility.

### 332.2.02 Antenna Equipment

Install power cables transporting AC power in separate conduit from DC power or telecommunications cable.

Install only the following cable types: coaxial, fiber optic, solid or stranded metallic conductor. Hybrid cables with two or more cable types enclose in one sheath are allowed.

Install all cables in conduit with top side weather heads. Exposed riser cables are not allowed.

Install all new telecommunications or utility lines below ground as required in TMC 3-6-330.

#### <u>Conduit</u>

Install and ground all conduit according to National Electric Code standards.

The maximum number of conduits allowed for each antenna installation is four conduits total, one for service power and three for the coaxial cables and fiber.

Conduits larger than 4 inches in diameter are not allowed. To allow for pole climbing, install conduits with at least 4-1/2 inches between the pole and the closest part of the conduit or as required by National Electrical Safety Code (NESC).

#### Equipment Cabinet

Do not exceed the following maximum dimensions: 11 cubic feet in volume with no dimension larger than 48 inches.

If above ground, install equipment cabinets a minimum of 10 feet above the ground.

Equipment cabinets include but are not limited to remote radio heads/units (RRHs or RRUs), fiber interface boxes (e.g. SAR-O), and battery backup.

Locate all ground mounted equipment in pre-existing equipment cabinets that meet the requirements of these standards unless otherwise approved by the City.

### 332.2.03 Replacement and New Poles

Within the right-of-way, new poles for small cell wireless equipment are not allowed unless approved by the city in writing, in accordance with <u>TMC 3-6- 300(4)(b)</u>.

Locate only on existing or replacement utility poles or street lights.

Replacement pole maximum dimensions: 10 feet taller than the existing pole or the minimum additional height necessary to meet required vertical clearance for safety purposes as approved by the City. Pole height is calculated from the base of pole to the top of the pole or top of pole top mounted antennas.

When replacing street lights, design and install in accordance with PGE standards per Public Works Construction Code Section 203.2.28 Street Lights and as approved by the City.

#### 332.3.00 Workmanship

#### 332.3.01 <u>General</u>

Meet structural and clearance requirements of the latest revision of the National Electrical Safety Code (NESC) and National Electrical Code (NEC).

Construct all required work at Utility Operator's expense, installed in a neat and workmanlike manner, and in such a manner to not adversely affect the structural integrity of the City's service poles, streetlight poles, or communication facilities of other entities.

All wireless infrastructure installations are subject to inspection and/or observation by the City.

Field verify utility pole or street light ownership and notify City of all discrepancies between City maps/records and actual utility poles or street lights identified in the field.

# 332.3.02 Repairing Damaged Equipment

Graffiti or other damage to Utility Operator's equipment remedied within 10 business days of City notifying Utility Operator.