PUBLIC WORKS - ENGINEERING
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February 28, 2024

To: All Users of the City of Albany *Standard Construction Specifications*

Revised Standard Construction Specifications February 28, 2024

The City of Albany Public Works Department has completed revisions to the Standard Construction Specifications Standard Drawings. No changes have been made to the written specifications found in Divisions 1 through Division 6. Revisions are made effective and shall apply to all projects approved for construction from this date forward. A summary of changes made to the Standard Drawings are described in the document: *Summary of Changes SCS – February 2024*.

The most current version of the City of Albany *Standard Construction Specifications* and associated drawings is located on the City's website at https://www.albanyoregon.gov/pw/engineering/standard-construction-specifications. The current version of the *Standard Construction Specifications* has "February 2024" in the footer of each page. All holders of this manual should review the attached Summary of Changes and update their manuals.

Sincerely,

Staci L Belcastro

Staci Belcastro, P.E.
City Engineer

SLB:

CITY OF ALBANY
CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS
Summary of Changes – Effective February 28, 2024

STANDARD DRAWINGS

- **NO. 205 – STANDARD UTILITY TRENCH BACKFILL DETAIL**
  Updated to clarify required backfill materials in deep trenches

- **NO. 208 – TYPICAL SIGN INSTALLATION**
  Updated to clarify minimum sign height and sign post clear space for ADA compliance

- **NO. 211 – UNDERGROUND UTILITY SUPPORT**
  New drawing describing pipe support requirements when there is less than 12-inches of clearance between two underground utility pipes.

- **NO. 212 – END OF STREET BARRICADE**
  New drawing showing requirements for a barricade at the end of a street that does not end in a cul-de-sac.

- **NO. 213 – SPEED BUMP**
  New drawing of standard speed bump

- **NO. 301 – TYPICAL STREET SECTION**
  Updated to clarify that the standard street section applies to local residential streets and that other street classifications require a pavement section as described in the Engineering Standards.

- **NO. 304 – DETAILS FOR TYPICAL CURB AND GUTTER CONFIGURATIONS**
  Updated to change the rolled curb and gutter back of curb height from 14-inchs to 12-inches. This reduces the overall rolled curb height from 6-inches to 4-inches to improve driveway rideability for lower clearance vehicles.

- **NO. 309B – DRIVEWAYS ON ROLLED CURB WITH CURBSIDE SIDEWALK (OPTIONAL)**
  Updated drawing to make this detail optional on driveway approaches with rolled curb and gutter since the overall rolled curb height has been reduced from 6-inches to 4-inches.

- **NO. 401 – STANDARD PRECAST MANHOLE**
  Updated with new note requiring minimum of 6-inches between pipe openings at the interior of the manhole.

- **NO. 408 – LARGE DIAMETER PRECAST MANHOLE**
  Added new note to clarify that maximum distance between final surface grade and the top of the manhole cone is 15-inches.

- **NO. 416 – STANDARD SANITARY SEWER/STORM DRAIN MAINLINE 24" MINI-MANHOLE CLEANOUT DETAIL**
  Updated to remove note requiring 3-feet minimum cover over pipe.

- **NO. 507 – ¾" AND 1" WATER SERVICES**
  Updated to show sacrificial anode location to be at the meter end of the service line and not near the main.

- **NO. 508 – 1-½" AND 2" WATER SERVICES**
  Updated to show sacrificial anode location to be at the meter end of the service line and not near the main.

CITY OF ALBANY
CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS
Summary of Changes – Effective February 28, 2024

- **NO. 509 – 1" AND 2" COMBINATION AIR/VACUUM RELEASE VALVE**
  Updated to show sacrificial anode location to be at the meter end of the service line and not near the main.

- **NO. 513 – DUCTILE IRON FITTING SACRIFICIAL ANODE DETAIL**
  New drawing showing requirements for sacrificial anodes on ductile iron fittings.

- **NO. 615 – CURB INLET SEDIMENT COLLECTOR WITH PLANTER**
  Updated with note requiring handrail adjacent to sidewalk when depth of planter exceeds 20-inches.

- **NO. 616A – CATCH BASIN SEDIMENT COLLECTOR WITH PLANTER**
  Updated with note requiring handrail adjacent to sidewalk when depth of planter exceeds 20-inches.

DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 1 GENERAL REQUIREMENTS

101 APPLICATIONS, DEFINITIONS, AND ABBREVIATIONS

101.01.00 APPLICABILITY OF THE STANDARD CONSTRUCTION SPECIFICATIONS

The standard construction specifications and standard details contained herein shall apply to the construction and maintenance of all public improvement projects that ultimately will be owned, operated, or maintained by the City of Albany. Private construction firms, developers, City crews, or any other individuals or business entities engaged in the construction of improvement projects that ultimately will be owned, operated, or maintained by the City of Albany shall comply in every respect with these specifications and any applicable requirements or revisions that may be included in the contract documents for a particular improvement.

101.02.00 APPLICABILITY OF DIVISIONS

Division I contains definitions and abbreviations used throughout these specifications. In addition, it provides one of the processes by which the owner contracts with the private sector for the construction of capital improvements.

Division II contains the general technical requirements for all capital improvements that are to be operated and maintained by the owner.

Division III contains specific requirements for the construction of streets that are to be operated and maintained by the owner.

Division IV contains specific requirements for the construction of sanitary sewers and storm drains that are to be operated and maintained by the owner.

Division V contains specific requirements for the construction of water distribution systems that are to be operated and maintained by the owner.

Division VI contains specific requirements for the construction of post-construction stormwater quality systems that are to be operated and maintained by the owner.

In general, command-type sentences are used throughout these standard specifications. In all cases the command expressed or implied is directed to the contractor.

The specifications contained herein are divided into three categories:
(1) division; (2) section; and (3) subsection, and are formatted in the following example:

(1) Division: **DIVISION 1 GENERAL REQUIREMENTS**

(2) Section: **102 PROPOSAL REQUIREMENTS**

(3) Subsection: 102.03.02 PROPOSAL GUARANTEE AND SIGNATURE

Subsection: 102.03.02A PROPOSAL GUARANTEE

101.03.00 DEFINITIONS

Unless otherwise defined in the contract documents, the following definitions and abbreviations shall apply wherever used.

Acceptance of Work

Work required by the contract documents will be considered accepted upon approval of the final payment by the Albany City Council.

Addenda

Requirements added to the scope of work or additional clarifications of the work or contract documents subsequent to advertisement for bids and prior to the bid opening.

Advertisement
The public announcement inviting bids for work to be performed or materials to be furnished; synonymous with "invitation to bid."

Approved or Approval
Acceptance, given to the contractor by the City Engineer, for specific materials, construction or manufacturing processes, changes in contract conditions, or any other items to be used in the work.

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 solely by the City Engineer.

Attorney
The City Attorney of the City of Albany, Oregon.

Bid Security
The security (bond, cash, certified check) required to be submitted with each proposal that assures that the bidder will enter into a contract upon acceptance of the submitted proposal.

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

Change Order
A written order, approved by owner and issued by City Engineer to the contractor, covering changes in the contract documents or other conditions within the scope of the contractual documents.

City
The City of Albany, Oregon, an Oregon municipality.

City Engineer (Engineer)
The City Engineer, or any authorized city staff or designee who represents the owner, under whose direction the work will be performed, acting directly or through properly authorized officials, employees, and agents limited to the particular duties entrusted to them.

Code
The City of Albany Municipal Code and any other federal, state, county, or local codes, laws, or regulations affecting the work.

Contract
A part of the contract documents executed by the owner and the contractor that binds the owner and contractor to the stipulated work to be performed. In circumstances in which a contractor is constructing public improvements through private development the contract shall mean the provisions of the Site Improvement permit, Encroachment permit, or other mechanism under which the work has been authorized by the City.

Contract Cost
The aggregate amount promised to be paid by owner to contractor upon fulfillment of the contract.

Contract Documents
The contract, authorizing ordinance, the advertisement calling for bids, the proposal, drawings, all specifications, schedule of contract prices, addenda, permits, payment and performance bonds, insurance certificate, and change orders for any approved revisions made during the performance of the work to any of the above listed documents.

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

Contractor
Any individual, firm, co-partnership, corporation, or any combination thereof who has or have entered into a contract with the owner for a particular project.

Day
Calendar day, any and every day shown on the calendar.

Developer
Any individual, partnership, corporation, joint venture, or other legal entity in the primary business of developing real property.

Drawings
The official construction drawings included in the contract documents, which may include some or all of the following: profiles, cross sections, elevations, details, and other working, supplementary, and detail drawings, or reproductions thereof, that show the location, character, dimensions, and details of the work to be performed. Construction drawings are signed by the City Engineer. Drawings may either be bound in the same book as the balance of the contract documents or bound in separate sets and are a part of the contract documents, regardless of the method of binding.

Domestic Manufacture
The creation within the United States of America of parts, components, appurtenances, or other system constituents by any means of generation.

Easement
The right to use a defined area of property for a specific purpose or purposes.

Engineer's Report
A report prepared by the Public Works Director informing the Albany City Council of the status, viability, or need relating to a particular improvement project and making specific recommendations concerning the project.

Final Completion
The date at which the work, and all related aspects of the work, has progressed to the point where, in the opinion of the City Engineer, all requirements of the contract documents have been met; all construction equipment and unused materials have been removed; all waste has been removed and the project area thoroughly cleaned and restored; and the project is 100 percent complete in every respect and can be utilized for the purpose for which it was intended.

Force Account Work
Force account work is extra work that is not covered under unit-price or lump-sum items in the contract documents and where negotiated price or prices have not been agreed upon.

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

Improvement
General term encompassing all phases of the work to be performed under the contract; synonymous with the term "project."

Invitation to Bid
The public announcement inviting bids for work to be performed or materials to be furnished; synonymous with the term "advertisement."

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

MUTCD
Manual of Uniform Traffic Control Devices published by the U.S. Department of Transportation.

Notice
A written communication delivered by hand, mail, or e-mail to an individual, authorized member of a firm, or officer of a corporation for which it is intended. If delivered or sent by mail, it will be addressed to the last known address of the individual, firm, or corporation.

Oregon Standard Specifications for Construction
The latest edition of the specification document published by the state of Oregon entitled *Oregon Standard Specifications for Construction*. This document is available from the Oregon Department of Transportation, Salem, Oregon.

Owner
The City of Albany, acting through its legally constituted City Council.

Performance and Payment Bond
The bond submitted by the contractor and the contractor's surety as specified in the contract documents.

Public Works Department
The Public Works Department of the City of Albany, Oregon, acting directly or through properly authorized officials, employees, and agents limited to the particular duties entrusted to them.

Project
General term encompassing all phases of the work to be performed under the contract; synonymous with the term "improvement."

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

Proposal
The written offer of a bidder that is the basis of the contract cost to perform stated work at prices quoted and submitted on owner's official proposal form.

Proposal Guarantee
The security furnished with a proposal to ensure that the bidder will enter into a contract upon acceptance of the proposal.

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

Reference Specifications
Bulletins, standards, rules, methods of analysis or test, codes and specifications of other agencies, Engineering societies, or industrial associations referred to in the contract documents. All such references specified herein refer to the latest edition thereof, including any amendments thereto, that are in effect and published at the time of advertising for bids or of issuing the permit, unless specifically referred to by edition, volume, or date.

Resident Bidder
Resident bidder is as defined in ORS 279A.120.

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

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

Shall
An auxiliary word used to express a command in the contract documents describing a specific requirement or course of action that is required of the contractor.

Shop Drawings
Supplementary drawings or data that the contract requires the contractor to submit to the City Engineer.

Shown
As used herein, the word "shown" or "as shown" shall be understood to refer to work depicted on the drawings in the contract documents.

Special Provisions
Requirements unique to the project that may include changes and modifications of the standard construction specifications.

Specifications
Synonymous to the term "standard construction specifications."

Specified
As used herein, the word "specified" or "as specified" means as required by the contract documents.

Standard Details
Details of structures, devices, or instructions adopted by owner as a standard and included as a permanent part of the standard construction specifications.

Standard Construction Specifications
The terms, directions, provisions, and requirements set forth herein, including the standard details.

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

Subcontractor
An individual, partnership, firm, corporation, or other legal entity entering into a contract with the contractor to perform a portion of the work.

Supplemental Agreements
Agreements made between the owner and other governmental agencies, utility companies, or other entities that are included in the contract documents and affect some aspect of the work.

Ton
The short ton of 2,000 pounds avoirdupois.

Unit Price
A method of payment for a contract item of work based on a specific unit of measurement as indicated in the proposal.

Utility
Railroad tracks, utility poles, overhead or underground wires, pipelines, conduits, ducts, or structures owned, operated, or maintained in or across a right-of-way or easement.

Warranty
The contractor's responsibility to the City for the repair or replacement of defective materials and/or workmanship relative to the work or a portion or a component part thereof.

Will
Used in the contract documents as an auxiliary verb to express a determination to meet a specific requirement or to take a specific course of action or to describe the inevitable.

Work
All material, labor, equipment, transportation, and appurtenances necessary to perform and complete the contract and such additional items not specifically indicated or described that can be reasonably inferred as belonging to the item described or indicated and as required by good practice to provide a complete and satisfactory system or structure.

Working Day
Any and every day shown on the calendar with the exception of Saturdays, Sundays, and legal holidays.

101.04.00 ABBREVIATIONS

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

102 PROPOSAL REQUIREMENTS

102.01.00 FACSIMILE TRANSMISSIONS

Documents sent to the City by means of facsimile machines, or by means of other present or future technology not specifically accepted by the owner, will not be accepted for the submission, replacement, or modification of any document that requires an original signature.

102.02.00 EQUAL EMPLOYMENT OPPORTUNITY

The attention of bidders is directed to the provisions of Oregon law concerning unlawful employment practices. Violation of such provisions may be grounds for immediate termination of the contract.

It is the policy of the City of Albany to promote equal opportunity to all persons in matters affecting, but not limited to: Recruitment, employment, compensation, benefits, promotions, training, discipline, transfer, and layoff practices without regard to a person's race, color, religion, national origin, disability, sex, or age (except where sex, age, or non-disability are bona fide occupational qualifications). This policy extends to all contractors receiving public money for the fulfillment of public contracts with the City of Albany.

102.03.00 BID PROPOSAL

102.03.01 PREPARATION AND SUBMITTAL OF PROPOSAL

Proposals must be clearly and distinctly typed or written with ink or indelible pencil.

Proposals shall be on the form furnished by owner and, in addition to necessary unit price items and total prices in the column of totals to make a complete bid, all applicable blanks giving general information must be filled in and the bid signed by the contractor or a duly authorized agent. Any statement accompanying and tending to qualify a bid may cause rejection of such bid, unless such statement is required in a proposal embracing alternative bids.

Bidders shall bid on all bid items included in the proposal. Proposals that are incomplete, conditional, or fail to reply to all items required in the proposal may be rejected.

The bidder shall enclose the proposal, bid bond, certified check, or cashier's check, in a sealed, labeled, and addressed envelope as required in the invitation to bid and file as required therein. The outside of the envelope shall plainly identify: (1) The project name, (2) the bid opening time and date, and (3) the bidder's name.

102.03.02 PROPOSAL GUARANTEE AND SIGNATURE

102.03.02A PROPOSAL GUARANTEE

Proposals shall be accompanied by a proposal guarantee in the form of a certified check or cashier's check payable to the order of the owner, or a bidder's bond for the single bid submitted, in an amount of at least 10 percent of the amount of the proposal. Such proposal guarantee shall be forfeited in case the successful bidder shall fail or neglect to furnish a performance and payment bond and insurance, if required, and to execute the contract within 10 days after receipt of said contract from the owner for execution.

102.03.02B PROPOSAL SIGNATURE

The bidder shall state whether business is being done as an individual, a co-partnership, a corporation, or a combination thereof and, if incorporated, in what state and, if a co-partnership, the names of all partners. The position of the person signing on behalf of a corporation, a co-partnership, or combination thereof shall be stated and whether the corporation is licensed to do business in the state of Oregon. A corporation requires the signatures of two corporate officers.

102.03.03 WITHDRAWAL, MODIFICATION, OR ALTERATION OF PROPOSAL

Once submitted, bids may be modified in writing prior to the time and date set for bid closing. Any modifications shall be prepared on the company letterhead, signed by an authorized officer, and state that the new document supersedes or modifies the prior bid. To ensure the integrity of the bidding process, the envelope containing any modifications to a bid shall be clearly marked as follows: (1) BID MODIFICATION, (2) the project name, (3) the bid opening time and date, and (4) the bidder's name.

Bids may be withdrawn by written notification on company letterhead signed by an authorized officer and received prior to the time and date set for bid closing. Bids also may be withdrawn in person prior to the scheduled bid closing upon presentation of appropriate identification. Unopened bids, withdrawn as specified above, may be released to the bidder after voiding any date and time stamp used. Envelopes containing written requests to withdraw bids shall be clearly marked as follows: (1) BID WITHDRAWAL, (2) the project name, (3) the bid opening time and date, and (4) the bidder's name.

Prior to bid opening, changes may be made provided changes are initialed by the bidder or authorized agent. If the intent of the bidder is not clearly identifiable, the interpretation most advantageous to owner, as determined by the owner, will prevail.

102.03.04 LATE PROPOSALS

Proposals, modifications, and withdrawal requests received after the scheduled closing time for filing bids, as set forth in the invitation to bid, will be rejected and returned unopened to the bidder unless such closing time is extended by owner.

102.03.05 RESIDENT BIDDERS

Bid documents must contain a statement as to whether the bidder is a resident bidder as specified in ORS 279A.120.

102.04.00 EXAMINATION OF CONTRACT DOCUMENTS AND SITE OF WORK

Bidders shall determine for themselves all the conditions and circumstances affecting the project or the cost of the proposed work by personal examination of the site, contract documents, and by such other means as they may choose. It is understood and agreed that information regarding underground or other conditions or obstructions indicated in the contract documents has been obtained from data actually known by the staff of the office of the Public Works Department, Engineering Division. There is no expressed or implied agreement that such conditions are fully or correctly shown and the bidder must take into consideration the possibility that conditions affecting the cost or quantity of work may differ from those indicated.

102.05.00 INTERPRETATION OF CONTRACT DOCUMENTS

If it should appear to a bidder that the work to be done or matters relative thereto are not sufficiently described or explained in the contract documents or that contract documents are not definite and clear, the bidder shall make written inquiry regarding same to the City Engineer, at least seven days before the scheduled closing time for filing bids. Then, if in the judgment of the owner, additional information or interpretation is necessary, such information will be supplied in the form of an addendum to all individuals, firms, and corporations who have taken out contract documents. Such addendum shall have the same binding effect as though contained in the main body of the contract documents.

Oral instructions or information concerning the contract documents or the project given out by officers, employees, or agents of the owner to prospective bidders shall not bind the owner.

102.06.00 ADDENDA TO CONTRACT DOCUMENTS

Neither the owner nor the City Engineer will give verbal answers to inquiries regarding the meanings of drawings and specifications or verbal instructions previous to the award of the contract. Any explanation desired by bidders must be requested from the owner or City Engineer in writing; and if explanation is necessary, a reply will be made in the form of an addendum, a copy of which will be forwarded to each bidder who has received a set of contract documents.

All addenda issued to bidders prior to date of receipt of proposals shall become a part of the contract documents and all proposals are to include the work therein described. Each proposal submitted shall list, by

number, all addenda that have been received prior to the time scheduled for receipt of proposal. Any proposal that is not in compliance with this section and/or does not include a listing of all addenda listed may be rejected.

102.07.00 FAMILIARITY WITH LAWS AND ORDINANCES

The bidder is presumed to be familiar with federal, state, and local laws, ordinances, and regulations that in any manner affect those engaged or employed in the work or the materials or equipment used in the proposed construction, or that in any way affect the conduct of the work; and no plea of misunderstanding will be considered on account of ignorance thereof. If the bidder, or contractor, shall discover any provision in the contract documents that is contrary to or inconsistent with any law, ordinance, or regulation, such discrepancy shall be reported immediately to the owner in writing.

102.08.00 AMOUNT OF WORK TO BE DONE

Owner reserves the right to increase or decrease the amount of any class or portion of the work. No such change in the work shall be considered as a waiver of any condition of the contract nor shall such change invalidate any of the provisions thereof.

The estimate of quantities of work to be done under unit-price bids is approximate and is given only as a basis of calculation for comparison of bids and award of the contract. The owner does not by implication agree that the actual amount of work will correspond precisely to the amount as shown or estimated. Payment will be made at unit prices under a contract only for work performed or materials furnished according to actual measurement.

102.09.00 BID PRICES TO COVER ENTIRE WORK

Bidders must include in their bid prices the entire cost of each item of the work set forth in the proposal; and when, in the opinion of the City Engineer, the prices in any proposal are obviously unbalanced, such proposal may be rejected by the owner.

102.10.00 ACCEPTANCE OR REJECTION OF PROPOSAL

Owner reserves the right to accept or reject any or all bids, in whole or in part, or waive irregularities as the best interests of the City may require.

103 AWARD AND EXECUTION OF CONTRACT

103.01.00 AWARD OF CONTRACT

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

The owner reserves the right to reject any or all bids in its own best interests.

While price extensions are required as a matter of convenience, in the event of error in extensions, the unit prices bid shall govern.

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

If awarded, award and tender of contract will be according to ORS 279C.375.

103.02.00 EXECUTION OF CONTRACT

The bidder to whom award is made shall execute and return the contract in the required number of copies and shall furnish a performance and payment bond and other required bonds and insurances satisfactory to owner within 10 days after notice of award. Bidder shall execute at least one copy of the contract as the original, or

any number of copies as originals as required by owner; one original shall remain in the possession of owner. It shall be the bidder's responsibility to confirm the accuracy and completeness of all copies of the contract submitted by the owner to the bidder for signature.

The federal tax identification number or social security number of the successful bidder shall be supplied to the owner.

103.02.01 FAILURE TO EXECUTE CONTRACT

Failure on the part of the successful bidder to execute and deliver the contract, required performance and payment bond, and the required insurance shall be just cause for cancellation of the award, withdrawal of the contract, and forfeiture of the proposal guarantee. The forfeited proposal guarantee shall become the property of the owner, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest acceptable bidder; or the work may be readvertised, or otherwise, as the owner may decide.

103.03.00 RETURN OF PROPOSAL GUARANTEE

The owner reserves the right to retain the bid security of the three lowest bidders until the successful bidder has signed and delivered the contract and furnished the required bonds and insurance certificates.

103.04.00 SUBCONTRACTING LIMITATIONS

The contractor's own organization shall perform contract work amounting to at least 40 percent of the original total contract amount which shall be defined as the sum of the amounts computed by multiplying the bid item quantities by the unit price in the schedule of contract prices of the contract as awarded.

The term "own organization" includes only workers employed and paid directly by the contractor and using equipment owned or rented by the contractor. It shall also include materials and manufactured products that are purchased or produced by the contractor.

103.04.01 TRANSFER OF CONTRACT AND INTERESTS THEREIN

Transfer of the contract or any interest therein to any other party or parties shall not be made without the prior written consent of owner. In case of such attempted transfer without permission, owner may refuse to carry out the contract either with the contractor or the transferee, but all rights of action for any breach of the contract by said contractor are reserved to the owner. No officer of owner, nor any person employed in its service, is or shall be permitted any share or part of the contract or shall be entitled to any benefit that may arise therefrom. Assignment of any of the monies payable under the contract or claims thereto shall not be made without the prior written approval of owner.

Any assignment of money shall be subject to all proper offsets and withholdings in favor of owner and to all deductions provided for in the contract and, particularly, all money withheld, whether assigned or not, shall be subject to being used by owner for completion of the work in the event contractor should be in default therein.

103.05.00 PERFORMANCE AND PAYMENT BOND

At the time of execution of the contract, the contractor shall furnish performance and payment bond or bonds approved by the owner and City Attorney in an amount equal to the amount of the contract based upon the estimate of quantities or lump sum as set forth in the proposal, conditioned upon a compliance with and fulfillment of all terms and provisions of the contract, including maintenance, repair, and replacement and all applicable laws and prompt payment, as due, to all persons supplying labor and/or material for prosecution of the work.

103.06.00 PROOF OF CARRIAGE OF INSURANCE

Work shall not commence until all insurances required in the contract have been obtained and a certificate thereof has been approved by the City Attorney. The contractor shall maintain insurance throughout the life of the contract that will hold owner harmless and shall indemnify owner and City Engineer for any and all losses to third persons or to owner arising out of the operations, including any contingent liability arising therefrom.

103.07.00 NONRESIDENT CONTRACTOR

When a public contract is awarded to a nonresident bidder and the contract price exceeds $10,000, under provisions of ORS Chapter 279A.120(3), the bidder shall promptly report to the Department of Revenue and the owner on forms to be provided by the department, the total contract price, terms of payment, length of contract and such other information as the department may require before the bidder may receive final payment on the public contract. The contracting agency shall satisfy itself that the requirement of this subsection has been complied with before the contracting agency issues a final payment on a public contract.

104 SCOPE OF WORK

104.01.00 CONTRACT DOCUMENTS

The contract documents, which include the standard construction specifications, special provisions, drawings, and any other pertinent specifications, permits, regulations, and requirements unique to the project, will govern the work to be done. When a particular specification, regulation, or requirement is referred to in the contract documents, such reference shall be to current revisions or amendments, if any, that are in effect at the time of advertising for bids.

Anything mentioned in the special provisions and not shown on the drawings and standard details; or shown on the drawings, and not mentioned in the special provisions or shown on a standard detail; or shown on a standard detail, and not mentioned in the special provisions or shown on the drawings, shall be of like effect as though shown or mentioned in all three. Specifications, drawings, and standard details referred to in any of the contract documents shall be considered as being included in the document in which such reference is made.

104.01.01 PRECEDENCE OF CONTRACT DOCUMENTS

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

(1) Addenda, change orders, and supplemental agreements
(2) Contract
(3) Proposal
(3) Permits from outside agencies required by law
(4) Special provisions
(5) Drawings
(6) Standard details
(7) Standard construction specifications
(8) Reference specifications

In case of any ambiguity or dispute over interpretation of the provisions of the contract, the decision of the City Engineer will be final.

104.02.00 SHOP DRAWINGS

The contractor shall supply and bear the cost of any shop drawings required in connection with the prosecution or construction of any part of such work.

The contractor shall submit to the City Engineer for review, in quadruplicate, such shop drawings, electrical diagrams, and catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) required for the construction. Shop drawings shall be submitted in sufficient time to allow the City Engineer not less than 14 days for examination.

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

Shop drawings shall be submitted only by the contractor, who shall indicate by a signed stamp on the shop drawings, or other approved means, that the contractor has checked the shop drawings and that the work shown is in accordance with contract requirements and has been checked for dimensions and relationship with work of all other trades involved. The practice of submitting incomplete or unchecked shop drawings for the City

Engineer to correct or finish will not be acceptable; and shop drawings that, in the opinion of the City Engineer, clearly indicate that they have not been checked by the contractor will be considered as not complying with the intent of the contract documents and will be returned to the contractor for resubmission in the proper form.

When the shop drawings have been reviewed by the City Engineer, two sets of submittals will be returned to the contractor with remarks relative to acceptance or rejection of the drawings. If major changes or corrections are necessary, the shop drawings may be rejected and one set will be returned to the contractor with such changes or corrections indicated and the contractor shall correct and resubmit the shop drawings in quadruplicate. No changes shall be made by the contractor to resubmitted shop drawings other than those changes indicated by the City Engineer, unless such changes are clearly described in a letter accompanying the resubmitted shop drawings.

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

104.03.00 CHANGES IN THE WORK

104.03.01 CHANGES REQUESTED BY THE CONTRACTOR

Changes in the contract documents requested in writing by the contractor, that do not materially affect the work and that are not detrimental to the work or to the interests of the owner, may be made to facilitate the work when approved in writing by the City Engineer.

If such changes are granted, they shall be made at a reduction in cost or at the contractor's sole expense. Nothing herein shall be construed as granting a right to the contractor to demand acceptance of such changes.

104.03.02 CHANGES INITIATED BY THE OWNER

Owner may at anytime, by written order, and without notice to the sureties, unless such change exceeds 25 percent of the original contract amount, make changes in the contract documents. If such changes cause an increase or decrease in the amount due under the contract, or in the time required for its performance, adjustment may be made and the contractor will be notified accordingly by written change order. The contractor shall make any claim under this subsection in writing within 10 days from the date of postmark of the notification of change. Nothing provided herein shall excuse contractor from proceeding with the prosecution of the work as changed. Except as otherwise herein provided, no charge for extra work or material will be allowed.

104.04.00 CHANGED CONDITIONS

If, subsequent to the contractor's bid submittal, changes in the work site occur that necessitate additional work not provided in the contract, the contractor shall notify the City Engineer in writing prior to disturbing said changes in the work site. The contractor may submit a claim for extra compensation for such additional work. Such a claim shall be submitted, in writing, to the City Engineer within 10 days of discovery of the changed condition. If the claim is not submitted within such 10-day period, contractor will be deemed to have waived any right to extra compensation for additional work.

If the owner or City Engineer determines the conditions to be such as to justify a claim for additional compensation, the compensation may be provided in the form of additional payment for the particular phase of work in question, or by any other equitable arrangement mutually agreeable to owner and contractor.

Unknown or unexpected subsurface conditions, unseasonal weather conditions, utility locations, or other job site conditions that have not changed since contractor's bid submittal shall not be considered changed conditions under this paragraph; and encountering such condition shall not entitle contractor to extra compensation.

104.05.00 EXTRA WORK

Owner shall have the right to require and contractor hereby agrees to do extra work over and above that which is indicated by the contract documents and covered by the unit prices of the contract, or negotiated price or prices, that is reasonably necessary to accomplish the intent of the contract arising from reasonably unforeseeable conditions, changed requirements, or new information. Such additional work shall be undertaken only upon written instructions from the City Engineer.

In giving instructions, the City Engineer may order minor changes in the work not involving extra cost and not inconsistent with the purposes of the work. Otherwise, except in an emergency endangering life or property, extra work shall be performed only in pursuance of a written order from the City Engineer stating that the owner has authorized the extra work. No claim for additional payment shall be valid unless so ordered.

104.06.00 FORCE ACCOUNT WORK

The contractor shall maintain records in such a manner as to provide a clear distinction between direct cost of extra work paid for on force-account basis and costs of other operations paid for under unit prices in the contract documents.

The contractor shall submit signed daily reports to the City Engineer, in duplicate, for extra work to be paid for on a force-account basis. Work shall be itemized as follows: (1) Costs of materials used in the work shall be itemized and substantiated with receipts showing quantity and cost from vendor; (2) cost of direct labor shall be substantiated by providing names, identification, and classes of workers, date and time spent performing the extra work; and (3) cost of equipment used shall be itemized by showing type, numbers, dates used, time of use, and size of equipment actually used in completing the extra work.

City Engineer's records will be compared with the reports furnished by contractor, any necessary adjustments made, and then the costs of extra work paid for on a force-account basis compiled on forms furnished by the contractor. When these extra-work reports are agreed upon and signed by both parties, they shall become the basis of payment for work performed.

104.06.01 COST OF MATERIALS

The contractor shall submit a written breakdown of material costs to the City Engineer in advance of using said materials in the work. Upon review of the proposed materials costs, the owner reserves the right to furnish such materials as the owner deems necessary to take advantage of any available cost savings.

The contractor shall substantiate material charges by submitting vendors' invoices with the daily reports or, if not available, submit with subsequent reports. In the event said vendors' invoices are not submitted within 15 days after acceptance of the work, owner reserves the right to establish the cost of such materials at the lowest current price at which said materials are available in the quantities concerned, delivered to the location of the work.

105 CONTROL OF WORK

105.01.00 AUTHORITY OF THE CITY ENGINEER

Subject to such authority as is delegated by the owner, the City Engineer will decide questions that may arise as to the quantity, quality, and acceptability of materials furnished and work performed; the rate of progress of the work; interpretation of the contract documents; the measurement of all quantities; and the acceptable fulfillment of the contract on the part of the contractor. The City Engineer's estimates and decisions in these matters shall be final, binding, and conclusive upon all parties to the contract.

The authority of the City Engineer is such that the contractor shall at all times acknowledge and comply with directions from the City Engineer insofar as they concern the work not in compliance with the contract. Upon failure on the part of the contractor to comply with any provisions of the contract, the City Engineer shall have the authority to suspend work, cause unacceptable and/or unauthorized work to be remedied, removed, or replaced, or to have such work remedied, removed, or replaced by a third party, and to deduct the costs thereof from any monies due or to become due the contractor.

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

Whenever in the contract documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory," or adjectives of like effect or import are used to describe a requirement, direction, review, or judgment of City Engineer as to the work, it is intended that such requirement, direction, review, or judgment will be solely to evaluate the work for compliance with the contract documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to City Engineer any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility for contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto; and City Engineer will not be responsible for contractor's failure to perform or furnish the work in accordance with the contract documents.

The owner and/or the City Engineer will not be responsible for the acts or omissions of contractor or of any subcontractor, any supplier, or of any other person or organization performing or furnishing any of the work.

105.02.00 AUTHORITY AND DUTIES OF INSPECTORS

City Engineer may appoint assistants to inspect materials used and work done. Such inspection may extend to any or all parts of the work and to the preparation or manufacture of materials to be used. An inspector is placed on the work to check the necessary lines and grades and to keep the City Engineer informed of progress of the work and the manner in which it is being done and also to call the attention of contractor to any infringements upon the contract documents; but failure of the inspector or City Engineer to call the attention of the contractor to faulty work or infringements upon the contract documents shall not constitute acceptance of said work.

An inspector will not be authorized to approve, accept, or issue instructions on any portion of the work that is contrary to the contract documents. The inspector will have authority to reject defective material and to suspend any work that is being done improperly, subject to final decision of the City Engineer. The inspector will exercise such additional authority as may be, from time to time, especially delegated by the City Engineer.

105.02.01 INSPECTION BY OTHERS

Inspection of work by persons other than the City Engineer will not constitute inspection by owner.

Private laboratories and/or Engineering firms may in some cases be retained by the City to provide testing and/or inspection duties.

105.03.00 DISPUTED WORK

If any work demanded is considered by contractor to be outside the scope of the contract or any ruling by the City Engineer is considered by the contractor to be unfair, upon such work being demanded or such ruling being made, the contractor shall proceed without delay to perform the work or to conform to the ruling. Within 10 days after date of receipt of the instructions or ruling, the contractor may file a written protest with the City Engineer stating clearly and in detail the basis of objection and include an itemized statement of any claimed extra costs that may have resulted. Except for such protests or objections as are made of record in the manner herein specified and within the time limit stated, the records, rulings, instructions, or decisions of the City Engineer will be final and conclusive.

105.04.00 RESPONSIBILITY OF THE CONTRACTOR

The contractor shall do all work and furnish all labor, materials, and equipment necessary for the performance and completion of the project in accordance with contract documents and within the specified time.

Material and construction details of plants, forms, shoring, falsework, and other structures built by contractor but not a part of the permanent project, shall be the contractor's responsibility.

The contractor shall assume all responsibility for the work and bear all losses and damages directly or indirectly resulting to contractor, to owner, or to others on account of the character or performance of the work, unforeseen difficulties, accidents, or any other cause whatsoever. The contractor shall assume the defense of, indemnify, and save harmless the owner, the City Engineer, their officers, agents, and employees from all claims, liability, loss, damage, and injury of every kind, nature, and description, directly or indirectly resulting from activities in the performance of the contract, the ownership, maintenance, or use of motor vehicles in connection therewith, or the acts, omissions, operations, or conduct of the contractor or any subcontractor under the contract or in any way arising out of the contract. Contractor shall not be liable for nor be required to defend or indemnify the owner relative to claims for damage or damages resulting from acts or omissions of the owner, its officers, agents, or employees.

105.05.00 NOTIFICATIONS RELATIVE TO CONTRACTOR'S ACTIVITIES

105.05.01 GENERAL

The contractor shall be solely responsible for notifying the appropriate agencies prior to commencing work, requesting on-site utility locations by phone and confirming by letter a minimum of 48 hours prior to commencing work, and adhering to notification requirements during the progress of the work where location of utilities is necessary as the work progresses.

When performing work in streets and easements, whether inside or outside owner's legal boundaries, the contractor shall notify all of the affected local agencies about the operations so as to properly coordinate and expedite the work in such a manner as to cause the least amount of conflict and interference between the operations and those of other agencies.

Notifications shall include, but may not be limited to, the time of commencement and completion of work, names of streets or location of alleys to be closed, and schedule of operations and routes of detours where possible. Other specific information may be required depending upon the nature of the work.

If the project or work there under involves the crossing of any railroad line or encroachment on any railroad right-of-way, adequate notice shall be given prior to construction as required in the contract documents.

Damages or claims resulting from improper or insufficient notification of the affected agencies shall be the responsibility of the contractor.

The contractor shall not place required notifications in U.S. Postal Service mail boxes.

105.05.02 STREET CLOSURES

In addition to other notifications, the contractor shall obtain prior approval from the City Engineer for the closing or partial closing of any street. The contractor shall give at least 48 hours advance notice of such closure to all agencies providing emergency services, including police, fire, and ambulance services.

When access to private, public, or commercial property will be denied or impaired, the contractor shall give occupants of affected properties at least 24 hours prior notice. In the absence of required notice, the contractor shall immediately undertake to provide the desired access when directed to do so by the City Engineer.

For commercial properties, in addition to the required notice, the contractor shall provide and maintain appropriate signing to advise potential customers and commercial traffic of alternate routes to the property.

105.05.03 WATER WORKS PROJECTS

Work involving existing water lines shall be scheduled in a manner that will minimize disruption of local water service. Interruption of water service shall not be scheduled to occur on a Friday or City Holiday. Scheduled interruptions of water service shall occur between the hours of 9:00 a.m. and 2:00 p.m., except as otherwise authorized by the City Engineer. The Contractor shall give written notice to each affected residential water customer a minimum of 48 hours in advance of the scheduled interruption of water service. The Contractor shall give written notice to the City and to commercial and industrial water customers a minimum of 72 hours in advance of the scheduled interruption of water service. A copy of this notice shall be presented to the City Engineer for approval prior to distribution to water users.

The notification shall include details indicating the date, time of day, and expected duration of the proposed shutdown. The notification shall also include the contractor's name, contact person's name, and phone number of the contact person. These notifications shall be delivered in person to the service address and shall be secured to the customer's primary entrance. The Contractor shall coordinate with affected businesses to ensure water service interruptions occur at times convenient for their normal operation. In some circumstances it may be necessary to schedule water shutdowns outside of normal working hours.

105.05.03A UNSCHEDULED INTERRUPTION OF WATER SERVICE

In the event that the water line is required to be out of service for a longer period than given in the original notice, or is to be taken out of service again after service was restored, the contractor shall immediately notify, in person, as many of the affected water users as possible that received the original notice.

Where water lines or hydrants are taken out of service without the required notice due to an emergency endangering life or property, the contractor shall notify, in person, the affected water users as soon as the emergency is under control.

Each situation involving a scheduled interruption of water service shall be limited to four hours unless otherwise authorized by the City Engineer. If the Contractor does not complete the work within the allotted time or for circumstances otherwise causing an unscheduled interruption of water service, mitigating circumstances notwithstanding, the Contractor shall pay to the City, not as penalty but as liquidated damages, $225 each hour, or fraction thereof, beyond the time limit established by the City Engineer.

105.05.03B DAMAGE TO EXISTING WATER SYSTEM

In the event the Contractor's activities cause damage to any part of the existing water system, the Contractor shall immediately cease all work activities, except to make the area safe. The Contractor shall immediately notify the City of the damage and await further instruction from the City.

City forces will perform repairs to damaged water infrastructure. The Contractor shall repay costs to the City including materials, equipment, labor, and incidentals; and including costs associated with the loss of opportunity to perform work otherwise scheduled by City forces.

Liquidated damages identified in 105.05.03A shall apply.

105.06.00 PROTECTION OF WORK

Until final acceptance of the completed project by the owner, the contractor shall protect, at all times, all materials, equipment, and completed work from damage, theft, or other harm, whether it be from nature, including the action of the elements, and damage by any person or persons, or from any other cause or source whatsoever.

The contractor shall be responsible for the repair or replacement, and costs thereof, of lost or damaged materials and/or completed work when such loss or damage occurs prior to final acceptance of the project. The City Engineer will make the final determination of whether damaged materials or work shall be repaired or replaced.

105.07.00 USE OF IMPROVEMENT DURING CONSTRUCTION

Upon request and with written approval of the owner, contractor will be relieved of the duty of maintaining and protecting certain portions of work that are approved to be placed in service and that have been completed in accordance with the contract documents, including cleanup.

Owner shall have the right to take possession of and use any completed or partially completed portions of the improvement. Such use shall not be considered as final acceptance of the improvement or portions thereof.

105.08.00 USE OF LIGHT, POWER, WATER, AND PROPERTY

The contractor shall provide, install, and maintain temporary lighting, power, and water service as is necessary to perform the work. Temporary services shall be removed upon completion of the work. The contractor shall

obtain all permits and bear all costs in connection with temporary services and facilities at no expense to owner and conform to applicable rules and codes in the use of these facilities.

The contractor shall not make use of existing power or water service from public or private property, or the property itself, without the written consent of the property owner. A copy of any such written consent shall be forwarded to the City Engineer prior to making use of the service.

105.09.00 SUBSURFACE DATA

Information obtained by City Engineer regarding subsurface conditions and groundwater elevations will be available for inspection at the office of the City Engineer upon request. Such information is offered as supplementary information only. Neither the City Engineer nor owner assumes any responsibility for the completeness, correctness, or interpretation of such supplementary information.

Logs of test holes, test pits, soils reports, ground water levels, and other supplementary subsurface information pertaining to underlying materials and conditions at locations specified in the contract documents are presented as the best information known to the Public Works Department, Engineering Division. There is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur. Owner and City Engineer will not be liable for any loss sustained by the contractor as a result of any variance between conditions contained in or interpretations of test reports and the actual conditions encountered during progress of the work.

It shall be the contractor's sole responsibility to examine the site and available records. The submission of a proposal shall be conclusive evidence that the bidder has investigated and is satisfied as to the subsurface conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of the contract documents.

105.10.00 VERBAL AGREEMENTS

No verbal agreement or conversation with any officer, agent, or employee of the owner, either before or after execution of the contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the contract. Any such verbal agreement or conversation shall be considered as unofficial information and in no way binding upon owner.

105.11.00 WATER AND AIR POLLUTION CONTROL

Throughout the life of the contract, contractor's operations shall conform to applicable laws and regulations of the Oregon Department of Environmental Quality and other agencies of the state and federal government, as well as local ordinances and resolutions designed to prevent, control, and abate water and air pollution.

During all phases of the work, and when directed, the contractor shall protect work sites, storage, and disposal areas from washout and erosion and take precautions to control or abate dust nuisance and air pollution by cleaning up, sweeping, sprinkling, covering, enclosing, or sheltering work areas and stockpiles and by promptly removing from paved streets earth or other material that may become airborne or may be washed into waterways or drainage systems.

105.12.00 NOISE

The contractor shall avoid creating unnecessary noise as defined in applicable subsections of Chapter 7.08.050 of the Albany Municipal Code.

Equipment used during the course of the work that employs the use of internal combustion engines shall be equipped and maintained with serviceable mufflers or other noise reducing devices of a type recommended by the manufacturer of the equipment.

105.13.00 WORKING HOURS

The contractor shall limit construction activities to the hours between 7:00 a.m. and 6:00 p.m., Monday through Friday.

If the contractor desires to perform construction work on Saturdays, Sundays, City holidays, or outside the 8-hour, regular working day, the contractor shall request of the City Engineer permission to do so, in writing, a

minimum of 72 hours prior to commencing such work. Such work shall be subject to the approval of the City Engineer. Prior to the start of such work, the contractor shall arrange with the City Engineer for inspection of the work, surveys, and tests of materials, when necessary.

Any costs outside of an 8-hour day, Monday through Friday, including billable costs by the City Engineer due to such work shall be fully paid by the contractor. The owner shall be compensated for a minimum of 8 hours per day for an inspector to monitor the work, regardless of the amount of time actually spent on the job site. Failure by the contractor to pay such costs incurred by the owner or City Engineer shall result in the costs thereof being deducted from any payment due the contractor.

The contractor shall agree, pursuant to ORS Chapter 279C.520, that no person shall be employed for more than 10 hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it. In such cases, the worker shall be paid at least time and one-half for all overtime in excess of 8 hours a day and for work performed on Saturday, Sunday, and on any legal holiday.

105.14.00 ACCESS TO THE WORK

The contractor shall provide safe access to the work for the City and any other agencies having jurisdiction in the area or in the work, including public utilities and private testing labs, for determining if the work meets the requirements and intent of the contract documents.

During all construction activities, the contractor shall provide ladders, shoring, scaffolding, and other equipment as necessary for safe, legal access to the work area. Ladders, shoring, scaffolding, and related materials shall conform to the latest revision of the OSHA regulations.

105.15.00 DEFECTIVE OR UNAUTHORIZED WORK

105.15.01 GENERAL

Work that does not conform to the requirements of the contract documents will be considered as unacceptable and/or defective.

Any unacceptable and/or defective work found to exist at any time prior to final acceptance of the work shall be immediately removed and replaced with work and materials that conform to the contract documents, or remedied otherwise in an approved manner.

This provision shall have full effect regardless of the fact that the unacceptable work may have been accomplished or the defective materials used in the presence of or with the full knowledge of the City Engineer.

105.15.02 UNAUTHORIZED WORK

Work done contrary to or beyond the lines and grades shown in the contract documents, or as directed by the City Engineer, or any other work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the contractor's sole expense.

105.15.03 RETAINING NON-CONFORMING WORK

In some instances, including deviation from specified line and grade and use of unauthorized materials, the removal and replacement of defective or non-conforming work may not be in the best interests of the City. In the event any defect in workmanship or materials is determined by the owner to be of a minor nature in that retaining such work would not affect the function or purpose of the project, or if removal of the work would cause additional damage to adjacent work or inconvenience to the public, as determined by the owner, the owner shall have the right to retain such work and to make a deduction in the contract price for the work as is determined reasonable by the owner.

The following requirements shall apply to all non-conforming work that is retained by the owner:

(1) Retaining non-conforming work shall be at the sole discretion of the City Engineer. The contractor shall have the option of accepting a deduction in contract price for the work. In the event the contractor and the City Engineer are unable to agree on the terms relative to the acceptance of non-conforming work, the contractor shall replace the work or bring the work into conformance with the contract documents.

(2) A change order shall be issued and signed by both parties for all non-conforming work that is accepted by the City Engineer. The change order shall describe the work being retained, the amount of deduction, and any revisions to the normal warranty period for the work.

(3) The method of determining the amount of the deduction shall be determined by the City Engineer.

(4) Non-conforming work that is retained by the City Engineer shall remain under warranty. The warranty period may be extended depending upon the type of work being retained and the nature of the deficiency.

(5) Non-conforming work that subsequently deteriorates to a condition that compromises the function of the work or adjacent structures shall be replaced or brought into conformance with the contract documents within the warranty period by the contractor. The contractor shall not be entitled to a refund of any deduction made for the City Engineer's acceptance of non-conforming work that was subsequently replaced or brought into conformance with the contract documents during the warranty period.

105.16.00 FINAL INSPECTION

The contractor shall notify the City Engineer in writing when all work on the project is complete and all bills, forms, or other documents required in the contract documents have been submitted. The City Engineer will make an inspection of the project and project records within 14 days of receipt of said notice. If, during such inspection, all construction work on the project is complete and acceptable in every respect and all bills, forms, or other documents required in the contract documents have been properly submitted, such inspection shall constitute the final inspection.

If, during the inspection, incomplete or defective work is discovered, project documentation is incomplete or submitted incorrectly, or the project is not ready for final inspection, the City Engineer will provide the contractor with a written notification listing the work yet to be done. The contractor shall remedy incomplete or defective work and submit any required documentation prior to requesting final inspection.

106 CONTROL OF MATERIALS

106.01.00 PREFERENCE FOR USE OF OREGON PRODUCTS

Preference may be given to services, articles, or materials produced or manufactured in Oregon if price, fitness, availability, and quality are otherwise equal. These provisions do not apply to contracts on projects financed wholly or in part by federal funds.

106.02.00 QUALITY OF MATERIALS

The contractor shall use new materials and equipment that conform to specified requirements in the contract documents. Approved materials and products that become unsuitable or unacceptable for use, regardless of cause, will be rejected by the City Engineer and shall not be used. Any material rejected by the City Engineer shall be removed at once from the job site by the contractor at the expense of the contractor.

106.03.00 SAMPLING AND TESTING

Tests of materials may be required by the owner in accordance with methods described or designated in the contract documents at any time during the production, fabrication, preparation, and use of the materials.

The owner reserves the right to require the contractor to take samples and to have products tested for compliance with pertinent requirements without regard to prior certification of the products by the manufacturer.

When such tests of materials are required, collection of samples and subsequent testing shall be made by and at the expense of the contractor. The contractor shall withhold from use the materials represented by the samples until tests have been made and the materials found equal to requirements of the contract documents. No claim will be allowed for any delay caused by collection of samples, testing, or awaiting test results.

In the absence of any reference specification, it shall be understood that such materials shall meet the specifications and requirements of the ASTM, or the AASHTO. When there is no pertinent coverage under the ASTM or AASHTO, the material concerned shall meet specifications and requirements of applicable

Commercial Standards of the Commodity Standards Division of the U.S. Department of Commerce. Lacking such coverage, materials shall meet requirements established by a reputable industry standard for a high-quality product of the kind involved.

If testing indicates evidence of noncompliance with the specified requirements, the contractor shall correct the deficiency and conduct additional testing, at the contractor's sole expense, as necessary or as directed by the City Engineer to assure that the materials or the performance of the work continues to meet the specified requirements.

Testing shall be performed by or handled through a testing laboratory approved by the owner.

106.04.00 CERTIFICATION

For commercial products, inclusive of industry standardized products, in lieu of normal sampling and testing procedures by the contractor and owner, the City Engineer may accept from contractor two copies of the manufacturer's certification with respect to the product involved, under conditions set forth as follows:

(1) Certification shall state that the named product conforms to owner's requirements and that representative samples thereof have been sampled and tested as specified.

(2) Certification shall either be accompanied with a certified copy of test results or shall certify that such test results are on file with the manufacturer and will be furnished to City Engineer upon request.

(3) Certification shall give the name and address of the manufacturer and the independent testing agency and the date of tests and shall set forth the means of identification that will permit field determination of the product delivered to the project as being the product covered by the certification.

(4) Owner will not be responsible for any costs of certification or for any costs of the sampling and testing of products in connection therewith.

No materials that require certification shall be allowed on the job site unless the materials have been certified by the manufacturer and such certification accepted by the City Engineer.

106.05.00 TRADE NAMES, APPROVED EQUALS, OR SUBSTITUTIONS

In order to establish a basis of expected quality, specific materials, including manufacturing processes, construction practices, or types of equipment may be specified in the contract documents by description and/or trade name. Whenever designated in the contract documents, it shall be understood that these materials are not to be substituted with other materials unless approved by the City Engineer prior to the intended use of the substitute in the work. It is not the intent of these specifications to exclude other processes, practices, materials, or equipment of verifiable merit for use in the work. If, after the contract is executed, the contractor desires to furnish materials other than those specified, pertinent documentation and testing information for a material substitution shall be submitted at least 10 days in advance of its use in the work. Information submitted with the request shall be such that the City Engineer can determine whether the substitution is in compliance with the existing specification and comparable to the named brand. Materials delivered to the job site that are not listed in the contract documents as being acceptable or that have not received prior written approval of the City Engineer will be rejected for use in the work.

If the proposal includes a description of a process, a type of equipment, or materials for which contractor must name a supplier or manufacturer at time of submission of the bid, no substitutions will be permitted after a proposal has been accepted without the express written consent of the City Engineer.

The contractor shall assume full responsibility for all expenses involved in making any required changes in the contract documents to accommodate a substitution approved by the City Engineer for the convenience of contractor or to accommodate an unforeseen difficulty in obtaining a specified article.

106.06.00 STORAGE AND PROTECTION OF MATERIALS

The contractor shall store materials in a manner that will 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. Approved portions of the

right-of-way may be used for storage purposes, including contractor's equipment, but any additional space required therefore shall be provided at contractor's expense.

107 LEGAL RELATIONS AND RESPONSIBILITIES

107.01.00 LAWS AND REGULATIONS

It shall be the responsibility of the contractor to be fully informed of, and comply with, all applicable federal, state, and local laws, ordinances, and other regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority that may affect, in any manner, those engaged in the work or which in any way affects the conduct of the work. The contractor shall protect and indemnify owner and owner's representatives against any claim or liability arising from or based on the violation of any such law, ordinance, or regulation, order, or decree, whether by contractor, employees, subcontractors, suppliers of materials or services, or others engaged by the contractor.

The statutes of the state of Oregon for public works contracts, specifically but not exclusively ORS Chapter 279A through 279C, as amended or superseded, including the latest additions and revisions, are incorporated by reference as part of the contract documents.

107.02.00 SUBCONTRACTORS

No part of the work shall be transferred or subcontracted without the prior written consent of the owner, and no such consent shall release the contractor from any obligation to the owner or to persons employed by the subcontractors or to those supplying materials to the subcontractors.

107.03.00 NO WAIVER OF LEGAL RIGHTS

Owner shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after completion and acceptance of work or payment therefore, from showing the true amount and character of work performed and materials furnished by the contractor, or from showing that any such measurement, estimate, or certificate is untrue or incorrectly made, or that work or materials do not conform in fact to the contract. Owner shall not be precluded or estopped, notwithstanding such measurement, estimate, or certificate, or payment in accordance therewith, from recovering from the contractor and sureties such damages as it may sustain by reason of the contractor's failure to comply with terms of the contract, or from enforcing compliance with the contract. Neither acceptance by owner, or by any representative or agent of the owner, of the whole or any part of the work, nor any extension of time, nor any possession taken by owner, nor any payment for all or any part of the project, shall operate as a waiver of any portion of the contract or of any power herein reserved, or any right to damages herein provided. A waiver of any breach of the contract shall not be held to be a waiver of any other subsequent breach.

107.04.00 OTHER CONTRACTS

Owner will have the right to let other contracts "in coordination" with this contract. The contractor shall cooperate with and provide such other contractors reasonable opportunity for access to the work site, for storage of materials, and for execution of their work. In the absence of any applicable language in either contract, any matter of dispute between contractors will be decided by the City Engineer, whose decision will be binding. If any part of the work depends upon work of any such other contractor for its proper execution, the contractor shall inspect said work and promptly report in writing to the City Engineer any defects that may affect subsequent work. Failure to do so shall constitute an acceptance of such other contractor's work as acceptable for the reception and attachment of contractor's own work and equipment.

107.05.00 INSURANCE

Before the contract is executed and work begins, the contractor shall furnish to the owner a Certificate of Insurance for the coverage and limits set out below which is to be in force and applicable to the project for the duration of the contract. The issuing insurance companies must have a minimum current A.M. Best rating of A-VII or approved by the City. The Certificate must state that any insurance coverage shown cannot be suspended, voided, canceled by either party, or reduced in coverage or limits except after 30 days prior written notice has been given to the owner by certified mail.

107.05.01 COMMERCIAL GENERAL AND UMBRELLA LIABILITY INSURANCE

At all times during the contract, the contractor shall maintain Commercial General Liability and if necessary Umbrella Liability insurance with limits of not less than $2,000,000 per occurrence, $3,000,000 General Aggregate/Products or Completed Operations Aggregate. The aggregate limits shall apply on a per-project basis. Such insurance shall be written on ISO occurrence form CG 00 01 or a substitute equivalent and provide coverage for liability arising from premises, operations, independent contractors, products/completed operations, personal and adverting injury, and contractual liability for the indemnity included in this agreement. The contractor shall include the City, its officers, agents, and employees as Additional Insured on their policy by endorsement and shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to the City. The contractor shall be responsible for any deductibles or self-insured retentions contained in the coverage.

107.05.02 AUTOMOBILE AND UMBRELLA LIABILITY INSURANCE

At all times during the contract, the contractor shall maintain Automobile Liability and if necessary, Umbrella Liability insurance with limits of not less than $2,000,000 each accident. Such insurance shall cover liability arising out of any owned, non-owned, or hired automobile.

107.05.03 BUILDER'S RISK INSURANCE

The contractor shall insure the work for 100 percent of the replacement value thereof for the life of the contract against all loss or damage by fire and against all loss or damage covered by the Special Form Insurance coverage form, including theft, vandalism, and malicious mischief. The amount of the insurance may vary with the extent of the work completed but, at all times, shall be at least equal to the replace value of the amount furnished or delivered, but not yet accepted by owner. The insurance policy or policies shall be held jointly in the name of the owner and contractor as their respective interests may appear. The loss, if any, shall be made adjustable with and payable to owner as trustee for whom it may concern. Any payments made under such policy shall insure to the benefit of owner to the extent of any loss suffered by owner and to contractor as to any remaining balance, for replacement of the loss suffered. The contractor shall be responsible for all damage to the work under construction, whether from fire, water, high winds, theft, vandalism, or other cause during construction and until final completion and acceptance, even though partial payments or progress payments have been made under the contract. The contractor shall be responsible for any deductibles or self-insured retentions contained in the coverage.

107.05.04 WORKERS' COMPENSATION INSURANCE

The contractor, any subcontractors, and all employers working under the contract who are subject employers under Oregon Workers' Compensation Law ORS 656.017 are required to carry Oregon Workers' Compensation insurance coverage during this contract. The coverage provided must include at a minimum, Employers Liability limits of $1,000,000 each accident, $1,000,000 disease aggregate, and $1,000,000 disease each employee.

107.05.05 CONTRACTOR'S POLLUTION LIABILITY INSURANCE

If the project requires the removal of any hazardous materials, the contractor and any subcontractors are required to carry a Contractor's Pollution Liability Insurance policy with a limit of not less than $2,000,000 per incident/claim and $2,000,000 Policy Aggregate. If coverage is on a Claims-Made Basis, the policy must provide a 24-month extended reporting period.

107.06.00 ROYALTIES AND PATENTS

The contractor shall pay all royalties and license fees and save the owner free, indemnify, and defend owner from all loss or damage that may result from the wrongful or unauthorized use of any patented article or process.

107.07.00 PERMITS

The contractor shall keep fully informed of and comply with all federal, state, county, and local permit requirements applicable to the work specified in the contract documents. The contractor shall protect and indemnify the owner and its officers and agents against any claim or liability arising from or based on the violation of any such laws, ordinances, or regulations.

Permanent easements and right-of-ways necessary to the project will be obtained by the owner. Temporary working easements, licenses, and permits of entry shall be obtained by the contractor.

Building permits and similar permits required by the City of Albany in its regulatory capacity shall be obtained by and at contractor's sole expense. Other permits, licenses, and like fees related to the work and required by federal, state, county, or other agencies shall be obtained by and at contractor's sole expense.

107.08.00 WAGE RATES

Pursuant to ORS Chapter 279C.800 to 279C.870, the contractor shall pay minimum prevailing wages for work performed hereunder equal to the minimum prevailing wages on file in the office of the Commissioner of the Bureau of Labor and Industries applicable to the City of Albany, Oregon, area as of the date of advertisement for bids for each project.

107.09.00 EMPLOYER'S CONTRACT FOR MEDICAL CARE OF EMPLOYEES

The contractor shall make payment promptly, as due, to any person, co-partnership, association, or corporation, furnishing medical, surgical, and hospital care, or other needed care and attention incident to sickness or injury to employees of all sums that have been agreed to be paid for such services and all monies and sums which: (1) May or shall be deducted from the wages of employees for such services pursuant to the terms of ORS Chapter 655 and any contract entered into pursuant thereto; or, (2) are collected or deducted from the wages of employees pursuant to any law, contract, or agreement for the purpose of providing or paying for such service.

107.10.00 PAYMENT OF OBLIGATIONS

The contractor shall make payment promptly, as due, to all persons supplying labor or materials for the prosecution of work under the contract. The contractor shall not permit any lien or claim to be filed or prosecuted against the owner on account of any labor or material furnished. The contractor shall pay to the State Tax Commission all sums withheld from employees pursuant to ORS Chapters 315 or 316.

Failure to make prompt payment of any claim when due for labor or services supplied for the prosecution of work under the contract, including labor or material supplied to subcontractors, may necessitate owner paying such claim to the person furnishing the labor or services and charge the amount of payment against funds due or to become due contractor by reason of the contract. Such payment shall not relieve the contractor or the surety from their obligation with respect to any unpaid claims.

107.11.00 PROTECTION OF OTHER GOVERNMENTAL AUTHORITIES

Whenever work under the contract affects or may affect public property owned by or under the jurisdiction of any governmental authority, agency, or district, including governmental subdivision other than the owner, the contractor shall indemnify and save harmless such governmental authority, its officers, agents, and employees from any loss, damage, or claim of loss or damage to such property or the use thereof, arising from work under the contract. The contractor shall supply any bond or insurance and make any special guarantee deposit required by such governmental authority before beginning any portion of the work that affects or may affect the property of such governmental authority or the use thereof.

107.12.00 LABOR COMPLIANCE

Attention is directed to provisions of ORS Chapter 659 relative to unlawful employment practices and discrimination by employers against any employee or applicant for employment because of race, religion, color, sex, or national origin. Particular reference is made to ORS 659A.030, that states that it is an unlawful employment practice for an employer, because of the race, religion, color, sex, national origin, marital status or age if the individual is 18 years of age or older or because of the race, religion, color, sex, national origin, marital status or age of any other person with whom the individual associates, or because of a juvenile record, that has been expunged pursuant to ORS 419A.260 and 419A.262, of any individual, to refuse to hire or employ or to bar or discharge from employment such individual or to discriminate against such individual in compensation or in terms, conditions, or privileges of employment.

In the event the contract is funded in whole or in part by federal funds, the contractor shall comply with all provisions of Executive Order No. 11246 and of the rules, regulations, and relevant orders of the Secretary of Labor.

In the event of the contractor's noncompliance with the nondiscrimination clauses of a contract so funded, or with any such rules, regulations, or orders, the contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further government contracts or federally-assisted construction contracts, in accordance with procedures authorized in Executive Order No. 11246; and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 or by rule, regulation, or order of the Secretary of Labor or as otherwise provided by law.

107.13.00 RAILROAD CROSSINGS OR RIGHT-OF-WAYS

Specific requirements for projects that involve the crossing of any railroad line or encroachment on any railroad right-of-way will be outlined in the contract documents.

107.14.00 RIGHT-OF-WAYS, 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 contract documents, unless arrangements are made with adjacent private property owner(s). Prior to the use of any 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, file with the City Engineer a release from all damages, signed by the property owner(s).

The contractor shall not unreasonably encumber the specified work areas with materials and equipment. The contractor shall obtain and bear the cost of permits for special occupancy and use of the specified work areas from the proper agencies.

107.15.00 WARRANTY

The contractor shall make all necessary repairs and replacements to remedy, in a manner satisfactory to the City Engineer and at no cost to the owner, any and all defects in the work occurring within one year following the date of final acceptance of the work that are the result of defective or unauthorized materials and/or faulty workmanship. The warranty period and the contractor's obligation shall also apply to damage or disturbances to existing improvements and real property when such damage or disturbance is directly or indirectly caused, in whole or in part, by activities of the contractor in performing the duties and obligations under the contract.

When such defects or damage occur within the time period described heretofore to any part of the work done under the contract or to any existing improvements or real property adjacent to the work, the contractor shall repair or remedy the defect and the one-year maintenance period required shall be extended one year from the date of completion of such repair, with relation to such required repair.

Warranty periods for plantings, including street trees, are subject to additional establishment and warranty requirements as identified in 107.15.02.

107.15.01 WATER WORKS PROJECTS

The timely completion of warranty repairs on water works projects is especially critical since the failure of any component may adversely affect numerous water users or may cause extensive damage.

After receiving either written or verbal notification from the City, the contractor shall complete warranty repairs within the time period specified in that notification. The time period specified to complete a warranty repair will be dictated by the urgency of the problem as determined by the City Engineer.

Should the contractor not cause repairs to be made within the specified time, the City may undertake to make the necessary repairs and bill the contractor for the actual cost of the work.

107.15.02 WARRANTY PERIOD FOR PLANTINGS

The establishment and warranty periods for plantings shall be two years and shall be initiated upon the City's final acceptance of the work.

107.15.02A STREET TREES

The contractor shall provide a warranty for the vibrant and healthy survival of 100 percent of the trees through a two-year establishment period. The contractor shall replace trees that have died, are dying, or

are not demonstrating vibrant and healthy growth, as determined by the City, immediately upon discovery by the contractor or direction from the City Engineer within the warranty period. The warranty period shall be extended to provide a two-year establishment period for those trees which are replaced, beginning from the date of replacement. Section 210 of these standards identifies requirements during the establishment and warranty period for street trees.

107.15.02B PLANTS AND SHRUBS

The contractor shall provide a warranty for the vibrant and healthy survival of 100% of the plants and shrubs through a two-year establishment period. The contractor shall replace plants and shrubs that have died, are dying, or are not demonstrating vibrant and healthy growth, as determined by the City, immediately upon discovery by the contractor or direction from the City Engineer within the warranty period. At the end of the two year establishment and warranty period, if 15 percent of the plantings have required replacement an additional two-year warranty will be provided. Subsequent warranty periods will be required until 85 percent survival over the two-year warranty period has been achieved. Division 6 of these standards identifies requirements during the establishment and warranty period for post-construction stormwater quality facilities.

107.15.03 WARRANTY GUARANTEE

The contractor shall provide a financial instrument as a warranty guarantee in the amount of 100 percent of the contract amount. Acceptable instruments for the warranty guarantee are as follows:

(1) A warranty guarantee incorporated with the performance guarantee.

(2) A warranty maintenance bond.

(3) Cash deposit with the City.

107.16.00 PUBLIC SAFETY AND CONVENIENCE

The contractor shall conduct operations with proper regard for the safety and convenience of the public and shall limit travel over public ways only to the extent necessary to perform the work in accordance with the contract documents.

When the project is located within or involves the use of public ways, the contractor shall provide adequate traffic control and a means of free access to all fire hydrants and private, public, and commercial property at all times, except during stages of construction when, as determined by the City Engineer, it is impractical to perform construction and maintain access simultaneously.

The contractor shall provide adequate barricades of an approved type that can be seen from a reasonable distance at all open excavations and obstructions. At night, all open excavations and obstructions shall be marked by lights.

The contractor shall observe all safety instructions received from City Engineer or governmental authorities, but following of such instructions shall not relieve contractor from any responsibility or liability for accidents to workers or damage or injury to person or property.

Emergency traffic such as police, fire, and disaster units shall be provided reasonable access to and through the work area at all times. The contractor shall be liable for any damages that may result from failure to provide such reasonable access or failure to notify the appropriate authority.

107.17.00 PUBLIC HEALTH

The contractor shall provide and maintain enclosed toilets for the use of employees engaged in the work. These accommodations shall be maintained in a neat and sanitary condition. They shall also comply with all applicable laws, ordinances, and regulations pertaining to the public health and sanitation including ORS Chapter 654 and the Oregon Occupational Safety and Health Code. The contractor shall be responsible for all costs related to meeting these requirements.

Sewage flows in existing facilities shall not be interrupted. Should the contractor be required to disrupt existing sewer facilities, for any reason, the sewage shall be conveyed in closed conduits and disposed of in a

sanitary sewer system, or transported to an approved disposal site in equipment designed for that purpose. Transporting and disposal of sewage shall be in conformance with all applicable state and local regulations.

Sewage shall not be discharged into or allowed to flow in storm drains, trenches, creeks, ditches, and similar drainage ways. Sewage spills or accumulations shall be cleaned up promptly.

The contractor shall protect all existing water distribution systems during the course of the work. Appropriate precautions shall be taken to prevent contamination when repairing damaged water lines.

107.18.00 USE OF EXPLOSIVES

Explosives used to facilitate excavation shall be fresh, stable material manufactured to the standards of the Institute of Makers of Explosives and shall conform to applicable requirements of ORS Chapters 476 and 480.

Persons actually engaged in the handling and use of explosives shall be licensed by the state for such work.

The use of explosives anywhere within the City limits, regardless of location, shall require the express written permission of the owner.

107.19.00 VERMIN CONTROL

At the time of occupancy by owner, any structure or structures entirely constructed under the contract shall be free of rodents, insects, vermin, or pests. The contractor shall arrange and pay for extermination work as may be necessary as part of the contract work within the contract time. 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 resulting from extermination operations.

107.20.00 PERSONAL SAFETY

The contractor shall be responsible for conditions on the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to the applicable federal, state, county, and local laws, ordinances, and codes. Where any of these regulations are in conflict, the more stringent regulation shall apply.

The duty of the City Engineer to conduct construction review of the contractor's performance does not include review of the adequacy or legality of the contractor's safety measures.

107.21.00 CONDUCT OF CONTRACTOR'S EMPLOYEES

The contractor shall immediately remove from the job for its duration any laborer, workman, mechanic, foreman, superintendent, or other person employed by the contractor who, by the City Engineer, is found to be incompetent, intemperate, troublesome, disorderly, or otherwise objectionable or who fails or refuses to perform the work properly and acceptably.

108 PROSECUTION AND PROGRESS OF WORK

108.01.00 PRECONSTRUCTION CONFERENCE

The contractor shall meet with the City Engineer for a preconstruction conference at a time established by the owner to discuss items of work, coordination of the work, or other business relating to the project. The contractor shall submit, when required, a construction schedule prior to the preconstruction conference.

108.01.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

The contractor shall submit in writing, before starting work, a proposed construction schedule to the City Engineer. If it is desirable to carry on operations in more than one location simultaneously, the contractor shall submit a schedule for each location two weeks in advance of beginning such operations. In the event that the contractor's proposed construction schedule does not meet the necessary construction schedule as determined by owner, the contractor shall resubmit a schedule that conforms as approved. Construction schedules shall be updated by the contractor on a weekly basis or as necessary to represent the current status of the work and show how the work will be back on schedule.

The schedule shall show the proposed order of work and indicate the time required for completion of the major items of work. This working schedule shall take into account the passage or handling of traffic with the least practicable interference therewith and the orderly, timely, and efficient prosecution of work. It will also be used as an indication of the sequence of the major construction operations and as a check on the progress of work, but does not become a part of the contract.

108.02.00 NOTICE TO PROCEED

Written notice to proceed will be given after the contract has been executed and the performance bond and all required insurances have been filed with and approved by the owner. The notice to proceed date shall establish the date for commencement of the contract time. Work under the contract shall not begin until such written notice has been given.

Notice to proceed may be delayed by owner until required utility relocation, construction, or reconstruction has been completed or has progressed to a satisfactory degree of conformance that will allow initial contract work to commence.

108.03.00 CONTRACT TIME

Contract time shall commence from the date of the notice to proceed.

The work outlined in the drawings and special provisions shall be fully completed within the number of days specified in the contract documents. This work shall include, but may not be limited to, construction, restoration, final testing, cleanup, and completion of any additional work requirements discovered during the final inspection. If reasonable progress is not being made, insufficient forces are being employed, inadequate equipment and methods are being used, or if progress is for any reason unduly delayed, the City Engineer may instruct the contractor in writing to increase the work force or equipment or adopt improved methods to expedite the work. Conformity to the City Engineer's instructions shall not relieve the contractor of any responsibilities under the contract.

The owner, however, may grant extensions of time to the extent it finds reasonable and justified when the delay is due solely to causes beyond the control of the contractor and without any fault or negligence or participation by the contractor.

108.04.00 SUSPENSION OF WORK

The work may be suspended in whole or in part when the City Engineer determines that such a suspension is in the best interests of the owner. The contractor shall comply immediately with any verbal or written notice of the City Engineer suspending work. Verbal orders suspending work will be followed, as soon as is practical, with a written notice.

Such suspensions may be "without cause," where the owner assumes responsibility for certain costs associated with the suspension or "with cause," where the owner places liability for the costs of the suspension with the contractor.

108.04.01 SUSPENSION BY OWNER, WITHOUT CAUSE

The City Engineer may suspend work, without cause, when such suspension is deemed to be in the best interests of the owner, the public, the work, or for other reasons beyond the control of the contractor. The contractor shall temporarily suspend work on the project, wholly or in part, when directed to do so by the City Engineer.

In the event of such suspension without cause, the City Engineer shall give the contractor three days' notice of suspension. Work shall be resumed within five days after notice has been given by the City Engineer to the contractor to do so. The owner shall allow the contractor an extension of time for project completion corresponding to the total period of temporary suspension, as measured from the date and time a notice to suspend work is issued to the date and time a notice to resume work is issued, and shall reimburse contractor for necessary rental of unused equipment, services of security patrols, and other unavoidable expenses accruing by reason of a suspension without cause.

The contractor shall not be entitled to damages, intangible or overhead costs, or anticipated profits as a result of a suspension without cause.

108.04.02 SUSPENSION FOR CAUSE

The City Engineer may suspend work, with cause, on the project, wholly or in part, if the contractor fails to: (1) Correct unsafe conditions for working personnel, the general public, or owner's employees; (2) carry out provisions of the contract documents; (3) immediately correct defective and unacceptable work; (4) carry out orders or directives the City Engineer may deem necessary due to conditions considered unsuitable for the performance of the work; or (5) for other reasons deemed by the City Engineer to be in the public's best interest and within the control of the contractor.

108.04.03 VOLUNTARY SUSPENSION BY CONTRACTOR

There shall be no voluntary suspension or slowing of the contractor's operations without prior written approval of the City Engineer and, if approved, such approval will not relieve contractor from any responsibility to complete the contract work within the prescribed contract time. Should operations be discontinued, the contractor shall notify the City Engineer at least two working days in advance of resuming operations.

108.04.04 RESPONSIBILITY OF CONTRACTOR

Voluntary or involuntary suspension or slowdown of contractor's operations, 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, labor costs, or extra compensation. No allowance or compensation will be made on account of such suspensions of work except as provided herein.

At the commencement of and during any suspension of the work, the contractor shall be responsible for the care of work performed and shall take every precaution to prevent any damage or deterioration of the work. The contractor shall be responsible for all of the work, including temporary traffic control devices to warn, protect, and guide traffic during a suspension of work, the same as though the contractor's operations had been continuous and without interference.

The contractor shall be responsible for all costs for providing appropriate traffic control, maintenance, and protection of the work during any suspension of work.

108.04.05 RESUMPTION OF WORK

In all cases of suspension, work shall be resumed only upon verbal or written order by the City Engineer. Verbal orders ordering or authorizing a resumption of work will be followed, as soon as is practical, with a written order.

108.05.00 CONTRACT TIME EXTENSIONS

Contract completion time may be subject to adjustment during the progress of the work at the written request of the contractor for causes beyond the control of the contractor, that could not have been foreseen by the contractor, and that the City Engineer determines actually affected the time necessary for completion of work under the contract.

Contractor's request for adjustment of contract time shall be in writing and shall be accompanied by the written consent to such extension by the surety on the bond if the extension is accumulatively in excess of 25 percent of the time allowed in the original contract. The request must include the following as minimum information:

(1) Cause of delay

(2) Type of work affected (e.g., grading, paving, etc.)

(3) Date and time of start of delay

(4) Total duration of delay in days and hours

(5) Date and time of termination of delay

Owner or City Engineer will not consider adjustment of contract time based on a shortage or inadequacy of labor and equipment, negligence or fault on the part of the contractor, or other deficiencies or lacks that are within the contractor's control or responsibility. Causes that will be given consideration in justifying adjustment of contract time will include, but are not limited to, the following:

(1) Errors, changes, or omissions in the contract documents

(2) Failure of owner, its representatives, and its other contractors to act promptly in carrying out obligations and duties

(3) Failure of owner to submit the contract and bond form to the contractor for execution within the specified time

(4) Performance of extra work

(5) Court orders enjoining the prosecution of the project

(6) An act of the owner, its representatives, and its other contractors that is not authorized by the contract or permitted by law

(7) Strikes affecting the contractor's material, equipment, labor, or access requirements

(8) Acts of God that shall include unusual action of the elements not reasonably foreseeable

Adverse weather conditions will be considered as a basis of claim for additional time only if weather conditions were abnormal for the period of time and could not have been reasonably anticipated and weather conditions had an adverse effect on the scheduled construction.

A contract time extension will be considered only if the contractor has given written notice to owner of the cause of delay within 10 days after the beginning thereof and notice to owner of the termination thereof within five days after such termination and makes claim for such extension prior to the contract completion date. The decision by owner of the reasonable term of any extension or denial thereof shall be final.

An adjustment of contract time as herein provided shall be contractor's sole remedy for any delay in completion of the project arising from causes beyond the control of contractor and, in no event, shall contractor be entitled to collect or recover any damages, losses, or expenses incurred by reason of such delay.

108.06.00 LIQUIDATED DAMAGES

Time shall be considered the essence of the contract. If contractor fails to complete the project or to deliver the supplies or perform the services within the time specified in the contract or any extension thereof by owner, the actual damage to owner for the delay will be substantial but will be difficult or impractical to determine.

It is agreed, therefore, that the contractor shall pay to the owner, not as a penalty but as liquidated damages, a per diem amount as calculated from the table below. This amount, or modified amount thereof as given in the special provisions of the contract, shall be applied for every day elapsed in excess of the contract time or the final adjusted contract time applicable to the work required under the contract.

Contract Value in Dollars	Liquidated Damages per Day
0-50,000	$150
50,000 – 100,000	$300
100,000 – 500,000	$600
500,000 - 1,000,000	$700
1,000,000 - 2,000,000	$800
2,000,000 - 5,000,000	$1,100
5,000,000 +	$1,200

Assessment of liquidated damages shall continue until such time as all work has been fully completed, including, but not necessarily limited to, construction, restoration, final testing, cleanup, and completion of any additional work requirements discovered during the final inspection. Assessment of liquidated damages may be stopped, temporarily discontinued and restarted, or waived, in part or whole, at the discretion of the City Engineer.

Permitting contractor to continue and finish the work or any part thereof after the contract time or adjusted contract time has expired, as pertinent, shall in no way operate as a waiver on the part of owner or any of its rights under the contract.

Payment of liquidated damages shall not release contractor from obligations in respect to the fulfillment of the entire contract, nor shall the payment of such liquidated damages constitute a waiver of owner's right to collect any additional damages that may be sustained by failure of contractor to carry out the terms of the contract, it being the intent of the parties that said liquidated damages be full and complete payment only for failure of contractor to complete the work on time.

108.07.00 CONTRACTOR'S REPRESENTATIVE

Prior to starting work, contractor must provide written designation of an authorized representative who, in the absence of contractor, shall have complete authority to represent contractor in all respects.

The contractor, or authorized representative, shall supervise the work, shall be present on site continually during its progress, and shall keep a complete copy of the drawings and specifications on or near the site at all times.

If contractor, or authorized representative, is not present on any part of the work where it may be necessary to give communications, notice of non-conformance may be given by City Engineer to the superintendent or foreman who may have charge of that particular part of the project, and such notice shall be received and followed. Such communications shall not be deemed to change the status of contractor or subcontractor, nor to make owner an employer, nor to give owner responsibility for the methods and manner of the work. Such communications of major importance will be confirmed in writing. Any communications will be so confirmed in each case on written request from the contractor.

108.08.00 CONFLICTS, ERRORS, OMISSIONS, AND ADDITIONAL DRAWINGS

The contractor shall review thoroughly all contract documents prior to construction and notify City Engineer of any discrepancies, omissions, or conflicts in order to permit correction by City Engineer.

The contractor shall furnish labor and materials required for the work if indicated in one part of the contract documents and not the other as fully as if mentioned or indicated in all places. Should any work or materials be reasonably required or intended for carrying the project to completion that are inadvertently omitted in the contract documents, contractor shall furnish same as fully as if particularly delineated or described.

The intent of the contract documents is to show and describe a complete project within the limits stated. Dimensions and elevations shown on the drawings shall be followed, rather than scale measurements. Whenever it appears that the contract documents do not contain sufficiently detailed or explicit information, the City Engineer may furnish additional written information and the contractor shall perform the work in accordance with these additional details or instructions.

108.09.00 OWNER'S RIGHT TO DO WORK

In neglecting to prosecute the project properly, or by failing or refusing to perform any of the terms or conditions of the contract, the contractor shall permit the owner to supply or correct any deficiency or defect without prejudice to any other remedy. Such action by owner shall be taken only after three days' notice by the City Engineer to the contractor and contractor's surety unless, in the judgment of the City Engineer, an emergency or danger to the work or to the public exists; in which event, the City Engineer may take action as set forth above without any notice whatsoever.

The cost of such action by owner will be deducted from any payment due contractor. The contractor shall pay owner any costs in excess of such payment due.

108.10.00 TERMINATION OF CONTRACT

All terms and conditions of the contract are considered material, and failure by contractor to comply with any of said terms or conditions shall be deemed a breach of contract, at owner's option. Upon such failure, owner shall have the right, whether an alternative right is provided or not, to declare the contract terminated. Issuance by owner of an order stating that the contract is terminated, and service of a copy of said order upon contractor and contractor's surety, shall be deemed a complete termination of the contract. Upon the contract being so terminated, owner may retain all sums due under the contract and both the contractor and contractor's sureties shall be liable under the bond for all losses, expenses, and damages caused to owner by reason of the contractor's failure to complete the contract; and surety shall be required, at owner's option, to complete the

project. Notwithstanding such termination, contractor and contractor's sureties shall remain liable under the terms of the contract for work performed prior to such termination. The City Engineer, subject to owner's approval, will determine the payment due contractor for work performed prior to the date of contract termination.

108.11.00 DEFAULT BY CONTRACTOR

If contractor fails to begin work as required by the contract; or if contractor should be adjudged bankrupt or make a general assignment for the benefit of creditors or a receiver is appointed on account of insolvency; or, if at any time when work has been resumed after a suspension of work, contractor refuses, neglects, or fails to correct the deficiency(s) or reason(s) for the suspension; or if contractor abandons the work, owner may give written notice of default to contractor and contractor's surety, and contractor shall discontinue or not begin the work, and any or all payments due to or that may become due to contractor may be withheld by owner until the completion by owner, surety, or another person of all work included in the contract and until expiration of any maintenance and/or warranty period.

After service on contractor of such order to desist from work or part thereof, or notice of termination, owner may take possession of the project or such designated part thereof, and may use all or any part of contractor's plant, tools, equipment, materials, or other property on the project, none of which shall be removed by contractor as long as they may be required for the work, and owner may, by contract or otherwise, provide supervision of workmen, materials, appliances, and equipment necessary for the completion of, and may complete the project or such designated part thereof. The expense so incurred for completion of the project or part thereof, together with all damages, liquidated or otherwise sustained or to be sustained by owner, shall be deducted from the fund or appropriation set aside for the purpose of the contract and shall be charged to contractor as if paid to same. In case the amount of such expenses and damages exceeds the sum that would have been payable under the contract if completed entirely by contractor, the amount of such excess shall be paid to owner by contractor and both contractor and sureties shall be liable to owner therefore; in case the amount of such expenses and damages shall be less than the sum that would have been payable under the contract if completed entirely by contractor, contractor shall be entitled only to payment in accordance with contract terms for the work contractor actually performed, subject however, to all terms of said contract.

The contractor shall complete all work unless an order to desist as provided above has been received and cooperate with and in no way hinder or interfere with forces employed by owner or others.

Upon completion of the project by others, the contractor shall be entitled to the return of all material that has not been used in the work or that has not been paid for and for all plant, tools, equipment, and other property; provided, however, that no claim will be allowed because of usual and ordinary depreciation, loss, wear, and tear.

None of the foregoing provisions shall be construed to require owner to complete the work nor to waive or in any way limit or modify the provisions of the contract relating to the fixed and liquidated damages suffered by owner on account of the failure of contractor to complete the project within the time prescribed.

108.12.00 COMPLETION AND ACCEPTANCE

After completion of all items of work in the contract and completion of final inspection, the City Engineer will recommend to owner that the work be accepted, and final payment be made.

Final acceptance of work completed under the contract will be made by the approval of the final payment by the owner.

109 MEASUREMENT AND PAYMENT

109.01.00 MEASUREMENT OF QUANTITIES

Payments will be based on measurements of completed work in accordance with the United States Standard Measures. Basis is defined as the particular standard unit of measurement that will be applied to a particular item of work as shown in the proposal for a specific contract.

Units of measurement for payment will be as shown or specified. City Engineer will make measurements at no cost to contractor. In calculating quantities, lengths and areas will be based on horizontal and vertical measurements unless otherwise specified.

Volume of materials measured in the vehicles by which they are transported will require computing of the volume of the vehicle to the nearest 0.1 cubic yard for its approved capacity and identification of the vehicle and its capacity. Pay quantities will be determined by vehicle measurement at point of delivery with no allowance for settlement of material during transit. Loads shall be level and uniform. Payment will not be made for material in excess of the approved capacity of the vehicle and deductions will be made for loads below approved capacity.

Volumes of concrete and masonry in structures will be measured according to neat lines as shown on the contract documents or as altered on order of the City Engineer.

Volumes of earthwork, particularly excavation and fill, will be computed by the average-end area method or by other methods of equivalent accuracy.

When payment for materials other than bituminous cements is on a weight basis and unless otherwise set forth in the contract documents under which material is to be furnished, pay quantities will be determined by weighing material on weigh scales provided by the contractor as set forth hereafter. Such weighing is to be of material in the hauling vehicle as loaded for delivery. Determination of tare weights and weight of loaded vehicles will be to the nearest 20 pounds. Tare weights will be determined by weighing empty vehicles at intervals of such frequency as the City Engineer deems necessary to ensure accuracy of pay load weights.

Portland cement will be measured by the pound, hundredweight, ton, sack, bag, or barrel. The term "barrel of cement" will mean 376 pounds, avoirdupois, of cement. The terms "sack" and "bag" of cement will each mean 94 pounds, avoirdupois, of cement.

Quantities of asphalt cements, liquid asphalt materials, and other bituminous cements normally shipped in tank cars or tank trucks, when they are to be paid for by the gallon (U.S. Standard) or by the ton, will be determined from volume computations of the materials when at a temperature of 60° F, with standard recognized correction factors applied when the materials are measured at any temperature other than 60° F. Net certified scale weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When bituminous materials are shipped by truck or transport, net certified weights or volume, subject to correction for loss or foaming, may be used for computing quantities.

Weights of metals and of metallic coating will be determined on the basis set forth in the contract documents under which their use is required.

When the contract calls for materials that are to be measured by weighing on scales, the contractor shall provide suitable scales and transport materials to scales at no expense to the owner. Before use of scales is commenced, and as frequently thereafter as the City Engineer may deem necessary to ensure accuracy, the contractor shall have the scales examined by an official of the State Sealer of Weights and Measures, and bear all costs resulting there from. The contractor shall be responsible for maintaining the scales in accurate condition at all times.

The contractor shall furnish and so locate scales that the amount of hauling involved in the delivering of materials is no greater than if no weighing were required; if not, the contractor shall bear expense of whatever extra hauling is required. If hauling of materials is to be paid for as a separate pay item, the pay distance shall be via the approved route and no allowance will be made for extra hauling required to reach the scales.

If material is weighed on public scales, the City Engineer will be present at all times to witness the weighing and to check and compile records of scale weights.

109.02.00 SCOPE OF PAYMENT

Quantities listed in the proposal do not govern final payment. Payments to the contractor will be made only for actual quantities of contract items performed in accordance with terms of the contract and for items of work actually performed as extra work or under supplemental agreement in accordance with the terms of the contract.

The contractor shall accept the compensation, as herein provided, as full payment for furnishing all materials, labor, equipment, and incidentals necessary for performing all work under the contract and for all loss, damage, or liability arising from the nature of the work or from the action of the elements or from any unforeseen difficulties that may be encountered during prosecution of the work, until expiration of the warranty period.

109.03.00 PAYMENT FOR CHANGES INITIATED BY THE OWNER

109.03.01 CONTRACT UNIT PRICES

If a change is ordered in an item of work covered by a contract unit price, and such change does not involve a substantial change in the character of the work from that shown in the contract documents, an adjustment in payment will be made based upon the increase or decrease in quantity and the contract unit price. Any increase or decrease of more than 25 percent in the quantity of any major contract item requires the execution of a supplemental agreement acceptable to both parties. A major contract item is any item for which the contract price amounts to 10 percent or more of the total contract cost as determined by the original proposed quantities and contract unit prices.

If a change is ordered in an item of work covered by a contract unit price, and such change does involve a substantial change in the character of the work from that shown in the contract documents, an adjustment in payment will be made as specified herein.

Adjustments in payments for changes other than those specified herein will be determined by agreement between contractor and owner. If unable to reach agreement, the owner may direct the contractor to proceed on the basis of extra work.

109.03.02 STIPULATED UNIT PRICES

Stipulated unit prices are those established by the owner in the contract documents, as distinguished from contract unit prices submitted by the contractor. Stipulated unit prices may be used for the adjustment of contract changes.

109.04.00 ELIMINATED ITEMS

City Engineer will have the right to eliminate, omit, or cancel (herein collectively termed elimination) portions of the contract documents relating to construction of any item or part of any item therein by payment to the contractor of a fair and equitable amount covering all items of actual cost incurred directly in connection with eliminated work and prior to the date of elimination of work by order of the City Engineer. When practicable, work completed before elimination will be paid for at unit prices; otherwise, contractor will be allowed a profit percentage on materials used and construction work actually performed at rates as provided for force account work; but no allowance will be made for anticipated profits. Acceptable materials ordered by contractor, delivered on the work, or properly stored at sites approved by the City Engineer prior to date of elimination of work by order of City Engineer may be purchased from contractor by owner at actual cost and, thereupon, will become the property of owner.

109.05.00 PAYMENT FOR EXTRA WORK

The contractor shall perform extra work at prices agreed upon between contractor and owner, but in no event exceeding unit prices established in the contract. When such order pertains to work of a class or classes for which no unit prices are established, the agreed adjustment will be based either on unit prices decided on fair and equitable grounds or will be a lump sum similarly decided, as owner may determine, or such work may be done as extra work at force account. The contractor shall not make any claim for extra work unless ordered as such.

109.06.00 PAYMENT FOR FORCE ACCOUNT WORK

109.06.01 GENERAL

The contractor shall include all claims for force account work in progress estimates submitted to the City Engineer. Such claims shall show hours of all equipment use, and names and number of each worker employed thereon, date and number of hours so employed, character of work each is doing, and wages paid or to be paid.

Also, the claim shall identify all materials, show dates of delivery, quantities, and net amounts paid or to be paid, together with receipted invoices.

When work is performed on a force account basis by an authorized subcontractor, the contractor will be allowed a supplemental markup of five percent on each force account order.

109.06.02 PERCENTAGE ALLOWANCE OVER ACTUAL COST

When extra work is ordered to be done on a force account basis, such work will be paid for on the basis of cost plus certain percentage allowances.

The percentage allowances made to the contractor shall be reimbursement and compensation for all supervision, use of small equipment, overhead expense, bond cost, insurance premiums, profits, indirect costs, and losses of all kinds, and all other items of cost not specifically designated herein as items for which payment is to be made, whether the services, costs, and other items involved are furnished or incurred by contractor or by subcontractor. No other reimbursement, compensation, or payment will be made for any such services, costs, or other items.

Items of cost for which payment will be made and to which payment will be restricted, together with the percentage allowance applicable to the respective items, are as follows:

Items of Cost for Which Payment Will be Made	Percentage Allowance Additional to Actual Cost
LABOR, including time of foreman, while engaged directly upon force account work	20%
MATERIALS and supplies actually used on the force account work	15%
EQUIPMENT rental on each piece of equipment having a purchase value in excess of $300, provided the rental rate does not exceed the current rates established below	5%
INSURANCE contribution made by the employer for Industrial Accident Fund under terms of the Workers' Compensation Act	20%
INSURANCE contributions made by the employer under the Unemployment Compensation Act and under the Social Security Act for old age insurance	20%

109.06.03 LABOR

Payment for labor used in the work will be computed at the prevailing rates established by the Oregon Department of Labor, plus additional allowance set forth above. Time allowed shall be the number of hours worked directly on force account operations.

109.06.04 MATERIALS

Payment for materials and supplies used on force account work will be computed at prices billed to contractor by the supplier, less all discounts plus additional allowance set forth herein. Freight will be considered a part of the cost of materials and supplies and will be paid for as materials and supplies. Materials and supplies produced by contractor will be paid for at prices agreed upon between contractor and City Engineer.

The owner reserves the right to furnish such materials as the owner deems necessary to take advantage of any available cost savings or to establish the cost of such materials at the lowest current price at that said materials are available in the quantities concerned, delivered to the location of the work.

109.06.05 EQUIPMENT RENTAL

Rental rates for contractor's equipment will be based on the current edition of the "Rental Rate Blue Book for Construction Equipment" and the "Rental Rate Blue Book for Older Construction Equipment" that are published by the Equipment Guidebook Company, 2800 W. Bayshore Road, Palo Alto, CA 94303. The hourly rates for the contractor's equipment will be determined by dividing the weekly rate by 40 hours and not the

hourly rates as indicated in the publications listed above. Equipment for the force account work shall be paid for at this calculated hourly rate until the equipment is used for a week or a month and then, at that time, the appropriate weekly or monthly rate would apply. For the use of equipment not listed in said document, the rental rates shall be as agreed in writing between the contractor and the City Engineer prior to use of said unlisted equipment. Reference copies of the above publications are on file at the office of the Oregon Department of Transportation Region Engineer and area offices of the Associated General Contractors of America.

Rental on equipment not owned by the contractor will be computed at the rates actually paid by contractor, supported with an invoice, plus the allocable allowance set forth herein. The contractor shall obtain prior written approval of the City Engineer for rental rates higher than scheduled rates for non-owned equipment.

When equipment is ordered on standby status by the City Engineer, the rate for the standby equipment will be paid at one-third of the appropriate hourly rate as established herein. Standby rates that are calculated at less than $1.00 per hour will not be paid. Payment will be limited to not more than eight hours in a 24-hour day or 40 hours in a normal work week.

When a piece of equipment and operators thereof are hired, rented, or furnished as a unit, the additional percentage to be allowed shall be five percent; and contractor shall not be entitled to 20 percent on the time of operators of such equipment. Neither shall contractor be entitled to payment for contributions made under terms of the Workers' Compensation Act, Unemployment Compensation Act, or Social Security Act to cover the time of these operators.

For equipment rented on a daily or hourly basis, rental cost will be allowed for only those days or hours during which the equipment is in actual use. For equipment rented on a monthly basis, straight-time rental cost will be allowed from the day equipment is first used on the particular piece of force account work until and including the last day on which it is used on the particular work, excluding, however, time the equipment is used on other work during the period, and further excluding time that the equipment is idle for a continuous period of more than six days.

Rental costs allowed for equipment shall include all costs, and no further allowances will be made for those items unless specific agreement is made in writing before the work is commenced. Individual pieces of equipment having a purchase value of $300 or less will be considered small equipment, and no rental will be allowed on such.

109.07.00 PROGRESS PAYMENTS AND RETAINAGE

Payments for all work under the contract will be made at the price or prices bid therefore, and those prices will include full compensation for all incidental work.

109.07.01 PROGRESS PAYMENTS

Before the fifth of the following month, the contractor shall make a progress estimate of work performed in any calendar month, through the last day of the month, and submit to the City Engineer for approval. These estimates shall include value of labor performed and materials incorporated in the work since commencing work under the contract. Such estimates need not be made by strict measurements and may be approximate only, may relate to the cost schedule mentioned herein, and shall be based on the whole amount of money that will become due according to the terms of the contract when the project has been completed.

If the contract cost is determined, in whole or in part, on a lump-sum basis, the contractor shall prepare an estimated cost schedule relating thereto and shall have the City Engineer approve the same before commencing work; progress estimates based on said estimated cost schedule shall be the basis for progress payments.

If contract cost is determined wholly on a unit basis, City Engineer may use unit prices bid by contractor in making progress estimates on the work. In case said unit prices do not, in the opinion of the City Engineer, truly represent actual relative costs of different parts of work, a percentage of the unit price may be used in making progress estimates.

Progress payments will be issued by owner on a monthly basis within 20 days from the contractor's submitted estimate of work performed, as approved by City Engineer; except that 30 days may be required when a payment is accompanied by one or more of the following: an extension of completion time, a change order, or

extra bill. Negotiable warrants will be issued by owner for the amount of the approved estimate, less five percent retainage.

If contractor fails to complete the project within the time limit fixed in the contract or any extension thereof, no estimate may be accepted or progress or other payments allowed thereafter until the project is completed.

The making of progress payments shall, under no circumstances, be construed as an acceptance of any of the work or materials under the contract.

When the progress estimate indicates that the progress payment would be less than $500, no progress payment will be made for that estimate period.

109.07.02 RETAINAGE

Of each progress payment total, five percent retainage will be withheld and retained by owner until it is included in and paid to contractor as part of the final payment of the contract amount. Securities in lieu of retainage will be accepted, or if contractor elects, retainage as accumulated may be deposited by owner in an interest-bearing account in a bank, savings bank, trust company or savings association pursuant to ORS Chapter 279C.560 for progress payments. The withholding of retainage throughout the course of the project will be according to ORS 279C.550 through 279C.570.

109.08.00 DEFERMENT OF PAYMENTS

No partial or final payment will be made until all communications made by City Engineer to contractor in accordance with the specifications are complied with, nor until all claims or liens filed or prosecuted against owner, its officers, or employees contrary to provisions of the contract are satisfied.

In the event a complaint or charge of unlawful employment practices pursuant to the provisions of ORS Chapter 659A is filed against the contractor by anyone, including the owner, and the Commissioner of Labor issues a cease and desist order as defined in ORS Chapter 659A.820 through 659A.865, no further payments will be made on the contract until such time as all of the provisions of the cease and desist order have been complied with by contractor.

109.09.00 FINAL ESTIMATE AND PAYMENT

Pursuant to ORS Chapter 279C.570, the contractor shall notify the City Engineer when work is considered complete and City Engineer will either accept the work or, within 15 days after receiving notice, notify contractor of work yet to be performed on the contract. If accepted, City Engineer will so notify contractor, make a final estimate, and recommend acceptance of the work as of a certain date. Upon approval and acceptance by owner, contractor will be paid a total payment equal to the amount due under the contract, including all retainage.

Before final payment is made under the contract, the contractor shall supply and file with the City Engineer a statement in writing that complies with ORS Chapter 279C.845 and, under oath as heretofore set forth, certify the hourly rate of wage paid each nonexempt classification of worker employed by contractor upon such project. The contractor shall require each subcontractor who performed work on the project to file with the City Engineer a similar statement that covers its workers.

If a nonresident contractor, the contractor shall provide owner with evidence that provisions of ORS Chapter 279A.120 have been satisfied; this is a prerequisite to final payment.

As a further prerequisite to final payment, the contractor shall execute and deliver to owner, in form approved by the City Attorney, a receipt for all amounts paid or payable to contractor under the contract and a release and waiver of all claim against owner growing out of or connected with the contract and furnish satisfactory evidence that all amounts due for labor, materials, and other obligations under the contract have been fully and finally settled or are fully covered by insurance protecting owner, its officers, agents, and employees as well as contractor.

If owner declares a default of the contract, and the surety completes said contract, all payments after declaration of default and retainages held by owner will be paid to surety and not to contractor in accordance with terms of the contract.

109.10.00 ACCEPTANCE OF FINAL PAYMENT

Acceptance by contractor of final payment shall release owner and City Engineer as agent of owner from all claims and all liability to contractor for all things done or furnished in connection with the work and every act of owner and others relating to or arising out of the work. However, no payment, final or otherwise, shall operate to release contractor or sureties from obligations under the contract and the performance, payment, and other bonds and warranties as herein provided.

**** END OF DIVISION ****

DIVISION 2 – GENERAL TECHNICAL REQUIREMENTS

DIVISION 2 – GENERAL TECHNICAL REQUIREMENTS

201 MOBILIZATION

201.01.00 DESCRIPTION

Mobilization is the work necessary to move sufficient personnel, materials, and equipment onto the job site to commence construction.

201.02.00 CONSTRUCTION

The contractor shall mobilize personnel, materials, and equipment and set up construction facilities within designated or approved areas.

201.03.00 MEASUREMENT AND PAYMENT

201.03.01 LUMP-SUM BASIS

When mobilization is listed as a separate pay item on the proposal, it will be paid for on a lump-sum basis. Progress payments for mobilization will be equal to the percentage of total work completed and accepted by the City.

201.03.02 INCIDENTAL BASIS

When not listed in the proposal, mobilization costs will be considered incidental to other work and no separate payment will be made.

202 TEMPORARY TRAFFIC CONTROL

202.01.00 MATERIALS AND APPLICABLE REGULATIONS

The term "traffic control devices" shall include barricades, detour and warning signs, traffic delineators, flagpersons, and any other devices or personnel of whatever nature or function that are necessary to conduct construction operations in a manner that will protect the public and offer the least possible obstruction and inconvenience to motorists and pedestrians.

Traffic control devices and their application to the work shall conform to the most recent edition of:

Manual on Uniform Traffic Control Devices (MUTCD), published by the U.S. Department of Transportation; Oregon supplements to the MUTCD published by the Oregon Department of Transportation; and *Oregon Temporary Traffic Control Handbook*, published by the Oregon Department of Transportation.

Traffic control devices shall be clean and free of stains, excessive wear, or other damage as determined by the City Engineer.

202.02.00 CONSTRUCTION

The fabrication, application, and maintenance of traffic control devices shall conform to provisions in the contract documents and to applicable sections of the MUTCD.

The contractor shall place, relocate, or remove traffic control devices as often as necessary to reflect changing road and traffic conditions. No construction shall commence or continue without required traffic control devices located as required by the contract documents or the MUTCD.

During construction at any location, additional traffic control devices and flagpersons shall be used as necessary, or as directed by the City Engineer, to isolate the portion of public right-of-way under construction and to advise motorists or pedestrians of available detours.

When, in the judgment of the City Engineer, vehicular parking is a hazard to through-traffic or to the work, the contractor shall furnish and place "NO PARKING" signs on any street that is directly involved in the construction work.

202.02.01 ACCESS TO PUBLIC AND PRIVATE PROPERTY

When access to private, public, or commercial property will be denied or impaired, the contractor shall give agencies providing emergency services and occupants of affected properties advance notice of such restricted access in accordance with applicable requirements in Section 105 CONTROL OF WORK.

For commercial properties, in addition to required notifications, the contractor shall provide and maintain appropriate signing to advise potential customers and commercial traffic of alternate routes to the property.

202.02.02 DETOURS

The contractor shall construct and maintain temporary detours for protection of the work and the safe passage of traffic around the work area as required in the contract documents, the MUTCD, or as directed by the City Engineer.

When detours are not available, the contractor shall confine operations to a width that provides for safe passage of traffic. If, in the judgment of the City Engineer, one-way piloted traffic is necessary, the contractor shall provide at least two flagpersons to control traffic, one flagperson being stationed at each end of the roadway being limited to restricted use, and furnish a pilot car and driver to lead traffic. At the end of each day, the project area shall be left in such condition that it can be traveled without damage to the work and without danger to pedestrians and motor vehicle traffic.

202.02.03 NONCOMPLIANCE WITH SPECIFIED REQUIREMENTS

Partial compliance or failure on the part of the contractor to provide and maintain temporary traffic control as specified in the contract documents, or as directed by the City Engineer, will result in a suspension of work or a reduction in payment for traffic control, or both, until such time the contractor is in compliance with specified requirements.

In situations involving an immediate hazard to traffic, the City Engineer may, at his/her discretion, have the necessary traffic control established by others with the costs thereof deducted from any payment due the contractor.

202.03.00 MEASUREMENT AND PAYMENT

202.03.01 LUMP-SUM BASIS

When listed in the proposal as a separate pay item, payment for temporary traffic control will be made on a lump-sum basis and shall include the provision, fabrication, installation, placement, and maintenance of all traffic control devices used during the course of the work.

Payment for this bid item will include compensation for additional traffic control, including access signing for commercial or other properties, not called for in the contract documents but required by the MUTCD or as directed by the City Engineer as a result of unforeseen circumstances affecting the protection of the work or the public, and no additional payment will be made.

Progress payments for temporary traffic control will be equal to the percentage of total work completed and accepted by the City.

202.03.02 INCIDENTAL BASIS

When not listed in the proposal for separate payment, temporary traffic control shall conform to provisions of Section 202 TEMPORARY TRAFFIC CONTROL and will be considered incidental to other work and no separate payment will be made.

203 CLEARING AND GRUBBING

203.01.00 DEFINITION

Clearing and grubbing is work necessary to remove and dispose of debris and vegetation within the designated limits and to protect structures, objects, and vegetation that are designated to remain in place.

203.02.00 MATERIALS

203.02.01 EXPLOSIVES

Explosives shall be supplied, stored, and used in conformance with Subsection 107.18.00 USE OF EXPLOSIVES.

203.03.00 CONSTRUCTION

Trees, shrubs, plant growth, sod, topsoil, and organic earth shall be removed within designated areas. The work area shall be cleared above and below the natural ground surface of all debris and other objectionable materials. Tree stumps shall be completely removed to a depth not less than 24 inches below any subgrade within the designated excavation area.

Grass and sod on areas to be occupied by fills shall be removed to a depth not less than 18 inches below subgrade or the slope surface on which the fill is to be constructed.

Mail boxes in the work area shall be temporarily relocated to allow clearing and excavation as well as easy access by mail carriers and residents. Upon completion of excavation, mail boxes shall be permanently restored to original locations or as specified in the contract documents.

203.03.01 PROTECTION OF EXISTING SITE FEATURES

203.03.01A TREES AND VEGETATION

Trees, shrubs, and other vegetation not designated for removal shall be protected from damage caused by the work. The contractor shall provide construction fencing or other resources approved by the Engineer to visibly define the limits of work. Construction activities shall not occur within the preserved areas defined by the limits of work delineators. Construction fencing and other delineators shall not be placed within the dripline of trees being preserved. The contractor shall cut and remove trees and branches only where approved by the City Engineer. When directed by the City Engineer, the contractor shall remove additional branches to provide a balanced appearance of any tree.

203.03.02 SALVAGEABLE MATERIALS

Owners of property adjacent to the work shall have salvage rights to plants, trees, shrubs, fences and other improvements in the right-of-way.

Owner reserves the right to merchantable timber as designated in the contract documents and as marked at the project site by the City Engineer. Designated merchantable timber shall be cut, trimmed, and handled as directed in the contract documents. Contractor shall assume ownership and remove and dispose of all other timber and waste materials.

203.04.00 MEASUREMENT AND PAYMENT

203.04.01 LUMP-SUM BASIS

When shown in the proposal, payment for clearing and grubbing will be made on a lump-sum basis for all clearing and grubbing within the limits specified in the contract documents and as herein before described.

Progress payments for clearing and grubbing will be equal to the percentage of work completed under this bid item.

203.04.02 INCIDENTAL BASIS

When not listed in the proposal, clearing and grubbing will be considered incidental to other work and no separate payment will be made.

204 EXCAVATION, BACKFILL, AND OTHER SITE WORK

204.01.00 DEFINITIONS

204.01.01 UNCLASSIFIED EXCAVATION
Excavation, regardless of type, nature, or condition of materials encountered, unless separately designated. The contractor shall assume full responsibility to estimate the kind and extent of various materials to be encountered in order to accomplish the work.

204.01.02 TRENCH EXCAVATION
Excavation encountered in the trench to the depths and widths as shown and shall be considered unclassified excavation.

204.01.03 BORROW MATERIAL
Material obtained from sources lying outside of, separated from, or independent of planned excavation occurring within the project limits.

204.01.04 FILL
The furnishing, placing, and compacting of specified materials to the depth and configuration specified in the contract documents.

204.01.05 FOUNDATION STABILIZATION
The removal of unsuitable material in the bottom of an excavation and replacement with specified material for support of a roadbed, pipe, structure, or appurtenances thereto.

204.01.06 PIPE BEDDING
Material supplied and placed under and partially around the pipe in accordance with the appropriate standard detail.

204.01.07 PIPE ZONE
The full width of trench from subgrade to a point 10 inches above the top outside surface of the barrel of pipe.

204.01.08 TRENCH BACKFILL
Material supplied and placed in the trench between the pipe zone and the base course for surface improvements or restoration.

204.01.09 BASE COURSE
Material supplied and placed between the trench backfill and the bottom of pavement surface or other structures constructed over the trench.

204.01.10 OVERBREAK
Any material that is excavated, displaced, or loosened outside and beyond slopes, lines, or grades as staked or reestablished, regardless of whether overbreak is due to blasting, to inherent character of any formation encountered, or to any other cause.

204.02.00 MATERIALS

204.02.01 BORROW AND FILL MATERIALS
Fill and borrow materials shall be of a type specified in the contract documents. Generally, fill and borrow material shall be bank-run or river-run gravel, or crushed aggregate depending upon the intended application. Fill materials shall be free of organic matter, clay, or other materials or conditions detrimental to construction of firm, dense, and sound fills.

204.02.02 FOUNDATION STABILIZATION

Foundation stabilization materials shall conform to requirements of Subsection 205.03.03 FOUNDATION STABILIZATION MATERIAL.

204.02.03 PIPE ZONE MATERIAL

Bedding and backfill in the pipe zone for the installation of rigid and flexible pipes and conduits shall conform to applicable requirements in Subsection 205.03.02 TRENCH BACKFILL.

204.02.04 NATIVE BACKFILL MATERIAL

Native backfill material shall not be used unless such material is specified in the contract documents or approved by the City Engineer.

Native material excavated from within limits of the project and imported native-type materials shall be free of organic matter, clay, or other materials or conditions detrimental to meeting specified compaction requirements.

Maximum particle size for trench backfill shall not exceed four inches in any dimension.

204.02.05 SELECT BACKFILL MATERIAL

Materials for select backfill shall conform to applicable requirements in Subsection 205.03.02 TRENCH BACKFILL.

204.02.06 TOPSOIL

Imported topsoil shall be used. The contractor shall provide natural, fertile, friable topsoil, representative of local productive soil that is free of rocks, clay, or other foreign matter. Topsoil shall have a pH of 5.0 to 7.0, and not less than three percent humus as determined by loss on ignition of moisture-free samples dried at 100° C. Topsoil shall be free of noxious vegetation and their seeds. Should such regenerative material be present in the soil, resultant growth, both surface and root, shall be removed and replaced to original specifications at the contractor's expense within one year of acceptance of the work.

Existing topsoil may be reused only where specified in the contract documents or authorized by the City Engineer.

204.02.07 EXPLOSIVES

Explosives shall be supplied, stored, and used in conformance with Subsection 107.18.00 USE OF EXPLOSIVES.

204.03.00 GENERAL CONDITIONS

204.03.01 CONSTRUCTION STAKING

The contractor shall give notice to the City Engineer not less than three working days in advance of when City-provided survey services will be required in connection with any portion of the work.

The City Engineer will furnish and set construction stakes or marks establishing appropriate offset lines and grades as determined necessary for work under the contract. The contractor shall be responsible for the transfer of the lines and grade to the work. The City Engineer will not transfer the offset lines or grades for trenching operations, into the work area for any phases of street construction, to batterboards, or any other point within the work.

The contractor shall preserve construction stakes and marks for the duration of their usefulness during construction.

Upon completion, all work shall conform to the lines, elevations, and grades referenced by construction staking established by the City Engineer.

204.03.01A REPLACEMENT OF CONSTRUCTION STAKES AND MARKS

Disturbed, damaged, or lost construction stakes and marks will be replaced or restored by the City Engineer.

If any construction stakes or marks are disturbed, damaged, or lost through negligence of the contractor, and in the judgment of the City Engineer need to be replaced, the actual replacement cost of the construction stake or marker will be deducted from payments due the contractor.

204.03.02 PROTECTION OF SURVEY MARKERS AND MONUMENTS

The contractor shall notify the City Engineer not less than three working days prior to starting work of precautions the contractor will take to ensure the preservation of survey monuments, property pins, bench marks, and other permanent survey markers. Permanent survey markers shall not be disturbed without the consent of the City Engineer. Where permanent survey markers are at risk of construction related damage, the contractor, at the contractor's expense, shall provide and maintain appropriate protection for the marker in a manner approved by the City Engineer.

204.03.02A REPLACEMENT OF SURVEY MARKERS AND MONUMENTS

The contractor shall bear the expense of restoring or replacing any permanent survey markers and monuments that are disturbed without consent of the City Engineer.

Restoration or replacement of permanent survey markers and monuments will be performed by the City. The actual cost to replace or restore survey markers or monuments will be deducted from payments due the contractor.

204.03.03 PROTECTION OF PROPERTY

The contractor shall protect all public and private property, insofar as it may be endangered by operations and shall take every reasonable precaution to avoid damage to such property. The contractor shall at all times protect surface waters from the introduction of eroded sediments or other pollutants resulting directly or indirectly from any aspect of the work.

The contractor shall be responsible for the restoration or replacement of any public or private improvement, facility, or structure that is visibly evident or correctly shown in the contract documents and is damaged directly or indirectly by any act, omission, or neglect in the execution of the work. The contractor shall restore to a condition equivalent to that existing before such damage occurred, by repairing, rebuilding, replacing, or otherwise effecting restoration thereof. Costs associated with such restoration work shall be borne by the contractor.

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 that are designated for removal or which might be destroyed or damaged by work operations.

The contractor shall protect designated trees and planted areas within the right-of-way or easements. The contractor shall exercise care and conduct operations to minimize damages to other planted areas.

204.03.04 EXISTING UTILITIES AND IMPROVEMENTS

204.03.04A LOCATION OF UTILITIES

The approximate location of known underground utilities and other structures expected to be adjacent to or encountered in the work are shown in the contract documents. The information shown is not guaranteed to be precise and complete. Data previously gathered in connection with other public improvements may not be included in the utility information presented.

204.03.04B EXCAVATION

The contractor shall conduct operations in such a manner that existing streets, surface and subsurface utilities, railroad tracks, structures, and other facilities that are to remain in place will not be damaged.

The contractor shall be responsible for excavating far enough ahead of the work to determine the exact location of interfering utilities or underground structures.

Hand methods shall be used for excavation that cannot be accomplished without endangering existing or new structures or other facilities. When the approximate location of subsurface structures is known, the contractor shall locate such structures by hand excavation prior to utilizing mechanical excavation equipment.

The contractor shall be responsible for costs associated with the repair of any and all damage to contract work or to any utility, whether previously known or disclosed during the work, as may be caused by contractor's operations.

204.03.04C PROTECTION AND MAINTENANCE

The contractor shall protect and maintain existing utilities until they can be relocated or altered by others. The contractor shall protect and maintain utilities that have been relocated by others until the project work has progressed through the location and the utility can be permanently set in place. Protective measures shall include the installation of cribbing, shoring, or whatever means necessary to support adjacent material containing temporary and permanent facilities, or to support the facilities themselves, and maintain such supports until no longer needed.

The contractor shall provide for the flow of sewers, storm drains, or water lines interrupted during the progress of the work and restore such utilities as directed by the City Engineer or shown in the contract documents.

The contractor shall at all times protect new and existing stormwater facilities from the introduction of eroded sediments or other pollutants resulting directly or indirectly from any aspect of the work. These facilities may include, but are not limited to waters of the state; ditches and drainage swales; curb inlets; catch basins; culverts; manholes; and storm drainage piping.

204.03.04D REPAIR OF UTILITIES DAMAGED DURING CONSTRUCTION

The contractor shall assume responsibility for the repair of utilities damaged during the course of the work. Costs associated with the repair of such damaged utilities shall be borne entirely by the contractor.

Water, storm drain, and sanitary sewer pipe shall be sawcut or removed to the nearest joint and replaced with pipe and mechanical couplers of a type specified in the appropriate section of the Standard Construction Specifications.

The contractor shall install and compact underlying backfill to the density specified herein prior to repairing the utility.

The repair of other utilities shall be as directed by the City Engineer or the owner of the utility.

204.03.04E OWNER MAINTENANCE AND REPAIR

The owner and/or representatives of other utilities shall have the right to enter upon the right-of-way and upon any structure therein for the purpose of making new installations, changes, or repairs required during the course of the work. The contractor shall conduct operations so as to provide the time needed for such work to be accomplished during the progress of the improvement. The cost of waiting or "down" time necessary to accomplish such work shall be borne entirely by the contractor.

204.03.05 SALVAGED MATERIALS

Frame and cover sets, gratings, water system components, and other reusable materials from removed or abandoned structures and systems shall remain the property of the City and shall be salvaged as directed by the City Engineer and delivered to the City's storage area by the contractor.

Other salvageable materials shall become the property of the contractor and shall be disposed of by the contractor away from the site of the work.

204.03.05A REUSE OF SALVAGED MATERIALS

Salvaged materials of any kind shall not be reused in new work without the written approval of the City Engineer.

204.03.06 GENERAL CLEANUP

The contractor shall maintain a clean and orderly appearance of the work area at all times. Maintenance shall be continuous and without further order from the City Engineer. As the work progresses, the contractor shall remove all dirt, gravel, unused construction materials, refuse, and other debris from areas open to the general public and all roadways are open to traffic.

Failure to maintain the cleanliness of the work area continuously, or at the direction of the City Engineer, will result in the City Engineer having the work done, without further notice to the contractor or the contractor's surety, and the costs thereof will be deducted from any payment due the contractor.

204.04.00 CONSTRUCTION

204.04.01 GENERAL EXCAVATION

Excavation shall include the excavation, removal, and disposal of all natural or manmade materials encountered within limits of excavation specified in the contract documents, including surface and subsurface improvements and fill materials, irrespective of nature or condition. The method of excavation used is optional. Overbreak shall be removed at the contractor's expense.

The contractor shall excavate to the depths and widths designated, allowing for forms, shoring, working space, and surface improvements. Excavation shall not be extended deeper than the elevation specified in the contract documents.

Remaining ends of abandoned pipes, or portions of other items partially removed under this work and that would be left exposed after final excavation, shall be removed to a minimum of 12 inches below the finished grade or elevation. Ends of abandoned pipes in backfill or fill areas shall be plugged with concrete.

The contractor shall notify the City Engineer prior to filling or capping any pipes that are encountered during the course of the work. The contractor shall allow the City Engineer sufficient time to determine whether such pipes should be abandoned or maintained in serviceable condition. The costs of waiting or "down" time to determine serviceability and the subsequent abandonment or repair of such pipes shall be borne by the contractor.

Suitable barricades shall be erected and maintained around all unattended, open excavations, regardless of depth. The use of steel sheets to cover excavations shall be limited to locations where there is daily, ongoing work. Other excavations shall be backfilled and temporarily resurfaced the day they are excavated.

204.04.01A OVEREXCAVATION AND FOUNDATION STABILIZATION

If, in the judgment of the City Engineer, material at the bottom of an excavation is unsuitable for supporting the structure or utility for which it was intended, the unstable material shall be removed and replaced with compacted foundation stabilization material. Geotextile fabric shall be placed to form a barrier between the existing subgrade material and the foundation stabilization material.

Voids caused by overexcavation under footings shall be filled with concrete of strength equal to that of the footing. Excavation carried below grade lines without approval of the City Engineer shall be replaced with the specified foundation stabilization material at the contractor's expense.

204.04.02 SAWCUTTING AND SURFACE REMOVAL FOR TRENCHES

Slurry, sediments, dust, and other waste created by sawcutting shall be contained within and prevented from moving beyond the immediate sawcutting work zone. The Contractor shall protect against vehicular, equipment, or pedestrian traffic that may cause tracking of the sawcutting waste material. Sawcutting waste material shall be vacuumed and removed from the site concurrently with or immediately upon completion of sawcutting operations.

Concrete and asphalt surfaces shall be cut to full depth with a pavement saw or other suitable pavement cutter prior to excavation of trenches. The method of removal shall preclude or minimize damage to pavement adjacent to the trench. Sawcutting tools shall not "overcut" beyond the extents of the pavement to be removed.

Portland cement concrete pavement, curbs, and sidewalks shall be sawcut to a minimum depth of four inches or one-half the concrete thickness, whichever is greater. During removal of concrete structures, care shall be taken not to damage adjacent concrete. Use of a jackhammer or backhoe to remove concrete shall be limited to areas isolated by sawcutting or existing cold joints. Edges that are spalled or cracked during removal of adjacent material shall be recut. The contractor shall be responsible for recutting edges damaged during surface removal and no payment will be made for additional sawcutting or surface replacement.

Width of cut shall be at least equal to the required width of trench at ground surface and shall follow lines parallel to pipe or conduit centerline. Remove loose, undermined, or damaged pavement.

When the distance between the final sawcut pavement edge and a curb, gutter, pavement edge, construction joint, or other concrete structure or improvement will be less than 24 inches, the contractor shall remove the intervening pavement and include that area in the pavement restoration. This requirement is intended to prevent subsequent settlement, displacement, or premature breakup of narrow, noncontiguous sections of pavement.

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

204.04.02A REMOVAL AND REPLACEMENT OF EXISTING TOPSOIL

Existing topsoil shall be reused only when specified in the contract documents or approved by the City Engineer. When specified or approved for reuse, existing topsoil shall be removed to a depth of at least 18 inches for the full width of the trench to be excavated. Topsoil shall be stockpiled within the construction easement and not mixed with other excavated materials. Topsoil shall be protected from weather conditions or other situations that may render the topsoil unsuitable for reuse. Stockpiled topsoil shall be placed in the top of the backfilled trench to the depth removed and lightly compacted.

Finished grade of topsoil shall conform to the area adjacent to the trench. Damage to adjacent topsoil caused by work operations shall be repaired. Rock, gravel, clay, and any other foreign materials shall be removed from the surface of the ground, the area regraded, and additional topsoil added as required.

204.04.03 TRENCH EXCAVATION AND SHORING

The contractor shall excavate the trench to the lines and grades specified in the contract documents with proper allowance for pipe thickness, pipe bedding, and foundation stabilization.

The subgrade upon which bedding is to be placed shall be firm, undisturbed, and true to grade. If the trench is overexcavated, the proper grade shall be restored with approved material at the contractor's expense. The material shall be placed over the full width of the trench in compacted layers to established grade.

Length of trench excavated in advance of the pipe laying shall be kept to a minimum, and in no case shall it exceed 100 feet unless authorized by the City Engineer.

Suitable barricades shall be erected and maintained around unattended, open excavations, regardless of depth. The use of steel sheets to cover excavations shall be limited to locations where there is daily, ongoing work. Other excavations shall be backfilled and temporarily resurfaced the day they are excavated.

204.04.03A TRENCHING MACHINES

Trenching machines, earth saws, and other similar types of equipment designed to excavate trenches that are less than 12 inches in width shall not be used unless the use of such equipment is specified in the contract documents or approved by the City Engineer.

204.04.03B TRENCH WIDTH

The trench width at the ground surface shall be limited to a width that will preclude the possibility of damage to adjacent structures or property. The contractor shall confine the top width of the trench to

dedicated rights-of-way or construction easements. Trenches shall be of sufficient width to allow for shoring and permit proper joining of pipe and compaction of the backfill material along sides of the pipe.

Minimum trench width of sheeted and unsheeted trenches shall be such that a clear working space of at least six inches on each side of the outside diameter of the pipe bell is maintained.

Trench width at the top of pipe shall be limited to a width that will preclude the possibility of damage to the pipe in the form of increased loads or damage to adjacent structures. If the maximum trench width for a given class of pipe, as recommended by the pipe manufacturer, is exceeded by the contractor, the contractor shall provide pipe of a higher strength designation, a higher class of bedding, or both, as approved by the City Engineer.

The excavation for manholes and other structures shall be made wide enough to provide a minimum of 12 inches between the sides of structure and the sides of the excavation.

204.04.03C SHEETING AND SHORING OF TRENCHES

During trenching operations, the contractor shall provide ladders, bracing, sheeting, shoring, and other equipment and materials as necessary to protect adjacent earth banks and structures, property, personnel working in the excavation, and the public.

Sheeting shall be installed and secured such that the bottom edges of the sheets are positioned and maintained above the top of the bedding. Sheeting and shoring shall be maintained until pipe has been placed and backfilled through the pipe zone. Sheeting and shoring shall be removed as backfilling is accomplished, in a manner that will not damage the pipe or permit voids in the backfill.

When using a moveable trench shield or box and similar types of equipment, the sides of the trench at the bottom of the excavation shall be formed such that the bottom edges of the trench shield will be supported above the top of the bedding. Trench boxes shall be placed and moved in a manner that will preclude the possibility of displacing or disturbing the bedding under the pipe.

Ladders, sheeting, shoring, trench boxes, and related materials and equipment shall conform to the latest revision of the Occupational Safety and Health Administration (OSHA) regulations governing the equipment and the application of the equipment to the particular work being undertaken.

204.04.04 PIPE ZONE MATERIAL

Bedding shall be installed in conformance with the appropriate standard detail. Bedding shall be considered to include full width of excavated trench from the bottom of trench, or the top of any required foundation stabilization material, to the top of bedding.

Bedding material shall be spread smoothly to proper grade so that the pipe is uniformly supported along the barrel.

Bedding shall be fully compacted before placement of pipe or concrete cradle and shall provide a firm, unyielding support along the entire pipe length.

Bell holes shall be formed in the bedding at each joint to permit proper assembly and inspection of the entire joint.

Attention shall be given to the area from the flow line to the horizontal centerline of the pipe to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of pipe zone. The remainder of the pipe zone material shall be carefully placed and compacted around the pipe in six-inch layers. Care shall be taken to prevent lateral or upward movement of the pipe during placement and compaction of pipe zone material.

In the absence of a specific requirement, granular foundation bedding shall be used with all flexible and rigid conduits. Concrete cradle bedding shall be used only when specified in the contract documents or by the City Engineer.

204.04.04A CONCRETE CRADLE BEDDING

Concrete cradle bedding consists of a pipe cradle of portland cement concrete as specified on the appropriate standard detail. Concrete shall be placed in such a manner that no dirt or foreign material becomes mixed with the concrete. Concrete shall be allowed sufficient time to reach initial set before overlying backfill material is compacted.

204.04.04B GRANULAR FOUNDATION BEDDING

Granular foundation bedding consists of leveling the bottom of trench or top of foundation material and placing pipe bedding material to the horizontal centerline of pipe.

Bedding material shall be placed in at least two lifts. The first lift shall be placed to the minimum depth shown on the appropriate standard detail before pipe is installed. Subsequent lifts of not more than six-inch thickness shall be placed up to the horizontal centerline of the pipe. The lifts shall be brought up together on both sides of pipe and carefully worked under pipe haunches by slicing with a shovel. Care shall be taken to preclude upward movement of the pipe during placement and compaction of the bedding material in this area.

204.04.05 TRENCH BACKFILL

When backfill is placed mechanically, the backfill material shall be pushed onto the slope of the backfill previously placed and allowed to slide down into the trench. Native backfill shall not be pushed into the trench in such a way as to permit free fall of the material until at least two feet of cover is provided over the top of the pipe. Under no circumstances shall sharp or heavy pieces of material be allowed to drop directly onto the pipe or the tamped material around the pipe. Backfill material containing consolidated masses larger than four inches in any dimension shall not be used in the work.

204.04.05A SELECT BACKFILL

The trench shall be backfilled above the pipe zone and to within eight feet of the surface with compacted, imported, granular backfill material of a type specified in the contract documents.

The top eight feet of the trench shall be backfilled with compacted 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate.

204.04.05B NATIVE BACKFILL

Where called for in the contract documents, the trench above the pipe zone and to within 18 inches of the surface, shall be backfilled with excavated trench material. Native backfill material shall be temporarily stored only within the construction easement, right-of-way, or specified working area. The material shall be stored in such a manner that it will cause a minimum of inconvenience to the public and will permit free access to all fire hydrants, water valves, meters, and mailboxes and will leave adequate clearance for the free flow of storm water in gutters, conduits, and natural watercourses.

The contractor shall estimate and install sufficient native backfill material so that, after normal settlement, the finished surface will meet the existing grade. The contractor shall neatly windrow the material over the trench and remove all excess. Any excess or shortage of backfill material that becomes apparent after settlement and within the warranty period shall be corrected by regrading, disposing of excess material, or adding additional material where required. Rocks larger than two inches in any dimension shall be removed from the upper eight inches of the backfill.

The contractor shall take reasonable precautions to prevent excavated native material designated to be used for backfill from becoming unsuitable for reuse as a result of contractor's operations. If native material becomes unsuitable for reuse due to the contractor's operations, as determined by the City Engineer, the backfill shall be replaced with imported native type materials or granular material at the contractor's expenses.

In areas where topsoil existed or is required, the top 18 inches of trench shall be backfilled with native or imported topsoil. Topsoil, regardless of source, shall meet minimum requirements in Subsection 204.02.06. Topsoil shall be lightly compacted to resist settlement.

204.04.05C WATER COURSE UNDERCROSSINGS

The type of backfill material, dimensions, and installation requirements will be specified in the contract documents.

204.04.06 SURFACE MAINTENANCE OF TRENCHES AND OTHER EXCAVATIONS

Loose rock and debris shall be removed daily from the roadway, sidewalks, driveways, pedestrian crossings, and other areas accessible by the public.

Areas exposed to the movement of vehicular traffic and construction equipment shall be washed or treated with water as often as necessary to control dust.

Backfilled trenches and other excavations shall be maintained on a daily basis in conformance with the following requirements:

204.04.06A GRAVELED AREAS

In graveled areas, 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate shall be placed on all trenches and excavations and maintained level with adjacent, existing surfaces.

Crushed gravel and/or crushed aggregate shall conform to requirements in Subsection 205.03.01 AGGREGATE BASE.

204.04.06B IMPROVED SURFACES

In paved areas, cold mix asphalt shall be placed immediately after backfill operations on all trenches and excavations that are exposed to the movement of traffic and on trenches and excavations, regardless of location, that are located in intersections. Cold mix asphalt shall be placed in conformance with Section 208 RESURFACING.

In sidewalks and driveways, 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate shall be placed over all trenches and excavations and maintained level with existing surfaces until final surface restoration.

Crushed gravel and/or crushed aggregate shall conform to requirements in Subsection 205.03.01 AGGREGATE BASE.

204.04.07 TEMPORARY SURFACE RESTORATION

The contractor shall temporarily restore and maintain the construction area such that not more than a combined total of 800 linear feet of unrestored trench surface or other excavation exists at any given time. Temporary restoration shall be performed to the extent necessary to permit the area to be returned to normal public use pending final restoration.

No trenches or excavations of any kind shall be left open, regardless of any precautionary safety measures that may have been taken, unless such situations are required for the contractor to conduct construction operations in conformance with the contract documents.

Loose rock and debris shall be removed from the roadway, sidewalks, driveways, and pedestrian crossings.

Trenches and other excavations shall be temporarily restored in conformance with the following requirements:

204.04.07A GRAVELED SURFACES

In graveled areas, the surfaces of backfilled trenches and other excavations shall be maintained level with the adjacent and existing grade with compacted 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate.

Crushed gravel and/or crushed aggregate shall conform to requirements in Subsection 205.03.01 AGGREGATE BASE.

204.04.07B IMPROVED SURFACES

Cold mix asphalt shall be placed, compacted, and maintained over trenches and excavations in improved surfaces within the project area, regardless of location. The cold mix asphalt shall be maintained level with the adjacent existing surface.

Cold mix asphalt shall be placed in conformance with Section 208 RESURFACING.

204.04.08 COMPACTION REQUIREMENTS

204.04.08A COMPACTION SPECIFICATIONS

Compaction specifications for materials and their various applications shall meet the minimum requirements specified herein. Minimum compaction or density requirements for materials and applications not shown will be specified in the contract documents.

TRENCH BACKFILL

Compaction requirements shall be per modified proctor test method ASTM D 1557.

Select backfill in the pipe zone shall be compacted to a minimum density equal to 90 percent of the maximum dry density. Select backfill above the pipe zone to surface grade shall be compacted to a minimum density equal to 93 percent of the maximum dry density.

Native backfill shall be compacted to a minimum density equal to 90 percent of the maximum dry density.

ROADWAY AND STRUCTURAL FOUNDATION FILL

Each lift of roadway and structural foundation fill materials shall be compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D 1557.

IMPERVIOUS BACKFILL

Materials specified in the contract documents for use as impervious backfill for water course undercrossings and other similar applications shall be compacted to a minimum of 90 percent of maximum dry density as determined by ASTM D 1557.

AGGREGATE BASES

Minimum density requirements for aggregate bases shall conform to requirements in Subsection 302.02.04 DENSITY REQUIREMENTS.

CONCRETE TREATED BASE

Minimum density requirements for concrete treated base materials shall conform to requirements in Subsection 303.02.06 DENSITY REQUIREMENTS.

ASPHALT CEMENT CONCRETE

Minimum density requirements for asphalt cement concrete shall conform to requirements in Subsection 304.02.07 DENSITY REQUIREMENTS.

PORTLAND CEMENT CONCRETE PAVEMENT AND OTHER CONCRETE STRUCTURES

Portland cement concrete with a minimum compressive strength of 4,000 psi in conformance with Subsection 205.01.02 PORTLAND CEMENT CONCRETE shall be used when a minimum compressive strength or class of concrete is not specified in the contract documents.

204.04.08B COMPACTION METHODS AND EQUIPMENT

Compaction shall be by mechanical means for all types of materials. Compaction equipment for granular materials shall be vibratory plate or vibratory drum compactors and shall be adequate to obtain the amount of compaction specified. Compaction equipment shall be operated in strict accordance with the

manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.

The contractor shall determine the method of placing lifts and the amount of effort required to meet specified compaction requirements and to prevent subsequent settlement.

For trenches, the entire trench depth shall be compacted in lifts not to exceed three feet in depth.

204.04.08C COMPACTION TESTING

Sampling and testing of materials for determination of compliance with the specified compaction requirements will be conducted by the City Engineer at any location and time as the City Engineer may determine.

Compaction testing shall be performed by a testing laboratory approved by the City Engineer. The owner will be responsible for the cost of initial testing for any given area. The contractor shall schedule compaction testing with the City Engineer a minimum of 48 hours in advance of the time of testing.

The contractor shall be responsible for excavation of the test pits and for providing and installing any shoring, ladders, or other equipment necessary to protect the testing personnel. The contractor shall also suspend operations as necessary and at no cost to the owner for the purpose of conducting such testing.

Test pits shall be excavated in the backfill by the contractor as directed by the City Engineer for the purpose of testing the backfill compaction. At the option of City Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift.

Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year warranty period will be considered to be caused by improper compaction methods and shall be corrected at the contractor's expense. Structures damaged by settlement shall be restored to their original condition by the contractor at the contractor's expense.

204.04.08D NONCOMPLIANCE WITH SPECIFIED DENSITY REQUIREMENTS

When initial compaction testing performed by the City Engineer indicates the required density has not been obtained, the contractor shall recompact or replace the backfill as necessary to meet the specified minimum density.

The contractor shall be responsible for rescheduling compaction testing with the City Engineer and shall bear all costs for subsequent retesting in the areas of noncompliance.

Costs associated with retesting and scheduling delays shall be the sole responsibility of the contractor.

204.04.09 SLOPE GRADING

Slopes shall be free of exposed roots, unstable rock, and loose stones exceeding two inches in any dimension. Tops of banks shall be shaped to circular curves with not less than a six-foot radius, unless specific site conditions, as determined by the City Engineer, make such work impractical. Surfaces shall be smoothly graded and shall blend in with existing topography.

204.04.10 DISPOSAL OF EXCESS EXCAVATED MATERIALS

Excavated materials not suitable or not required for backfill or fill shall be deposited on one or both of the following types of waste sites: (1) predesignated waste sites specified in the contract documents, and (2) waste sites that are provided by the contractor and are outside the city limits. If needed, permits will be provided by owner for dumping on sites designated in the contract documents.

Where waste sites are designated in the contract documents, the material shall be placed as directed and the site cleaned and uniformly graded to conform to existing contours upon completion of the work. The natural drainage of the site shall be maintained and under no circumstances will the site be graded such that runoff will be impounded. The contractor shall provide a waste site for the disposal of materials that are in excess of that needed for predesignated sites. Waste sites shall be operated in a manner that will meet all safety and health requirements of federal, state, and local agencies.

Excavated materials shall not be deposited on public property anywhere within the city limits unless directed to do so by the contract documents. The contractor may be liable for the cost of removing excavated materials that are placed on unauthorized locations, whether publicly or privately owned.

204.04.11 DEWATERING

The contractor shall furnish, install, operate, and maintain equipment necessary to continuously remove and dispose of all water entering the excavation during the course of the work. If required, and before construction is started, the contractor shall advise the City Engineer of the method of dewatering that will be used.

Removal and disposal of water shall be in a manner that will prevent damage to public or private property, or inconvenience to the public. Drainage of trench water through a pipeline under construction is prohibited. The contractor shall have sufficient equipment and competent personnel on hand at all times to accommodate emergencies, including power outage.

Surface runoff and ground water shall be controlled in a manner that will prevent softening of the bottom of excavations. Dewatering systems shall be designed and operated in a manner that will prevent removal of natural soils and so that ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

The contractor shall prevent disturbance of compacted backfill and flotation or movement of structures, water mains, sewers, and other utilities.

204.04.12 FILL

204.04.12A ROADWAY AND STRUCTURAL FOUNDATION FILL

Unstable material or unsuitable foundation material shall be excavated and disposed of prior to construction of fills. Basements, trenches, and holes that occur within fill limits shall be backfilled with compacted material specified in the contract documents. Cleared and grubbed ground surfaces underlying areas to be filled shall be compacted to a minimum depth of 12 inches to the density specified in the contract documents.

The contractor shall place and compact fill material in continuous horizontal layers not exceeding eight inches deep across the full width of the fill. If the surface of the prepared subgrade or the compacted surface of a preceding lift is too dry or too smooth to bond properly with the next layer of material, the surface shall be moistened or scarified, or both, before the next layer of material is placed. Slopes of fills shall be compacted.

Fill material shall not be placed when the fill material, subgrade, or previously placed fill material is frozen or has an excessive water content as determined by the City Engineer. Water settling of fills will not be permitted.

204.04.12B PIPELINE FILL

Where pipelines are to be placed within a fill area, the fill shall be constructed and compacted to a minimum depth of six feet prior to trench excavation for the pipeline.

In locations where insufficient pipe cover exists, the contractor shall place and compact native material or material specified in the contract documents over the pipe to provide a minimum cover of three feet with a slope radius as specified in the contract documents.

204.05.00 MEASUREMENT AND PAYMENT

204.05.01 UNCLASSIFIED EXCAVATION AND BACKFILL

204.05.01A UNCLASSIFIED EXCAVATION

Unclassified excavation, with the exception of trench excavation, will be measured and paid for on a cubic-yard basis. Volume of material actually removed will be determined using measurements from

established construction staking. The quantity measured for payment will include only material excavated from within the limits defined in the contract documents.

Excavation required for the volume displaced by new concrete curbs, driveways, sidewalks, steps, and pathways will be considered incidental to those items of work and no additional payment will be made for the excavation of this material.

The unit cost per cubic yard will be considered full compensation for the excavation and the disposal or temporary storage of excavated materials, removal of interfering sections of existing surface and subsurface utilities and structures, the control of ground and surface waters, the preparation and compaction of the subgrade, and all other materials, labor, and equipment of whatsoever nature that is necessary to complete the work as defined in the contract documents and to begin placement of the backfill or base materials.

204.05.01B SELECT BACKFILL

Select backfill will be measured and paid for on a cubic-yard basis. Volume of backfill will be determined using measurements from established construction staking. The quantity measured for payment will include only material supplied within the limits defined in the contract documents.

The unit cost per cubic yard shall be considered full compensation for materials, labor, and equipment necessary to provide, place, and compact the specified backfill in conformance with the contract documents.

204.05.01C NATIVE BACKFILL

Native backfill will be measured and paid for as stated in the contract documents.

204.05.02 TRENCH EXCAVATION AND BACKFILL

Measurement and payment for items of work, including trench excavation, trench backfill, pipe zone material, and incidental work is included in the unit price for the conduit or utility being installed in the trench and will be paid for in conformance with applicable provisions in Division 4 or 5, depending upon the type of construction.

204.05.02A IMPROVED SURFACE REMOVAL FOR TRENCHES

Measurement and payment for the removal of improved surfaces will be included in the unit price for the conduit or utility being installed in the trench and will be paid for in conformance with applicable provisions in Division 4 or 5, depending upon the type of construction.

204.05.03 FILL

Measurement and payment for compacted fill, in place, will be made on a cubic-yard basis. Volume of fill will be determined using measurements from established construction staking. The quantity measured for payment will include only material supplied within the limits defined in the contract documents.

The unit cost per cubic yard will constitute full compensation for all materials, labor, and equipment necessary for providing specified fill materials, whether obtained from the site of work or imported, and for placing and compacting the fill in conformance with the contract documents.

No payment will be made for additional fill required due to settlement of the subgrade, fill, or of materials within the fill or other loss, regardless of cause.

No deduction in computed volume will be made for piers, columns, pipes, or miscellaneous construction features constructed within fill limits.

204.05.04 OVEREXCAVATION AND FOUNDATION STABILIZATION

Measurement and payment for overexcavation and foundation stabilization will be made on a cubic-yard basis. Volume of foundation stabilization will be determined using measurements from established construction staking or other methods as determined by the City Engineer. The quantity measured for payment will include

only material supplied within the limits defined in the contract documents. Woven Geotextile fabric shall be incidental to this item.

Payment for this item will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish stabilization materials at the site and for placing and compacting the materials in conformance with the contract documents or as directed by the City Engineer.

204.05.05 IMPORTED TOPSOIL

Measurement and payment for imported topsoil will be made on a cubic-yard basis. Volume of imported topsoil will be determined by actual truck measure as delivered to the site. The quantity measured for payment will include only material supplied within the limits defined in the contract documents.

Payment for imported topsoil shall constitute full compensation for all work necessary to furnish materials on site, placing material, and for full compaction in place.

When not listed as a separate bid item in the contract documents, provision and installation of imported topsoil shall be considered incidental to other items of work.

204.05.06 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS

205.01.00 PORTLAND CEMENT CONCRETE PRODUCTS

205.01.01 PORTLAND CEMENT

205.01.01A TYPES

The various types of portland cement and associated properties or characteristics are as follows:

Type I	For general use when special properties of other type cements are not required.
Type IA	Air-entraining cement for same uses as Type I, where air-entrainment is required.
Type II	For use when moderate sulfate resistance or moderate heat of hydration is required.
Type IIA	Air-entraining cement for same uses as Type II, where air-entrainment is required.
Type III	For use when high, early strength is required.
Type IIIA	Air-entraining cement for same use as Type III, where air-entrainment is required.

Differing brands or types of cement, or the same brand or type of cement from different plants shall not be mixed during use nor be used alternately.

205.01.01B SPECIFICATIONS

Portland cement shall conform to AASHTO M 85 for low alkali cement except as follows:

(1) Total alkali content (sodium and potassium oxide calculated as Na20+0.658K20) shall not exceed 0.8 percent.

(2) Types I, IA, III, or IIIA must contain a maximum of 10 percent tricalcium aluminate.

(3) Time-of-setting tests shall be by either the Gillmore Test or the Vicat Test, or both, as the City Engineer may elect.

205.01.01C APPLICATIONS

High, early strength concrete (Type III cement) shall be used when patching trenches in portland cement concrete pavement.

Type II cement concrete shall be used for all sewer and water main construction and appurtenances thereto.

Type I portland cement shall be used when a type is not specified in the contract documents.

205.01.02 PORTLAND CEMENT CONCRETE

205.01.02A MIX DESIGN

Before beginning any concrete work, the contractor shall submit a concrete mix design to the City Engineer for approval. Concrete used in the work shall conform to the approved mix design.

Any requested and authorized alteration to proportions of any of the concrete materials in the mix shall be made at the contractor's sole expense.

The mix design shall meet the following requirements:

(1) Entrained air range three percent to six percent (percent by volume). AASHTO T 152

(2) Slump range - two inches to four inches. AASHTO T 119

(3) When using ¾-inch maximum size aggregate, the fine aggregate shall be between 40 percent and 48 percent of the total aggregate used.

(4) When using 1½-inch maximum size aggregate, the fine aggregate shall be between 35 percent and 45 percent of the total aggregate used.

COMPRESSIVE STRENGTH

Portland cement concrete shall have a compressive strength of 4,000 psi, a maximum aggregate size of 1½ inches, a slump of between two inches and four inches, and a minimum of 658 pounds of portland cement per cubic yard.

FLEXURAL STRENGTH

Flexural strength requirements will be specified in the contract documents.

When a minimum flexural strength is specified, the contractor shall conduct such sampling and testing as is necessary to establish a correlation between the compressive and flexural strength for each mix design used in the work.

Prior to commencement of work, the contractor shall submit sufficient written documentation to the City Engineer to demonstrate that the concrete will meet the specified requirements.

205.01.02B AGGREGATES

Aggregates used in the production of portland cement concrete shall conform to requirements in Section 02690 - PCC AGGREGATES of the Oregon Standard Specifications for Construction.

205.01.02C WATER

Potable water shall be used in all work.

205.01.02D ADMIXTURES

AIR-ENTRAINING ADMIXTURES

Air-entraining admixtures shall conform to AASHTO M 154 (ASTM C 260). Chloride content of admixture must not exceed 0.5 percent by weight.

WATER-REDUCING, RETARDING, AND ACCELERATING ADMIXTURES

Water reducing, retarding, and accelerating admixtures shall conform to AASHTO M 194 (ASTM C 494) using one or more of several tests as the City Engineer may direct.

Chloride content of admixture must not exceed 0.5 percent by weight.

MINERAL ADMIXTURES

The use of fly ash requires approval of the City Engineer. Where approved, the weight of fly ash shall not exceed 20 percent of the weight requirement for portland cement. Fly ash shall conform to applicable requirements in ASTM C 141, 595, and 618.

205.01.02E SAMPLING AND TESTING

During progress of work, if concrete strength and quality as determined by sampling and testing conducted by the City Engineer fail to attain the requirements specified, the contractor shall suspend all concrete work and make necessary adjustments to obtain required results.

Portland cement concrete shall be sampled and tested in accordance with the following ASTM test methods:

(1) Sampling Fresh Concrete	C172
(2) Obtaining Drilled Cores	C42
(3) Molding and Curing Specimens	C31 or AASHTO T 23
(4) Compressive Strength	C39 or AASHTO T 22
(5) Flexural Strength	C78
(6) Slump	C143
(7) Air Content	C173 or C231
(8) Unit Weight Yield	C138
(9) Setting of Mortar	C191 or C266

205.01.03 PORTLAND CEMENT MORTAR

Portland cement used in portland cement mortar shall be Type I or Type II conforming to Subsection 205.01.01 PORTLAND CEMENT.

Use either standard premixed mortar conforming to ASTM C 387, or mortar proportioned with one part portland cement to two parts clean, well-graded sand that passes a ⅛-inch screen and which conforms to AASHTO M 45.

Admixtures may be used, but shall not exceed the following percentages of cement by weight: hydrated lime, 10 percent; and diatomaceous earth or other inert materials, five percent. Testing shall conform to the OSHD test for mortar strength.

205.01.04 PORTLAND CEMENT GROUT

Portland cement used in portland cement grout shall be Type I or Type II conforming to Subsection 205.01.01 PORTLAND CEMENT.

205.01.04A TYPE A GROUT

Type A grout shall consist of one part portland cement and three parts of clean and well-graded sand. A minimum amount of water shall be used to produce a grout with a thick, creamy consistency.

205.01.04B TYPE B GROUT

Type B grout shall consist of one part portland cement, five parts of clean and well-graded sand, and seven parts pea gravel, by volume.

205.01.04C NON-SHRINK GROUT

Non-shrink grout shall be a non-metallic, cementitious commercial grout exhibiting zero shrinkage in conformance with ASTM C 827 and CRD C 621.

205.01.05 PORTLAND CEMENT TREATED BASE (CTB)

205.01.05A MIX DESIGN

The contractor shall furnish the City Engineer a complete mix design showing the proportions of all constituents proposed for use and strength test results of samples prepared using the proposed proportions and constituents for a minimum of 7-day, 14-day, and 28-day curing periods.

205.01.05B COMPOSITION OF MIXTURE

The CTB mixture shall be comprised of aggregate, portland cement, and water in the proportions and amounts established by the mix design. The cement content shall be between 4.5 percent and 5.5 percent of the dry weight of the aggregate. The mixture shall be proportioned to provide for a minimum 28-day compressive strength of 1,000 psi. The proportions of the materials will be subject to change as required to meet these specifications.

In all plants, the weight or rates of feed of aggregates and water shall be within five percent of the amounts of the materials specified. The weights or rates of feed of cement shall be such that the variations in cement content in samples, taken from any part of a mixed batch or from different batches, or from time to time from the product of continuous mixers, or from mixtures spread on the roadbed, shall not have variations above or below the cement content designated by the City Engineer of more than 0.5 of a percentage point.

205.01.05C AGGREGATE

Aggregates used in the production of plant-mixed CTB shall conform to requirements in Section 02630 of the Oregon Standard specifications for Construction.

Aggregate size will be specified in the contract documents.

205.01.05D PORTLAND CEMENT

Portland cement to be used shall be Type I or Type II conforming to Subsection 205.01.01 PORTLAND CEMENT.

205.01.05E WATER

Water used in mixing shall conform to Subsection 205.1.02C WATER.

205.01.05F ASPHALT MATERIALS

The asphalt used for the curing seal shall conform to Subsection 205.2.01 ASPHALT CEMENT.

205.01.06 PORTLAND CEMENT CONCRETE FOR EXTRUSIONS

205.01.06A AGGREGATE

Aggregates used in the production of portland cement concrete for extrusion methods of construction shall conform to applicable requirements of Section 02690 of the Oregon Standard Specifications for Construction.

Maximum aggregate size shall not exceed ½ inch.

205.01.06B PORTLAND CEMENT

Portland cement to be used shall be Type I conforming to Subsection 205.01.01 PORTLAND CEMENT, and shall have a maximum slump of 2 inches.

205.01.06C WATER

Water used in mixing shall conform to Subsection 205.1.02C WATER.

205.02.00 ASPHALT CEMENT PRODUCTS

205.02.01 ASPHALT CEMENT

Asphalt cements, liquid asphalts, and emulsified asphalts shall conform to the requirements of the ODOT''s annual publication titled "Specifications for Asphalt Materials." Copies of this publication are available through the ODOT Pavement Services Engineer.

Asphalt cement types and applications shall conform to the following:

205.02.01A HOT AND WARM MIX ASPHALT

For hot and warm mix asphalt concrete applications, use asphalt cement as specified below:

Collector and Arterial Wearing Course (top 2-inches):
PG 70-22 is required if reclaimed asphalt binder content is less than 25 percent.
PG 64-22 is required if reclaimed asphalt binder content is between 25 and 35 percent.

All other applications:
PG 64-22 is required if reclaimed asphalt binder content is less than 25 percent.
PG 58-28 is required if reclaimed asphalt binder content is between 25 and 35 percent.

The reclaimed asphalt binder content shall not exceed 35% for any application.

205.02.01B TACK COAT

For tack coat applications, use CRS-1 or CSS-1 cationic emulsified asphalt.

205.02.01C JOINT SEALER

For joint seal applications, use either hot asphalt (PG 64-22) or CRS-1, CRS-2, or CSS-1 cationic emulsified asphalt.

205.02.01D CURING SEAL

For curing seal applications, use CRS-1 or CRS-2 emulsified asphalt.

205.02.02 ASPHALT CONCRETE PAVEMENT

205.02.02A APPLICATIONS

Asphalt concrete pavement shall conform to Section 00745 - Hot Mixed Asphalt Concrete (HMAC) of the Oregon Standard Specifications for Construction. HMAC used in the work shall be Level 2 dense graded mixture. The type of mix shall be ¾-inch (B-mix), ½-inch (C-mix) or ⅜-inch (D-mix) as specified in the contract documents. Where the type of HMAC is not specified a Level 2, dense graded ½-inch mix shall be used for the top lift, or wearing course, and Level 2, dense graded ¾-inch mix shall be used for base lifts. Level 2, dense graded ⅜-inch mix shall be used where the compacted thickness of the top lift, or wearing course, will be less than 1½ inches.

205.02.02B MIX FORMULA

When required by the City Engineer, the contractor shall submit a job-mix formula conforming to Subsection 00745.13 of the Oregon Standard Specification for Construction.

The job-mix formula shall indicate the gradation and proportion of each of the several aggregate constituents to be used in the mixture. The job-mix formula shall also indicate the ASTM bulk specific gravity of each aggregate constituent, the measured maximum specific gravity of the mix at the optimum asphalt content determined in accordance with ASTM D 2041, the percent of asphalt lost due to absorption by the aggregate, and any other information pertinent to the design of the mix.

The contractor shall submit a new job mix formula to the City Engineer for approval should conditions, as determined by the City Engineer, justify a change in materials.

205.02.02C MATERIALS

Asphalt cement shall conform to requirements in Subsection 205.02.01 ASPHALT CEMENT.

Aggregates, mineral fillers, and anti-stripping additives used in the production of asphalt concrete shall conform to applicable requirements of Subsection 00745.11 of the Oregon Standard Specifications for Construction.

205.02.02D PROPORTIONS OF MATERIALS

Proportions of materials that comprise the various classes of asphalt concrete shall be within the range of proportions and tolerances specified in Subsections 00745.12, 00745.13, and 00745.14 of the Oregon Standard Specifications for Construction.

205.02.02E ACCEPTANCE OF MATERIALS

Asphalt and aggregate shall be subject to approval preceding mixing. Mixtures will be subject to final approval after blending and mixing, either at the plant or at the place of delivery prior to rolling. Approval will be based on periodic sampling and testing of the materials at the discretion of the City Engineer.

The contractor shall collect and analyze as many samples as the City Engineer determines necessary to confirm that the mixture, and the materials that comprise the mixture, is in conformance with the mix design and all other applicable requirements specified herein.

Costs associated with the collection and testing of samples shall be borne by the contractor.

205.03.00 AGGREGATES

205.03.01 AGGREGATE BASE

Aggregate for aggregate base shall be well-graded 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate meeting all appropriate requirements for aggregate shoulder and base materials as specified in the Oregon Standard Specifications for Construction.

205.03.02 TRENCH BACKFILL

205.03.02A PIPE ZONE MATERIAL

One-inch minus or ¾-inch minus crushed gravel or crushed aggregate shall be used for bedding and backfill in the pipe zone for the installation of all rigid and flexible pipes and conduits.

Pipe zone backfill shall conform to requirements specified for aggregate base material.

205.03.02B SELECT BACKFILL MATERIAL

Material for select backfill shall be imported bank-run or river-run gravel, crushed gravel, or crushed aggregate.

BANK-RUN AND RIVER-RUN GRAVEL

Imported bank-run or river-run gravel shall be from a source approved by the City Engineer. Approval of material from a location does not mean approval of the entire site, but only as material continues to meet specification.

Material shall be well-graded sandy gravel free from organic matter, clay, or other deleterious material and debris. No more than five percent by weight shall pass the No. 200 sieve.

Materials excavated on site during the course of the work may not be used as select backfill until testing by a firm approved by the City has determined that the material is in conformance with the requirements specified above and has been approved for use by the City Engineer. If approved for use, the contractor shall stockpile reusable excavated materials prior to reuse until the materials are examined by the City Engineer and approved for use to ensure the materials continue to meet the specified requirements.

For trench backfill the maximum particle size shall not exceed three inches in any dimension.

CRUSHED AGGREGATE

One-inch minus or ¾-inch minus crushed gravel or crushed aggregate shall be used for select backfill.

Crushed gravel and crushed aggregate shall conform to requirements specified for aggregate base material.

205.03.02C CONTROLLED DENSITY FILL

Controlled Density Fill (CDF) shall be used only with the prior authorization of the City Engineer.

CDF shall be a uniform, flowable mixture of aggregate and cementitious material. Cured CDF shall present a consolidated mass easily penetrated or excavated with standard mechanical equipment.

Aggregate shall not exceed 3/8 inch in size, and shall not contain more than 12 percent by weight passing a No. 200 sieve. Cementitious material shall be a mixture of Portland cement and fly ash at a sufficient quantity to develop a 28-day compressive strength no less than 50 psi, and no more than 100 psi. CDF shall be self-compacting upon placement.

Contractor shall submit a mix design for approval prior to performing any work anticipating the use of CDF. The Contractor shall submit testing documentation from a state certified agency to demonstrate 28-day compressive strength meets the requirements of this section.

Air and surface temperatures shall be 40 degrees Fahrenheit and rising before placement of CDF.

205.03.03 FOUNDATION STABILIZATION MATERIAL

Foundation stabilization material shall consist of dense graded 3" minus crushed aggregate containing no more than 5 percent (5%) material passing the No. 200 sieve.

205.03.04 ACCEPTANCE OF MATERIALS

Aggregate shall be subject to approval after mixing and prior to compaction. Approval will be based on periodic sampling and testing of the materials at the discretion of the City Engineer.

The contractor shall collect and analyze as many samples as the City Engineer determines necessary to confirm the aggregate is in conformance with all of applicable requirements specified herein. Aggregate samples shall be taken from the actual stockpiles from which the aggregate will be taken for use in the work.

Costs associated with the collection and testing of samples shall be borne by the contractor.

205.04.00 MEASUREMENT AND PAYMENT

Measurement and payment of materials will conform to the specific section within these specifications that is applicable to the type of work specified.

206 CONCRETE STRUCTURES

206.01.00 APPLICABILITY OF SECTION

This section contains requirements that pertain to the mixing, delivery, handling, placing, finishing, and curing of plain and reinforced portland cement concrete.

Additional requirements applicable to specific types of concrete structures are contained in other sections of these specifications.

206.02.00 MATERIALS

206.02.01 PORTLAND CEMENT CONCRETE

Portland cement concrete, grout, and mortar shall conform to Section 205 CONCRETE AND ASPHALT MATERIALS.

206.02.02 JOINT MATERIALS

206.02.02A PREFORMED EXPANSION JOINT FILLERS

Preformed expansion joint fillers for concrete shall conform to AASHTO M 153 or AASHTO M 213 except that those furnished under AASHTO M 213 shall be tested in conformance to ASTM D 1751.

206.02.03 EPOXY CEMENT

Epoxy cement shall be a two-compound epoxy resin adhesive conforming to requirements of AASHTO M 235.

206.02.04 STEEL REINFORCEMENT

The contractor shall furnish mill certification that will substantiate that the reinforcing bars delivered to the project site are as specified in the contract documents.

206.02.04A BAR REINFORCEMENT

Steel deformed bars shall conform to ASTM A 615, Grade 40.

Longitudinal bars used in continuously reinforced concrete pavement and in high strength bar reinforcement applications shall be Grade 60.

206.02.04B DOWELS

Dowels for concrete pavement, slab or wall load transfer devices at joints and other elements, shall conform to ASTM A 615, Grade 60, unless otherwise specified.

206.02.04C BAR MATS

Bar and rod mats shall be of the clipped type and shall conform to ASTM A 184.

206.02.04D SPIRAL REINFORCEMENT

Plain wire for spiral reinforcement shall conform to ASTM A 82, except that F_Y shall be the stress corresponding to a strain of 0.35 percent if design yield strength exceeds 60,000 psi.

206.02.04E WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185.

206.02.04F TIES AND SUPPORTS

Ties shall be fabricated from 16-gauge, black, soft-annealed wire. Bar supports in beams and slabs that will be exposed after stripping shall be galvanized or plastic coated. Concrete supports shall be used for reinforcing in concrete placed on grade. Galvanizing shall conform to ASTM A 153, Class D. Plastic shall not chemically react with concrete, shall be impervious, and have a minimum thickness of $^3/_{32}$ inches at the point of contact with the form.

206.02.05 CURING MATERIALS FOR PORTLAND CEMENT CONCRETE

Curing materials shall conform to the following requirements:

(1) Plastic Film	ASTM C 171
(2) Reinforced Paper	ASTM C 171
(3) Liquid Membrane-Forming Curing Compounds	ASTM C 309
(4) Burlap Cloth, Cotton Mats	AASHTO M 182
(5) Water	
(6) Other materials approved by the City Engineer.	

White-pigmented, liquid membrane-forming compound shall be used for curing portland cement concrete pavement.

Other types of materials or methods used for curing concrete will be dependent upon weather and other existing site conditions and shall be subject to the approval of the City Engineer.

206.02.06 FABRICATED METAL ADJUSTMENT RINGS

Fabricated metal rings or plates used in the adjustment of existing frame and cover assemblies over concrete structures shall be equal to characteristics of strength and support required of the covers or grates to be adjusted. Fabricated metal materials shall provide uniform bearing of bearing surfaces and positive protection against displacement when in service.

Existing frame and cover assemblies on concrete structures may be reused at the discretion of the City Engineer. Salvaged components approved by the City Engineer for reuse shall be cleaned as necessary to return them to a serviceable condition.

Fabricated and/or salvaged metal frame and cover assemblies and other related components shall conform to applicable OSHD requirements pertaining to fabrication, installation, and applicable service limitations of such materials.

206.03.00 CONSTRUCTION

206.03.01 MIXING AND DELIVERY OF CONCRETE

Concrete shall be machine mixed. Concrete shall be transported in transit mixer trucks.

Concrete that has developed an initial set, or is partially hardened, shall not be retempered or remixed and shall be removed from the job site and disposed of by the contractor.

Manufacturing facilities and transportation equipment shall ensure continuous delivery of concrete as required by the type of construction and shall provide for the proper handling and placement of the concrete at the job site.

Methods of delivery and handling concrete shall allow placing with a minimum of rehandling and without damage to the structure or concrete.

206.03.01A MIXING AT SITE

Batch mixers of a size and type that will ensure a uniform distribution of materials throughout the mass shall be used for mixing concrete on site.

Mixers shall be equipped with adequate water storage and a device for accurately measuring and automatically controlling amount of water used in each batch.

206.03.01B TRUCK MIXING

Revolving drum-type truck mixers shall be used for truck mixing concrete. Truck mixers shall be watertight and constructed such that concrete can be mixed to ensure a uniform distribution of materials throughout the mass.

Truck mixers shall have suitable means by which the amount of water added to the mix on-site can be readily verified by the City Engineer.

206.03.01C TIME OF HAULING AND PLACING MIXED CONCRETE

All concrete shall be discharged and placed into the forms within 90 minutes after the introduction of mixing water to cement and aggregate, or cement to aggregate, or before 250 revolutions of the truck drum or blades, whichever comes first.

This time shall be reduced during conditions that contribute to accelerated setting of concrete, or when the temperature of the concrete is 85° F, or above.

Water shall not be added to concrete during hauling or before discharge, unless directed or approved by the City Engineer.

206.03.02 FORMWORK

Concrete shall be contained by the use of forms when constructing any concrete structure. Materials such as rock backfill, earth, and similar materials shall not be used as forms for containing concrete. Adjacent edges of asphalt cement concrete shall not be used as a form for containing concrete in curbs, gutters, and similar structures.

Forms shall be mortar-tight and sufficiently rigid to prevent distortion due to weight of the concrete and other loads incidental to construction operations. Forms shall be constructed in a manner that will provide for the complete removal of form materials upon completion of the work. Form materials shall be removed from the structure prior to final acceptance of the work.

Wood forms for exposed concrete surfaces shall be constructed of dressed lumber of uniform thickness with a form liner of an approved type. Plywood shall be sufficiently supported if used as a form liner. Formwork for exposed concrete surfaces shall be constructed of materials that are smooth with grain running in the same direction to give a good finished appearance.

Metal ties or anchorages within forms shall be installed in a manner that will permit their removal to a depth of at least one inch from face without injury to concrete. Cavities shall be patched with cement mortar in a manner that will leave the finished surface sound, smooth, and uniform in color.

In order to ensure easy form removal without damage to the concrete, the contractor shall fillet or bevel forms at all sharp corners or projections.

Forms shall be treated with a release agent immediately before placing concrete. The contractor shall use release agents that will not adhere to or discolor the concrete.

206.03.02A FALSEWORK

For structures requiring poured-in-place concrete superstructures, working drawings and calculations for falsework prepared and stamped by an Engineer registered to practice in the state of Oregon shall be submitted to the City Engineer for review.

Falsework shall be designed and constructed to support the total applied loads with a deflection/span ratio not to exceed 1/500 in any falsework span. Falsework for post-tensioned structures shall be designed to carry full dead load and any additional vertical or horizontal loads caused by the prestressing operation. Post-tensioned structures shall not be considered self-supporting until post-tensioning is complete.

Deck forms for concrete box girder spans shall be supported by girder stems. Posts or other supports for deck forms shall not come in contact with bottom slab of box girder.

206.03.02B REMOVAL OF FORMWORK

The contractor shall be responsible for all damage resulting from removal of forms.

Earth backfill shall not be placed against walls below grade. Forms and shoring shall not be removed from structural slabs or beams until concrete has reached an actual field strength equal to 75 percent of the specified 28-day design field strength. Actual field strength shall be determined from field-cured test cylinders that shall be cured under conditions equivalent to the most unfavorable conditions for the portions of concrete which the cylinders represent. Formwork shall be removed prior to final acceptance of the work.

206.03.03 REINFORCEMENT

Bar reinforcement shall be fabricated, shipped, and marked in conformance with *Manual of Standard Practice for Reinforced Concrete Construction* of the Western Concrete Reinforcing Steel Institute.

Steel reinforcement bars shall be deformed when cold.

Steel reinforcement shall be delivered with suitable hauling and handling equipment. Steel reinforcement shall be kept free from dirt, detrimental rust or scale, paint, oil, or other foreign substance.

206.03.03A PLACING

Reinforcing steel shall be accurately placed in the position shown in the contract documents. Bars shall be tied at all intersections except where spacing is less than one foot in each direction, in which case, alternate intersections shall be tied. Tack welding of reinforcing steel shall not be permitted. If bundled reinforcing bars are required, the bars shall be securely tied together with wire ties at not more than six-foot centers.

Reinforcing steel shall be securely blocked from the forms by means of small mortar blocks not more than two inches square so the reinforcement does not vary from the position shown in the contract documents by more than ¼ inch. The blocks shall have a compressive strength equal to that of the concrete in which the mortar blocks are embedded. Mortar blocks for supporting reinforcing steel in slabs shall have either a tie wire embedded with the protruding ends tied to the reinforcing steel or a grooved top designed to hold the mortar blocks in place.

If metal chair supports are used as supports for steel reinforcing bars, all surfaces of the chair supports not covered by a minimum of ½ inch of concrete shall be treated by one of the following methods:

(1) Hot-dipped galvanized after fabrication in conformance with ASTM A 153, Class D.

(2) Plastic or epoxy coating provided that the coating is bonded to the metal, has a minimum thickness of $^{3}/_{32}$ inch, and is not chemically reactive with the concrete.

(3) Constructed of stainless steel in conformance with ASTM A 493, Type 302.

Installation of steel reinforcement will be inspected by the City Engineer before placing of concrete begins.

If fabric reinforcement is shipped in rolls, the fabric shall be straightened into flat sheets before being placed. For fabric reinforcement, fabric shall be extended to within two inches of edges of slab, and lap splices at least 1½ courses of fabric with a minimum of six inches. Laps and splices in fabric shall be tied securely at ends and at least every 24 inches.

206.03.03B SPLICING

Steel bars for concrete reinforcement shall be furnished in the full lengths indicated in the contract documents. No changes in the number of splices, their type, or location shall be permitted without the written approval of the City Engineer. Splices shall be well distributed and/or located at points of low tensile stress. Splices will not be permitted at points where the section is not sufficient to provide a minimum distance of two inches between the splice and the nearest adjacent bar or the surface of the concrete. The bars shall be rigidly clamped or wired at all splices. Bars that are lapped for splicing shall be placed in contact for the length of the splice and tied together near each end.

Number 11 bars and smaller shall be lap spliced. Splicing of No. 14 and No. 18 bars shall be in conformance with the following requirements:

(1) Splices shall be made by a mechanical butt splicing method utilizing a ferrous filler metal and an enclosing steel sleeve.

(2) Splices shall develop in tension or compression, as required, at least 125 percent of specified yield strength (fy) of the bar.

206.03.03C WELDING REINFORCING STEEL

Welding of steel reinforcing bars shall conform to the requirements of the AWS 12.1, Reinforcing Steel Welding Code.

206.03.04 WEATHER LIMITATIONS

The contractor shall be solely responsible for taking whatever precautions necessary to protect concrete work performed during unusual or inclement weather conditions.

The contractor shall take appropriate precautions in placing, finishing, and curing concrete when the ambient temperature reaches 85° F or higher or whenever relative humidity, wind velocity, or exposure to sun is expected to cause adverse conditions for concrete work.

Concrete shall not be placed when the ambient temperature is below 32° F. The surface temperature of fresh concrete shall be maintained at no less than 50° F for a period of seven days after finishing.

Insulated formwork, plastic sheeting, straw, temporary enclosures, portable heat sources, or combinations thereof, shall be used as applicable to maintain the minimum required temperature. When using portable heating sources, a means of providing and maintaining sufficient atmospheric moisture for curing shall be provided.

206.03.05 HANDLING AND PLACING

Construction debris shall be removed from the formwork prior to placing concrete. Temporary bracing shall be removed from within formwork as the concrete is being placed. Temporary braces and other formwork shall not be left buried in the concrete.

Prior to placing concrete, the base rock, leveling course, or other underlying material shall be thoroughly moistened.

Concrete shall be placed so as to avoid segregation of material and displacement of reinforcement. Concrete shall not be allowed to "free fall" more than six feet.

The concrete shall be thoroughly consolidated as it is being placed. The concrete shall be consolidated by mechanical vibration in conformance with the following provisions:

(1) Vibrating devices shall be capable of transmitting vibration to concrete at frequencies of not less than 4,500 impulses per minute. Intensity of vibration shall be such that a concrete mass of one-inch slump is visibly affected over a radius of at least 18 inches.

(2) A sufficient number of vibrating devices shall be used to properly compact each batch as it is being placed in the forms.

(3) Vibrating devices shall be manipulated in a manner that will thoroughly consolidate concrete around reinforcement and embedded fixtures and into corners and angles of forms without causing segregation of the mixture.

(4) Vibrating devices shall not be applied directly to reinforcing steel or to layers of concrete that have hardened to the degree that concrete ceases to be plastic under vibration.

(5) Mechanical vibration methods shall be supplemented by hand work as necessary to ensure smooth surfaces and dense concrete.

206.03.06 JOINTS IN PORTLAND CEMENT CONCRETE

Joints in concrete structures will be designated as construction joints, contraction joints, and cold joints and shall be constructed as specified herein and in other sections of these specifications applicable to specific structures.

206.03.06A CONSTRUCTION JOINTS

Wherever possible, the placing of concrete shall be continuous and without the use of intermediate construction joints.

The contractor shall install a construction joint at the termination point of each day's work, at the beginning of temporary work stoppages, and at any other time where the concrete will be allowed to harden or take its initial set prior to resumption of work.

Construction joints shall be formed by shaping the leading edge of the concrete as necessary to form a vertical face with an edge thickness of not less than four inches. Construction joints shall be constructed transverse to the longitudinal axis of these structures.

Where a construction joint is required in the sloped top surface of a retaining wall, or similar type work, additional formwork shall be used to produce a blocked out portion in the preceding layer that will produce an edge thickness of not less than six inches in the succeeding layer. Placing of concrete shall not be discontinued within 18 inches of the top of any face during wall construction.

Before placing fresh concrete against concrete that has hardened or attained initial set, the surface of the previously placed concrete shall be roughened in a manner that will not leave loosened particles of aggregate or damaged concrete at the surface. The surface shall be thoroughly cleaned and saturated with water prior to resumption of work.

206.03.06B CONTRACTION JOINTS

Contraction joints shall be of the weakened plane type in the exposed surfaces of concrete structures at such locations required to confine the contraction joint spacing to a maximum of 15 feet.

Contraction joints shall be constructed by pushing a thin steel sheet, or similar tool, vertically into the fresh concrete to separate the coarse aggregate at the joint. Contraction joints shall be formed to a minimum depth of ⅓ of the thickness of concrete and to a width of ⅛ inch.

Contraction joints shall be installed in a straight line, transverse to the longitudinal axis of the structure. The edges of the joint shall be tooled.

Contraction joints shall coincide with existing joints in adjacent concrete structures.

206.03.06C COLD JOINTS

Cold joints shall be formed between adjacent structures by placing fresh concrete against a previously formed concrete surface that has been allowed to harden or obtain its initial set.

Cold joints shall be located and constructed such that one of two or more adjacent concrete structures can be removed without damage to the structures that are to remain in place.

206.03.06D KEYWAY JOINTS

Keyway joints in walls, slabs, and other structures shall be located and formed/installed as specified in the contract documents or as directed by the City Engineer.

206.03.07 SURFACE FINISHING

Details relative to wall and slab finishes will be specified in the contract documents.

Details relative to concrete street, sidewalk, driveway, and curb finishes are included under applicable sections of Division 3.

206.03.08 CURING

Concrete surfaces shall be cured by covering with materials conforming to Subsection 206.02.05. The contractor shall use curing materials consistent with the weather and other existing site conditions.

Slab concrete structures, such as pavement, sidewalks, curbs, and similar work, that are exposed to conditions causing premature drying during placing operations shall be protected by wind breaks, fog spray, or by other suitable methods.

The curing process shall be maintained for a time period of not less than 72 hours from the time the curing process commenced.

206.03.08A SHEET COVERINGS

Sheet-type curing materials, including burlap, cotton mats, plastic film, and similar coverings shall be placed as soon as the concrete has hardened sufficiently to support installation of the covering without marring the surface of the concrete.

Plastic film and similar non-absorbent sealing materials shall extend over and beyond the sides or edges of the concrete and shall be installed and secured as necessary to hold the covering in position as a moisture proof covering.

Burlap cloth, cotton mats, and other absorbent materials shall be saturated with water and kept fully wetted during the curing period.

206.03.08B LIQUID, MEMBRANE-FORMING COMPOUNDS

Liquid, membrane-forming compounds shall be applied uniformly to damp concrete by pressure-spray methods at a rate that will form an impervious membrane in accordance with ASTM C 309.

206.03.08C WATER CURING

If the use of other curing materials is impractical or not required, the surfaces shall be kept moist by flushing or sprinkling with water in a manner approved by the City Engineer.

The application of water shall be such that the concrete and surfaces of all forms will be kept damp for a period of seven days after placing of concrete. Curing and finishing shall be coordinated when both requirements are to be met at same time.

Water used for curing shall be free of harmful amounts of deleterious materials that will stain, discolor, or adversely affect the physical properties of the concrete. Care shall be taken to avoid thermal shock due to the use of cold water or high rates of evaporative cooling.

206.03.08D OTHER MATERIALS

The use of straw, earth, sand, sawdust, or other similar materials that have been saturated with water shall be used only when approved by the City Engineer.

206.03.09 PROTECTION OF CONCRETE

The contractor shall erect and maintain suitable barriers to protect the concrete from traffic or other detrimental trespass until the concrete has attained the specified compressive strength.

Wherever traffic, of any type, is to be permitted to move over the surface of the concrete, the contractor shall construct and maintain suitable bridges over the concrete.

The contractor shall repair or replace, as determined by the City Engineer, any concrete that has been damaged prior to its acceptance by the owner. The contractor shall be solely responsible for costs associated with the repair or replacement of work that is damaged prior to final acceptance.

206.03.10 ADJUSTMENT OF EXISTING CONCRETE STRUCTURES TO GRADE

Wherever possible, existing concrete structures shall be adjusted to a new elevation by the addition or removal of precast concrete adjustment rings or extensions. Final adjustment to grade shall be made by seating the frame in fresh mortar and adjusting the assembly to finish elevation. Mortar shall not be placed to a depth in excess of one inch.

Concrete reinforcement may be required by the City Engineer depending on the type and location of the structure and the amount of adjustment required.

Portions of existing structures to be removed shall be isolated by sawcuts or other suitable means prior to removal to preclude spalling, cracking, or other damage to sections of the structure that are to remain in place.

206.03.10A EXCAVATION AND BACKFILL

Excavation shall be unclassified and shall include removal and disposal of whatever materials are encountered to the depths required to conduct the work.

If the structure is located in an improved area, the contractor shall sawcut and remove the asphalt or concrete from around the structure and excavate sufficient underlying material to conduct the work. The contractor shall not remove more material than is necessary to perform the required work.

Backfill shall be provided, placed, and compacted in conformance with the contract documents.

206.03.10B RAISING TOPS OF CONCRETE STRUCTURES

If the structure has no provision for the use of precast concrete extensions, fresh concrete shall be used to extend the structure to the new grade. The existing concrete surface shall be cleaned by brushing or with compressed air and moistened with water prior to placing the new concrete. New concrete shall be contained within suitable formwork and placed to a minimum depth of four inches in non-traffic areas and six inches in traffic areas. New concrete shall be cured at least three days, after which the frame shall be seated in fresh mortar and brought to proper grade.

If the required adjustment exceeds one inch but is less than the specified minimum thickness for the new concrete, existing shells or walls of structures to be raised shall be cut down as necessary to provide space for the new construction.

206.03.10C LOWERING TOPS OF CONCRETE STRUCTURES

Where the tops of manholes and similar structures are to be lowered and there is no provision for the removal of precast adjustment rings or extensions, the manhole cone shall be removed and the standard manhole sections removed and replaced with appropriate heights to accommodate the new finish grade. On shallow manholes and similar structures, it may be necessary to replace the cone section with a flat top section to achieve the new finish grade. Manhole cones and similar components shall not be modified.

Where curb inlets, catch basins, and similar structures are to be lowered and there is no provision for the removal of precast extensions, the walls of the structure shall be removed to an elevation that will locate the frame and cover assembly at finish grade. Final adjustment to grade shall be made by seating the frame in fresh mortar and adjusting the assembly to finish elevation.

206.04.00 MEASUREMENT AND PAYMENT

206.04.01 CONCRETE STRUCTURES

Measurement and payment for concrete structures will conform to the specific section within these specifications that is applicable to the type of work specified.

206.04.02 ADJUSTMENT OF EXISTING CONCRETE STRUCTURES TO GRADE

The adjustment or reconstruction of existing concrete structures, including manholes, storm drain inlets and catch basins, concrete valve boxes, and other similar structures will be paid for at the contract unit price per each structure adjusted or reconstructed.

Compensation for this work will include all materials, labor, and equipment necessary for the excavation and removal of surface improvements and sufficient underlying material to conduct the work, removal and disposal of portions of the structure necessary to adjust or reconstruct the structure, adjustment or reconstruction of the structure, providing and installing backfill materials, restoration of the ground surface, and any other miscellaneous work or materials required to complete the work in conformance with the contract documents.

206.04.03 INCIDENTALS

Materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

207 BORING AND JACKING

207.01.00 LEGAL RESPONSIBILITIES

In addition to the requirements contained herein and elsewhere in the contract documents, the contractor shall comply with all other applicable federal, state, and local laws and regulations pertaining to this type of work.

The term “permitter” shall designate the owner of railroad tracks or other facilities with prior rights, under which a pipe or conduit must be bored or jacked.

207.01.01 PIPELINE CROSSING AGREEMENT

Work conducted under or across permitter's right-of-way shall conform to the requirements of the permitter as outlined in a pipeline crossing agreement made between the permitter and the City. The contractor shall comply with all requirements of the pipeline crossing agreement.

207.01.02 INSURANCE

The contractor shall obtain and deliver to the permitter a public liability and property damage insurance policy in the amount required in the pipeline crossing agreement. The insurance company writing the policy shall be authorized to do business in the state of Oregon and shall be satisfactory to the permitter. Any other special agreements required between the contractor and the permitter shall be completed and signed by both parties before the contractor enters upon or commences work on the permitter's property. The contractor shall provide the City Engineer with copies of all required documentation prior to beginning work.

Written authorization to proceed from the permitter shall be submitted to the City Engineer by the contractor prior to beginning work.

207.01.03 SAFETY

The contractor shall conform to federal, state, and local laws and regulations pertaining to tunneling and specifically to the standards set forth in the Oregon Safety Code for Places of Employment, Chapter 24, Safety Code for Mining, Tunneling, and Quarrying, published by the Oregon Industrial Accident Commission, latest revision.

207.02.00 MATERIALS

207.02.01 PIPE ZONE AND BACKFILL MATERIAL

Pipe zone and backfill material shall conform to the requirements of Section 205.03.00 AGGREGATES.

207.02.02 CARRIER PIPE

Carrier pipe shall conform to Section 401 PIPE AND FITTINGS (SANITARY SEWERS AND STORM DRAINS) or Section 501 WATER PIPE AND FITTINGS for the strength, class, and type of pipe required for the work.

Uncased, jacked concrete pipe shall conform to ASTM C 76 as modified in Section 401. The pipe shall have tongue-and-groove joints designed to provide a minimum ¾-inch wide annular space on the interior of the joint for grouting after jacking is completed. The pipe shall have double circular cage reinforcement with additional longitudinal reinforcing steel as necessary for jacking operations.

207.02.03 CASING PIPE

Casing pipe shall be smooth steel pipe conforming to AWWA C 201 with a minimum wall thickness of $^{5}/_{16}$ inch. The contractor, however, shall be ultimately responsible for providing and installing materials consistent with the method of installation and the specified requirements of the permitter.

207.03.00 CONSTRUCTION

207.03.01 EXCAVATION

Excavation shall be unclassified and shall include removal of all materials that are encountered.

207.03.02 JACKING AND BORING

Jacking and boring equipment shall be in serviceable condition and of a type that will maintain correct alignment and grade of the pipe during installation.

In jacking operations, excavation shall be carried out entirely within the jacking head assembly or lead pipe. No excavation shall be made in advance of the jacking head. The contractor shall take whatever precautions are necessary to prevent loss of earth and the subsequent formation of voids outside the jacking head. Should

there be an appreciable loss of earth, as determined by the City Engineer, the contractor shall promptly fill the resultant voids, as they occur, with materials specified in the contract documents.

Once the jacking operation has commenced, it shall be continued uninterrupted around the clock until the pipe has been installed to the limits specified in the contract documents.

The contractor shall be responsible for any increase in pipe strength necessary to withstand jacking or boring loads and grouting operations.

207.03.03 CONCRETE PIPE

Protection shall be provided for the driving end of concrete pipe to preclude spalling and other damage. Intermediate joints shall be protected by the installation of bearing shims or other materials to properly distribute the bearing stresses.

207.03.04 STEEL CASING

Sections of steel casing to be jacked or bored shall be joined by welding the joints with a continuous weld for the full circumference. The contractor shall provide joints that are capable of resisting the jacking and boring forces without failure.

Welding of steel pipe used in jacking or boring operations shall conform to applicable American Welding Society specifications. Welders performing this type of work shall meet American Welding Society certification requirements and shall be prepared to present proof of such certification upon demand.

207.03.05 FILLING VOIDS BETWEEN CARRIER PIPE AND CASING

The annular space between the casing and the carrier pipe shall be filled ⅔ full with sand unless specified otherwise by the permitter or the contract documents.

207.03.06 FILLING VOIDS OUTSIDE CARRIER PIPE OR CASING

After the casing, or carrier pipe where no casing is specified, has been jacked or bored into position, all voids outside the casing shall be filled with materials specified in the contract documents.

If grout is specified as a filler, the grouting operation, once commenced at any one point, shall be completed without stopping. Nipples installed in carrier or casing pipes for the purpose of filling voids with grout shall be removed and the holes grouted flush with the pipe wall upon completion of the grouting operation.

207.03.07 CARRIER PIPE INSULATORS

The carrier pipe shall be supported within the casing with Calpico brand Model "M" Series pipe insulators or approved equal. The length, configuration, and location of the pipe insulators are dependent on the size and type of carrier pipe. These requirements vary by application and will be determined by the City Engineer, permitter, or the contract documents.

207.04.00 MEASUREMENT AND PAYMENT

207.04.01 BORING AND JACKING

Measurement and payment for bored and jacked carrier or casing pipe will be made on a linear-foot basis along the centerline of the pipe or conduit between the limits specified in the contract documents and shall include full compensation for all excavation, construction of the jacking or boring pits, pipe, casing, backfill, filling the annular space between the pipe and the casing, and any other labor, equipment, and materials of whatever nature that are required to complete the work and place the improvement into service.

Where a casing is installed at the option of the contractor, the casing, pipe skids, backfill of the annular space between the pipe and the casing, and all other labor, equipment, and material requirements associated with the installation of the casing shall be included in the pay item for boring or jacking, or as applicable, and no separate or additional payment will be made.

Jacking and boring extended beyond the limits shown in the contract documents without written authorization from the City Engineer shall be considered to be for the contractor's convenience and measurement and

payment for said extension shall be made through the pay item for pipe work adjacent to the jacked or bored section.

Final payment for each crossing will be made after the contractor furnishes the City Engineer with a satisfactory release from the permitter stating that the work across the permitter's right-of-way has been completed to the satisfaction of the permitter.

208 RESURFACING

208.01.00 APPLICABILITY OF SECTION

This section covers work necessary to replace all pavement base, pavement, curbs, sidewalks, and other surface features, with the exception of landscaping, damaged during the construction of public improvement projects.

208.02.00 MATERIALS

208.02.01 HOT AND WARM MIX ASPHALT CONCRETE

Hot and warm mix asphalt concrete shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

208.02.02 COLD MIX ASPHALT CONCRETE

Cold mix asphalt concrete with an aggregate gradation of ½-inch minus shall be used for temporary resurfacing of hard-surface areas.

208.02.03 TACK COAT

Liquid asphalt shall conform to requirements for tack coat in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

208.02.04 JOINT SEALER

Liquid asphalt shall conform to requirements for joint sealer in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

208.02.05 PAVEMENT BASE

Pavement base material for resurfacing trenches shall be 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate conforming to requirements in Subsection 205.03.01 AGGREGATE BASE.

208.02.06 FORMS

Formwork shall conform to requirements in Section 206 CONCRETE STRUCTURES.

208.02.07 ROCK SURFACING

Rock surfacing shall be 1-inch minus or ¾-inch minus crushed gravel or crushed aggregate conforming to requirements in Subsection 205.03.01 AGGREGATE BASE.

208.03.00 CONSTRUCTION

208.03.01 PAVEMENT RESTORATION

208.03.01A SAWCUTTING AND SURFACE REMOVAL

Slurry, sediments, dust, and other waste created by sawcutting shall be contained within and prevented from moving beyond the immediate sawcutting work zone. The Contractor shall protect against vehicular, equipment, or pedestrian traffic that may cause tracking of the sawcutting waste material. Sawcutting waste material shall be vacuumed and removed from the site concurrently with or immediately upon completion of sawcutting operations.

The existing pavement shall be sawcut a minimum of 12 inches from the edge of the existing pavement at the side of the trench or excavation. Earth saws and similar types of equipment shall not be used for cutting the pavement for final surface restoration.

Sawcutting of the final pavement edge shall occur after backfill and compaction operations are completed and as close to the actual time of final pavement restoration as possible.

The sawcut shall be a straight line, parallel to the pipe centerline, and shall provide a smooth, sound edge for joining the new pavement.

When the pavement edge at the side of the trench has been damaged beyond the 12-inch cutback, the final sawcut shall be moved out far enough to remove all damaged or undermined pavement and remain parallel to the trench. The pavement shall be cut in a manner that will provide a smooth transition back to the 12-inch cutback to allow effective use of compaction equipment along the edge.

When the distance between the final sawcut pavement edge and a curb, gutter, pavement edge, construction joint, or other concrete structure or improvement will be less than 24 inches, the contractor shall remove the intervening pavement and include that area in the pavement restoration. This requirement is intended to prevent subsequent settlement, displacement, or premature breakup of narrow, non-contiguous sections of pavement.

The material immediately below the cutback areas shall be replaced with 1-inch minus compacted, crushed gravel base.

208.03.01B PAVEMENT BASE

Pavement base shall be placed to a depth of 24 inches. The contractor shall bring the top of the pavement base to a smooth, even grade allowing for the thickness of paving material specified herein.

The contractor shall compact the pavement base as specified in Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK. Compaction tests shall be required on the finish rock grade prior to any final trench restoration.

208.03.01C SURFACE SMOOTHNESS AND WORKMANSHIP

Surface characteristics and workmanship of pavement restoration, including driveways, sidewalks, and curbs, as applicable, shall meet the following minimum requirements:

(1) When checked with a 12-foot straightedge, longitudinal deviation in surface smoothness for asphalt and concrete structures, including pavement, curbs, sidewalks, and driveways, shall not exceed .01 foot within 12 feet. Only one such deviation is permitted within 12 feet.

(2) The surfaces of the new pavement shall be flush with the existing street.

(3) Crown in the resurfaced areas shall be consistent with the existing crown and the position of the patch on the street.

(4) Completed pavement restoration shall not impound water or block existing means of drainage.

Pavement restoration that does not meet the above requirements shall be removed and replaced by the contractor at the contractor's expense.

Heating and reworking of asphalt surfaces, "skin" patches, grinding, surface applications (binders or sealers), or other like methods of improving surface characteristics of rejected pavement restoration will not be permitted.

Surface irregularities or other detrimental aspects of the existing roadway and other surfaces adjacent to the new work shall not be used by the contractor as a basis of evaluating the acceptability of the restored pavement.

208.03.01D WEATHER LIMITATIONS

Pavement restoration shall not be performed when the atmospheric temperature is lower than 40° F, during rainfall, or when the surface upon which the paving material is to be placed is frozen or has impounded water unless precautionary measures have been taken and are approved by the City Engineer.

208.03.01E PROTECTION OF ADJACENT STRUCTURES AND PROPERTY

The contractor shall take necessary precautionary measures to protect exposed structures and any other adjacent property, including motor vehicles and surface improvements, from paving materials and paving operations. Paving materials and other undesirable matter that may be deposited on adjacent structures or property as a result of paving operations shall be removed by the contractor upon completion of the work.

Manhole covers, metal valve boxes, and like structures shall be protected with diesel oil, paper, or other suitable materials prior to placing paving materials.

208.03.01F RESTORATION OF PAVEMENT MARKINGS

The contractor shall be responsible for the restoration of pavement striping, directional marking, crosswalk marking, and curb marking damaged by construction. Appropriate equipment operated by personnel qualified in its use shall be used to perform this work. Restored markings shall have sharp, clearly defined edges and shall be neat and uniform in appearance. Striping placed on existing pavement or on new pavement restoration shall be of a material approved by the City Engineer.

208.03.02 TEMPORARY COLD MIX ASPHALT

Temporary cold mix asphalt shall be placed and compacted over the backfilled and compacted trench areas to a minimum depth of two inches. After compaction, the temporary cold mix asphalt shall match the adjacent existing grade.

208.03.03 ASPHALT CONCRETE PAVEMENT

208.03.03A TACK COAT

Tack coat shall be applied in conformance with applicable requirements in Section 304 ASPHALT CONCRETE PAVEMENT.

208.03.03B ASPHALT CONCRETE PLACEMENT

Asphalt concrete shall be placed on the prepared base over the trench to a compacted depth of not less than four inches, or the depth of the adjacent pavement, whichever is greater.

Asphalt concrete shall be placed in a minimum of two lifts. Maximum thickness for any one lift of pavement shall not exceed three inches for class B mix and two inches for class C mix. The minimum thickness for placement of pavement shall not be less than 1½ inches.

Asphalt shall be roller compacted with equipment capable of providing compression of 200 to 300 pounds per linear inch. Compaction equipment shall be operated in a manner that will remove all roller marks and produce a smooth, uniform surface. Density requirements for asphalt concrete pavement shall conform to those in Section 304 ASPHALT CONCRETE PAVEMENT.

208.03.03C JOINT SEALER

A seal coat of liquid asphalt shall be applied to joints between the new and original asphalt pavement immediately after the new paving is completed. The seal coat shall be a minimum of 12 inches in width and shall be centered on the joint. The liquid asphalt shall be applied to the point that it begins to run off. The minimum application rate shall be 1.7 gallons per 100 linear feet.

The seal coat shall be covered with clean sand immediately after the liquid asphalt has been applied and before the asphalt has solidified. The sand shall be applied in a layer thick enough to prevent tracking of seal coat.

208.03.04 PORTLAND CEMENT CONCRETE PAVEMENT

Pavement restoration shall be the same thickness as that removed, or a minimum of eight inches thick, whichever is greater.

Concrete shall have a minimum compressive strength of 4,000 psi. Requirements for the provision and installation of dowels, tie bars, and load transfer devices will be specified in the contract documents.

The contractor shall provide, transport, place, finish, cure, and protect concrete pavement in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES.

208.03.05 CONCRETE DRIVEWAYS, SIDEWALKS, AND CURBS

Concrete driveways, sidewalks, and curbs shall be replaced to the same section, width, depth, line, and grade as that removed or damaged. The contractor shall replace concrete driveways, sidewalks, and curbing between scored joints. The contractor shall provide a minimum 3-inch thick compacted leveling course of 1-inch minus crushed aggregate.

Concrete edges adjacent to the work that were damaged during construction shall be recut. The contractor shall be responsible for recutting edges damaged during concrete removal or construction operations and no payment will be made for additional sawcutting or concrete removal.

Concrete replacement work shall be completed a minimum of seven days prior to the placement of adjacent asphalt concrete.

Sidewalks, driveways, and curbs damaged outside the limits of construction shall be replaced at the expense of the contractor.

The handling, placing, finishing, curing, and protection of concrete shall be in conformance with the applicable provisions of Section 206 CONCRETE STRUCTURES and Section 306 CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APPROACHES, AND WHEELCHAIR RAMPS.

208.04.00 MEASUREMENT AND PAYMENT

208.04.01 TEMPORARY COLD MIX ASPHALT

Payment for temporary cold mix asphalt pavement placed in street crossings to be maintained over trench backfill will be considered incidental to the work and included in the unit price for pavement replacement.

208.04.02 ASPHALT AND PORTLAND CEMENT CONCRETE PAVEMENT REPLACEMENT

The basis of measurement and payment for asphalt cement concrete and portland cement concrete pavement will be made on a linear-foot or square-yard basis as stated in the contract documents. When measurement is made on a linear-foot basis, the total length will include the full width of the restored surface.

Payment for asphalt cement concrete and portland cement concrete will include compensation for labor, equipment, and materials necessary for sawcutting the existing pavement; excavation and removal of sufficient material to provide space for the surfacing; supplying, placing, and compacting the base and leveling course materials; supplying and placing specified surfacing materials, including tack coat and joint sealer; restoration of pavement markings; disposal of excess excavated materials, including temporary cold mix asphalt; and all other labor, materials, and equipment of whatsoever nature required to complete pavement restoration.

208.04.03 SIDEWALK AND DRIVEWAY REPLACEMENT

Measurement and payment for concrete sidewalk and driveway replacement will be made on a linear-foot or square-yard basis as stated in the contract documents.

Payment for sidewalk and driveway replacement will include compensation for labor, equipment, and materials necessary for additional sawcutting of the existing sidewalk and driveway materials; excavation and removal of sufficient material to provide space for the restoration; supplying, placing, and compacting the base and leveling course materials; supplying and placing concrete, including curing and joint materials; formwork; and restoration of markings; disposal of excess excavated materials, including temporary surfacing materials; and all other labor, materials, and equipment of whatever nature required to complete restoration of the sidewalks and driveways.

208.04.04 CURB REPLACEMENT

Measurement and payment for the replacement of concrete curbs, curb and gutter, or gutter sections will be made on a linear-foot basis.

No differentiation in measurement or payment will be made between curb and monolithic curb and gutter sections.

Payment for concrete curbs, curb and gutter, or gutter sections will include compensation for labor, equipment, and materials necessary for additional sawcutting of the existing curb; excavation and removal of sufficient material to provide space for the restoration; supplying, placing, and compacting the base and leveling course materials; supplying and placing concrete, including formwork, curing materials, and joint materials; restoration of markings; disposal of excess excavated materials; and all other labor, materials, and equipment of whatever nature required to complete restoration of the concrete curbs.

208.04.05 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

209 CLEANUP AND SITE RESTORATION

209.01.00 GENERAL

Satisfactory completion of all requirements described herein will be a condition precedent to final acceptance of the project.

209.02.00 CONSTRUCTION

209.02.01 RESTORATION OF PLANTED AREAS

Planted areas, including grassy areas, shall be raked by hand as necessary to remove gravel, clay, construction debris, and deleterious materials.

Areas where the sod has been damaged shall be leveled and raked as necessary to conform to the original surface and shall be free of holes, rough spots, or other surface features detrimental to seeding or placement of sod.

Grassy and planted areas damaged by oil, gasoline, or other hazardous and/or poisonous materials shall be excavated and the contaminated soil removed and replaced with suitable topsoil to the satisfaction of the City Engineer.

Grass and other plantings shall be replaced in kind. Grass shall be restored by seeding or with sod as required by the City Engineer.

Shrubs and trees located outside the limits of construction that have been disturbed or damaged shall be removed and replaced, in kind, as directed by the City Engineer and at the contractor's sole expense.

Adequate drainage shall be maintained in all restored areas.

209.02.02 REMOVAL OF EQUIPMENT AND MATERIALS

Construction materials, equipment, and debris of whatever nature resulting from construction operations shall be removed from the project site.

209.02.03 CLEANING DRAINS

Drainage facilities such as inlets, catch basins, culverts, manholes, open ditches, storm drainage and sanitary sewer lines, and similar structures shall immediately be cleaned of all debris that is the result of construction operations.

209.02.04 CLEANING PAVED SURFACES AND APPURTENANCES

Pavement surfaces, gutters, sidewalks, manhole and valve box castings, and other similar structures and installations, whether new or existing, within the limits of the project, shall be cleaned as necessary to remove gravel, dirt, oil, asphalt, concrete, and other materials that are a result of the contractor's operations.

After gravel and larger debris have been cleaned up as much as is practicable by other methods, paved areas shall be flushed with a pressure-type flusher. Sidewalks shall be hand broomed or flushed with water, taking care not to further damage planted areas with the water.

209.02.05 RESTORING MOBILIZATION, BORROW, AND DISPOSAL AREAS

Properties that were used for storage or mobilization during construction of the project shall be cleaned up, all equipment and supplies removed, and the area restored to a condition equal to or better than that existing before mobilization.

For borrow and disposal areas, cleanup shall include the disposal of all uprooted stumps, felled trees, brush, excess excavation, rock, discarded materials, rubbish, and debris.

209.03.00 MEASUREMENT AND PAYMENT

209.03.01 INCIDENTAL BASIS

Materials, labor, and equipment required for cleanup and site restoration will be considered incidental to other work and no separate payment will be made.

210 STREET TREE STANDARDS

210.01.00 APPLICATION OF STANDARDS

Selection, provision, planting, and maintenance of street trees shall comply with the standards contained in this section. Requirements contained in this section shall be used in the development of Street Tree Planting Plans as required for publicly or privately funded public works projects. These standards are intended to ensure that new trees planted within the public right-of-way are of the highest quality, require low maintenance, and will not compromise public safety.

210.02.00 STREET TREE SELECTION

The species of trees to be planted shall be selected from the City of Albany's Approved Street Tree Species List or as specifically approved by the City Forester. The species of trees to be planted in post-construction vegetated stormwater facilities shall be as shown on the construction drawings. No street trees shall be planted in post-construction stormwater quality facilities with impermeable liners.

210.03.00 STREET TREE QUALITY AT TIME OF PLANTING

The tree shall have a straight trunk perpendicular to the ground with a minimum branching height of four feet above the ground for trees 1½-inch in caliper to a minimum of six feet above the ground for trees two inches in caliper.

Plant material shall be grown to the current standards and specifications of the American Association of Nurserymen, American Standard for Nursery Stock. Plant material shall be of standard quality or better, true to name and type of their species or cultivar.

Tree material originating within the state shall have the Oregon inspection certificate attached. Nursery stock imported from other states shall be accompanied by a certificate of inspection from the place of origin as required by Oregon law. Certificates shall be given to the City's Representative prior to tree approval. The Contractor shall be responsible for making all arrangements with the State Department of Agriculture for inspection of tree materials shipped from out of state.

Trees shall be provided reasonably free, as defined by nursery industry standards for street trees, from insects and disease, decay, major structural defects, and damage to the trunk, branches, and root system.

Trees' structural scaffold branches shall be well proportioned where they attach to the main trunk, with an average spacing of at least six inches.

Plant materials that have been pruned immediately before or during the time of planting will be rejected.

The City shall be notified and will have the right to inspect all trees and shrubs before they are planted. The City reserves the right to reject any materials at any time. The Contractor will replace materials with specified plants at the Contractor's expense.

210.04.00 STREET TREE SIZE AT TIME OF PLANTING

Trees for residential classed streets shall be a minimum of 1½ inches in caliper, measured six inches above mean ground level, eight – ten feet in height.

Trees for collector or arterial streets and abutting commercially zoned properties shall be a minimum of two inches in caliper, measured six inches above mean ground level, 10 – 12 feet in height.

210.05.00 STREET TREE CONDITION AT TIME OF PLANTING

210.05.01 BALLED AND BURLAPPED AND IN WIRE BASKETS

Trees shall have a sound ball with a firm attachment of the trunk with the root ball. The trunk shall not be loose, but firmly held within the root ball.

The size and condition of root balls shall conform to the current standards and specifications of the American Association of Nurserymen and the American Standard for Nursery Stock.

Root balls of trees shall not be allowed to dry out at any time from the nursery to final planting.

Trees shall have a well developed root system and not be root bound or have circling/girdling roots.

210.05.02 IN A CONTAINER

The trees shall be free of circling, girdling roots.

The trees shall have been grown in the container for a maximum period of one year.

210.05.03 BARE ROOT

Trees in a bare root condition shall not exceed 1½ inches in caliper, measured six feet above mean ground level.

The roots shall not be allowed to dry out and shall be kept moist at all times from the nursery to final planting.

The roots shall be well-established and full of live and vigorous fibrous roots along with the larger structural roots.

210.06.00 STREET TREE PLANTING LOCATION

210.06.01 GENERAL

On public streets without sidewalks, trees shall be located so as to accommodate future sidewalk placement and with regard to current and future utility line corridors. Trees and shrubs (which attain a height of eighteen inches (18") or more) that may form a hedge or screen shall not be allowed within the "Clear Vision Zone" of a street or alley intersection so as to obscure required traffic sight distances. The clear vision area consists of a triangular area, two sides of which are lot lines or a driveway and a lot line for a distance specified in this section, or, where the lot lines have rounded corners, the lot lines extended in a straight line to a point of intersection and so measured, and the third side of which is a line across the corner of the lot joining the non-intersecting ends of the other two sides. The following measurements shall establish the clear vision areas:

Type of Intersection	Measurement Along Each Lot Line
Controlled Intersection (stop sign or signal)	20 feet
Uncontrolled Intersection (60’ right-of-way)	30 feet
Uncontrolled Intersection (less than 60’ right-of-way)	30 feet
Commercial and Industrial District driveways	20 feet

210.06.02 MINIMUM STREET TREE PLANTING CLEARANCES

Minimum Recommended Distances from Feature:

Feature	Small Tree (up to 35’ height)	Medium Tree (up to 60’ height)	Large Tree (over 60’ height)
Sidewalks	2 feet	3 feet	4 feet
Driveways	5 feet	5 feet	10 feet
Fire Hydrants	5 feet	5 feet	5 feet
Intersections	35 feet	35 feet	35 feet
Water Meters	5 feet	5 feet	5 feet
Utility Boxes	5 feet	5 feet	5 feet
Utility Poles	5 feet	10 feet	10 feet
Street Lights	10 feet	20 feet	30 feet
Stop Signs	35 feet	35 feet	35 feet
Regulatory Signs	Not to block sign		

210.06.03 MINIMUM DISTANCE FROM SIDEWALKS AND CURBS

Trees shall be centered in the planting strip between the sidewalk and the street curb. If centering within the planting strip is not possible or desirable due to design considerations, the tree must be located at least two feet from the sidewalk edge or the curb edge.

210.06.04 MINIMUM DISTANCE FROM BURIED UTILITY LINES THAT TRAVERSE THE PLANTING STRIP

8”-10” water and sewer line	10 feet
12”-16” water and sewer line	15 feet
18” + water and sewer line	20 feet
All other services	10 feet

210.06.05 OVERHEAD UTILITY LINES

No tree with the potential of reaching a mature height of more than thirty-five feet (35’) shall be planted in the right-of-way under “primary” overhead wires.

210.06.06 MINIMUM RECOMMENDED DISTANCE FROM BUILDINGS

Small trees (potential growth of up to 35’ height)	10 feet
Medium trees (potential growth of up to 60’ height)	10 feet
Large trees (potential growth of over 60’ height)	15 feet
Shrubs	3 feet

210.06.07 VEHICULAR AREA

Provisions shall be made to prevent any parts of the vehicles from touching trees.

210.06.08 LINEAR SPACING

Trees shall be placed an average of every thirty feet (30'). Depending on the size, species, and variety, the City Forester may approve planting distances which may be as close as ten feet (10') and as far as forty feet (40') to fifty feet (50') based on the size and growth habit of the tree.

210.06.09 WIDTH OF PLANTING AREA WITHIN CITY RIGHTS-OF-WAY (I.E., DISTANCE BETWEEN THE CURB AND SIDEWALK)

Trees shall not be planted where the rooting space is less than four feet (4') in width without prior approval of the City Forester.

The minimum width of a planting site for each tree will be governed by the approved street tree list.

Trees that commonly produce a large-buttress root system shall be planted in a site greater than eight feet (8') wide (i.e., Quercus phellos, Acer macrophyllum, Liquidambar styraciflua).

210.06.10 WIDTH OF MEDIANS

No tree shall be planted in any median that is less than ten feet (10') in width. On state rights-of-way, Oregon Department of Transportation's "Guidelines for Planting Within Highway Right-of-Way" apply.

210.07.00 STREET TREE PLANTING PROCEDURES

210.07.01 PLANTING SEASON

Bare root trees may be planted only between October 15th and April 15th unless otherwise approved by the City Forester. Balled and burlapped or container grown trees may be planted only February 1 through November 15 unless otherwise approved by the City Forester.

210.07.02 PREPARATION OF TREE PLANTING HOLES

210.07.02A BALLED AND BURLAPPED AND CONTAINER GROWN TREES

A shallow, broad, tree planting hole at least 1½ times the diameter of the root ball shall be excavated to a depth that will position the trunk flare level with finish grade.

The inner surfaces of the excavation shall be scored or roughened to the extent necessary to encourage rooting in the existing native soil.

210.07.02B BARE-ROOT STOCK

Tree-planting holes shall be one foot wider than the spread of the roots. Holes shall have sufficient depth to position the trunk flare level with finish grade.

A mound of native soil shall be left in the center of the hole to support the roots. The roots shall be draped and spread in their natural position over the mound.

210.07.03 PLANTING CONDITIONS

Street trees shall not be planted in standing water.

210.07.03A BALLED AND BURLAPPED TREES

Trees shall have a sound root ball that has not been allowed to dry out at any time. The root ball shall be firmly attached to the trunk.

Tree planting materials that are untreated and biodegradable may be left around the root ball after planting. Other debris shall be removed from the tree planting hole prior to backfilling with soil.

Tie material shall be removed and the burlap peeled back as necessary to expose the top ⅓ of the root ball prior to planting.

Wire baskets shall be cut off to a minimum depth of 18" from the top of the root ball.

210.07.03B CONTAINER GROWN TREE

The tree shall be carefully removed from the container and the root mass gently loosened.

The roots shall be inspected for a girdling or circling condition. Trees found to have girdling or circling roots shall not be planted.

Container grown trees shall not exceed 12 months in the container prior to planting.

210.07.03C BARE ROOT TREES

Roots shall not be exposed to sunlight or otherwise allowed to dry out at any time.

Dead, damaged, broken, or frayed roots shall be pruned off prior to planting.

210.07.04 SEATING OF TREES

Trees shall be set plumb, upright, and faced for best appearance. Broken branches shall be pruned after planting.

The hole shall be backfilled one-half full with original soil and the hole flooded with water to remove any air pockets. After backfilling is complete, the entire planting area shall be thoroughly saturated with water to remove any remaining air pockets. For tree locations in stormwater facilities, backfill soil shall be specified growing medium and shall only be compacted with a water filled roller.

For trees that are not installed in post-construction stormwater quality facilities, a continuous three-inch high raised berm shall be constructed around the planting hole to direct water to roots. The berm shall be removed after one year. Additionally, mulch shall be applied to a depth of two – four inches around the tree. Mulch shall be kept free of an area within two inches of trunk.

210.07.05 ROOT BARRIER

Any tree planted ten feet (10') or closer to a building shall have an impenetrable root barrier installed near the building. The root barrier shall run the length of the planting area or the structure, and reach a depth of at least eighteen inches (18").

Root barrier shall be Deep Root UB 18-2 or approved equal.

210.07.06 STAKING

Hardwood stakes shall be driven firmly into the ground outside of the hole. Care shall be taken to avoid driving the stakes through the root structure.

Stakes shall be driven to appropriate depths and locations in stormwater facilities to avoid puncturing of stormwater facility liner or perforated piping where applicable.

Trees shall be attached to the stakes at knee height using nonbinding tree ties or tree ties that are at least one inch wide to prevent damage to the tree trunk. Ties shall be attached to the tree in a manner that will allow the tree to move but still be held firmly in place.

210.08.00 ESTABLISHMENT RESPONSIBILITIES

210.08.01 ESTABLISHMENT PERIOD

The establishment and warranty period for plantings, including street trees, is two years as identified in Division 1 of these Specifications. During the establishment period, and until final inspection, the Contractor shall be responsible for care of the planting to maintain a vigorous growing condition by watering, pruning, cultivating, repairing, adjusting tree stakes, spraying for pest control, removing dead trees or trees not showing vigorous growth, and replacing missing or damaged plants.

210.08.02 MONITORING

Approval and acceptance of installed street trees will be conditioned upon the contractor providing a monitoring schedule for the purpose of evaluating the health and establishment of street trees. The schedule shall span the entire establishment period; shall identify the responsible party and its contact information;

and shall identify the dates of inspection (minimum of three per growing season, evenly spaced, and one prior to onset of growing season) to be performed. The monitoring schedule shall be updated, revised, and resubmitted within five working days of any request by the City.

During the establishment period the contractor shall provide reporting documents to the City to demonstrate conformance with the monitoring requirements. Reporting documents shall include the name of the person performing the inspection; date and time; location; and the health and general condition of each size and variety of street tree. Complete reporting documents shall be submitted to the City within five working days of each inspection.

210.08.03 IRRIGATION

Approval and acceptance of street tree installation will be conditioned upon the contractor providing an acceptable irrigation schedule. The contractor shall be responsible for irrigating all street trees to sustain an unstressed growing condition throughout the establishment period. Regardless of the submitted irrigation schedule, the contractor is ultimately responsible for tree survival throughout the establishment period and is required to increase the irrigation frequency as necessary to avoid stressing trees.

210.08.04 MULCHING

During the establishment period a minimum three-foot by three-foot planting area around each tree shall be maintained with a layer of bark mulch two – four inches in depth, for all trees not installed in a post-construction stormwater quality facility. The mulch shall be kept at least two inches away from the trunk of the tree, and the mulched planting area around the tree shall be kept free of weeds.

210.08.05 PRUNING REQUIREMENTS

Dead, broken, or split branches shall be pruned at the time of planting.

Trees shall be pruned to remove branches that are crossing, damaged, diseased, broken, or have included bark.

Trees shall not be topped or reduced in height without specific approval of the City Forester.

Trees shall be pruned so at least two thirds of the tree's height is canopy with one third of the height being the trunk.

The lower limbs shall be pruned off or tipped back to comply with clearance requirements for sidewalks and streets.

Initial structural pruning shall be performed at the end of the three-year establishment period. A strong scaffold branch structure shall be developed by pruning to select the primary scaffold branches.

Pruning shall be performed according to the approved urban forestry pruning standards and specifications.

210.08.06 TREE REPLACEMENT

Any tree that falls under one or more of the following conditions at any time during the establishment period shall be replaced immediately during the next approved planting season after receipt of the corrective notice.

210.08.06A DEAD TREE

Trees that have no live growth originating in the scaffolding branches.

210.08.06B STRESSED TREE

Trees that have lost a minimum of 50 percent of its total foliage or have a reduction of 50 percent of normal leaf size for that species.

210.08.06C NON-APPROVED TREE

Trees that are not listed on the Approved Street Tree Species List or that have not been approved by the City Forester.

210.08.07 TREE PROTECTION

Trees shall be protected during the establishment period by the use of the following measures:

210.08.07A MULCH

For trees not installed in post-construction stormwater quality facilities, bark mulch shall be maintained in the drip line, which is the area directly below the tree's branches, two – four inches in depth and a minimum of three feet by three feet.

210.08.07B ROOT ZONE PROTECTION

No construction or human activity shall take place within the tree's critical root zone. The critical root zone for trees three inches or smaller in caliper shall be an area with a radius of at least three feet from the trunk.

The critical root zone for trees over three inches in caliper shall be an area with a radius of at least one and one-half feet from the trunk for every one inch of caliper size.

No soil grade changes shall take place within the critical root zone, except as required for construction of post-construction stormwater quality facilities.

No storage of material shall be allowed within the critical root zone or protected area of the tree.

210.08.07C PROTECTIVE FENCING

Where required, fencing shall be installed to protect trees. Installation of protective fencing shall not damage liners, piping, or other improvements within post-construction stormwater quality facilities.

Where required, the critical root zone or tree protection zone shall have a protective fence installed at its perimeter. The protective fence shall be at least four feet in height and made of orange plastic material or approved equivalent.

The protective fencing shall be installed prior to any construction/landscaping activity around the tree and be maintained in place during the construction/landscaping activities and removed only when the final construction is completed.

210.09.00 MEASUREMENT AND PAYMENT

210.09.01 TREES

Tools, equipment, labor, and materials necessary to furnish and place street trees will be paid on a lump sum basis unless otherwise specified in the contract documents. Root barriers, tree staking, and tree protection measures shall be incidental to this bid item.

210.09.02 ESTABLISHMENT PERIOD MAINTENANCE

Tools, equipment, labor, and materials necessary to provide maintenance for trees throughout the establishment period shall be incidental to specified bid items, unless otherwise identified in the contract documents.

**** END OF DIVISION ****

DIVISION 3 – STREETS

301 SUBGRADE

301.01.00 CONSTRUCTION

301.01.01 CLEARING AND GRUBBING

Clearing and grubbing operations shall conform to requirements in Section 203 CLEARING AND GRUBBING.

Clearing and grubbing shall be completed in advance of staking final lines and grades. Depressions or ruts containing water shall be drained and the subgrade bladed to remove irregularities and to produce a uniform surface.

301.01.02 EXCAVATION

Excavation and backfill shall conform with applicable requirements of Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

301.01.03 UNTREATED SUBGRADE

The subgrade shall be shaped to the lines, grades, and cross sections shown in the contract documents.

Areas that are to receive fill shall be compacted to the depth of grubbing for the full width of the fill. The subgrade shall be compacted to 93 percent or the density specified in the contract documents.

The contractor shall obtain optimum moisture content for the subgrade materials in a manner approved by the City Engineer.

301.01.04 OVEREXCAVATION AND FOUNDATION STABILIZATION

The contractor shall, at the direction of the City Engineer, remove and dispose of unsuitable materials beyond the lines and grades shown on the project plans. Stabilizing material shall be entirely isolated from contact with native materials by use of woven Geotextile fabric, and shall conform to the requirements of section 205.03.03 FOUNDATION STABILIZATION MATERIAL.

301.02.00 MEASUREMENT AND PAYMENT

301.02.01 PREPARATION OF SUBGRADE

Labor, materials, and equipment required to prepare the subgrade in conformance with the contract documents, including any additional work necessary to obtain optimum moisture content for the subgrade materials, will be considered incidental to excavation and backfill.

301.02.02 FOUNDATION STABILIZATION

Measurement and payment for foundation stabilization will be made in conformance with Subsection 204.05.04 FOUNDATION STABILIZATION.

301.02.03 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

302 AGGREGATE BASES

302.01.00 MATERIALS

302.01.01 AGGREGATE

Aggregate shall conform to requirements for aggregate base materials in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

302.02.00 CONSTRUCTION

302.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

302.02.02 SURFACE CONDITIONS

The contractor shall not place aggregate materials in standing water or on a soft, muddy, frozen, or otherwise unsatisfactory subgrade.

The contractor shall be solely responsible for any damage that occurs to the subgrade, aggregate materials, or completed aggregate base that is a result of the contractor's operations. Subgrade, aggregate materials, or completed aggregate base so damaged shall be restored, removed, or reconstructed, as determined to be applicable by the City Engineer, at the contractor's expense.

302.02.03 PLACEMENT OF BASE AND SUB-BASE

Equipment shall be capable of spreading and striking off aggregate materials to the designated line, grade, and transverse slope at a uniform rate and in a manner that will not cause segregation of coarse and fine materials.

Aggregate shall be graded in a manner such that excessive shifting, rehandling, or regrading will not be necessary to place the aggregate to the required thickness and to the designated line and grade. The aggregate shall be placed without segregating the components of the mixture.

302.02.03A THICKNESS OF LIFTS

The maximum compacted thickness of any one lift shall not exceed eight inches. Each lift shall be placed as wide as is practical and compacted to the specified density before a succeeding lift is placed.

302.02.03B COMPACTION

Compaction equipment shall be operated in accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

The contractor shall use compaction equipment that will not crush the aggregate.

302.02.04 DENSITY REQUIREMENTS

Each lift of base and sub-base material shall be compacted to not less than 93 percent of maximum density as determined by ASTM D 1557.

302.02.05 SURFACE FINISH

The completed surface of the base course shall be within 0.05 of one foot of the cross section and grade specified in the contract documents and shall not vary more than 0.05 of one foot from specified line and grade at any point when checked with a 10-foot straightedge.

302.02.06 SAMPLING AND TESTING

The contractor shall collect samples of aggregate materials for testing and conduct subsequent analysis of the samples as provided for in Subsection 106.03.00 SAMPLING AND TESTING.

Aggregate base materials and the source of such materials shall be approved by the City Engineer prior to delivery to the job site.

302.03.00 MEASUREMENT AND PAYMENT

302.03.01 AGGREGATE BASE AND SUB-BASE

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade, furnish aggregate base materials at the site, and to place and compact the materials in conformance with the contract documents.

The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Aggregate base and sub-base materials under curbs, gutters, combination curb and gutter, and sidewalks are not included in this pay item.

302.03.01A SQUARE-YARD BASIS

Measurement and payment for aggregate base and sub-base will be made on a square-yard, in-place basis.

Measurement will be based on the surface length and width of the aggregate base measured to the nearest 0.1 of a foot.

302.03.01B CUBIC-YARD BASIS

Measurement and payment for aggregate base and sub-base will be made on an in-place, compacted, cubic-yard basis.

Load receipts shall be given to the City Engineer for each load of material as it is delivered to the job site. Each receipt shall show the date and time of delivery, truck number, and driver's name and will be considered a valid receipt only when signed by the City Engineer.

The actual volume of material in any given load shall be based on the length, width, and depth of the leveled material in the dump box measured to the nearest 0.1 of a foot.

302.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

303 CEMENT TREATED BASE (CTB)

303.01.00 MATERIALS

303.01.01 CEMENT TREATED BASE

Materials used in the production of CTB shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

303.01.02 CURING SEAL

Bituminous curing seal shall conform to requirements for asphalt materials in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

303.02.00 CONSTRUCTION

303.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

303.02.02 MIXING

The CTB materials shall be prepared and mixed at a plant capable of providing a mix of aggregate, cement, and water of specified proportions and consistency as designated by the mix design.

Mixing shall continue until a uniform and homogeneous mixture of aggregate, cement, and water has been obtained and is in conformance with the mix design and applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

303.02.03 SURFACE AND WEATHER CONDITIONS

Operations associated with the construction of the CTB shall be so coordinated that regardless of daily or seasonal variations in weather, temperature, and humidity such work shall result in a completed CTB that conforms in every respect to specified requirements.

The contractor shall not place CTB in standing water or on a soft, muddy, frozen, or otherwise unsuitable subgrade.

The contractor shall be solely responsible for any damage that occurs to the subgrade, CTB mixture, or the completed CTB that is a result of the contractor's operations. Subgrade, CTB mixture, or the completed CTB so damaged shall be restored, removed, or reconstructed as determined to be applicable by the City Engineer, at the contractor's expense.

303.02.04 HAULING

Vehicles used for hauling the CTB mixture shall be watertight and capable of discharging the mixture without waste or separation.

The mixture shall not be retempered with water during transit to the work site. Mixture that has been retempered with water in transit or has begun to harden or take an initial set prior to placement will be rejected by the City Engineer and will not be considered for payment.

303.02.05 PLACING

The CTB mixture shall be placed and compacted within two hours of mixing. Any CTB mixture that is not placed and compacted within this two-hour period shall be subject to rejection, removal, and replacement as the City Engineer determines to be applicable. Costs associated with such removal and replacement shall be borne by the contractor.

The mixture shall be delivered and placed without operating hauling equipment over any uncured mixture.

The placing of CTB mixture shall progress continuously. Should operations be stopped for a duration sufficient for the mixture to harden or take its initial set, the contractor shall construct a transverse construction joint at the end of the work as specified herein.

The surfaces of the subgrade and the CTB mixture shall be maintained in a moist condition at all times by sprinkling with water.

303.02.05A SPREADING

The contractor shall use equipment that is capable of spreading the mixture without segregating or fracturing the aggregate.

Equipment that will be operated over freshly spread CTB mixture shall not displace the mixture or leave tracks that are of such depth as to be visible after compaction is completed.

The CTB mixture shall be placed in a manner such that excessive shifting or rehandling will not be necessary to place the mixture to the required thickness and to the designated line and grade. The mixture shall be placed without segregating the components of the mixture.

The mixture shall be placed such that the number of longitudinal joints shall be held to a practical minimum.

303.02.05B THICKNESS AND NUMBER OF LIFTS

If the required compacted depth of the CTB exceeds six inches, the CTB shall be constructed in two or more layers of equal thickness. The maximum compacted thickness of each lift shall not exceed six inches.

303.02.05C CONSTRUCTION JOINTS

The contractor shall construct a transverse construction joint near the termination point of each day's work, at temporary work stoppages, and at any other time where the CTB mixture will be allowed to harden or take its initial set prior to resumption of work.

The construction joint shall extend across the full width of the exposed face of the CTB and shall be at a slope of 2:1 or steeper with the face of the joint free of loose material.

303.02.05D COMPACTION

Compaction shall be by vibratory, drum-type compactors and shall be adequate to compact the CTB to the density specified herein.

Compaction equipment shall be operated in accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

Compaction of the CTB mixture shall begin as soon as it has been spread and shall be continuous until completion.

Compaction operations shall be controlled as necessary to prevent breakdown or lateral displacement of the mixture at the sides of a strip and at the edges of successive passes of the compactor.

303.02.06 DENSITY REQUIREMENTS

Density of the completed CTB shall be 95 percent of the maximum density indicated by the mix design.

303.02.07 CURING OF CTB

The surface of the compacted CTB mixture shall be kept moist until the bituminous seal has been placed.

After each lift of CTB is completed, the surface and exposed edges shall be covered with a bituminous curing seal. The curing seal shall be applied by a pressure spray method at a rate necessary to provide a continuous unbroken curing membrane.

After the curing seal has been applied, the CTB shall be allowed to cure for a period of four days before placing the next lift. During the curing time, no vehicles of any type shall be permitted to drive over the surface.

CTB that is damaged during the curing period shall be removed and reconstructed and the curing seal replaced, all at the contractor's expense.

303.02.08 SURFACE FINISH

The surface of each lift of CTB shall parallel the cross section and grade of the finished surface within 0.05 of a foot. The finished surface of the CTB shall not vary more than 0.05 of a foot from specified line and grade at any point when checked with a 10-foot straightedge.

303.02.09 SAMPLING AND TESTING

The contractor shall collect samples of CTB mixtures, and component parts thereof, for testing and conduct subsequent analysis of the samples as provided for in Subsection 106.03.00 SAMPLING AND TESTING.

CTB mixtures, and component parts thereof, shall be subject to testing at the time of delivery to the job site and during placing and compaction operations to assure compliance with the mix design and other requirements specified herein.

303.03.00 MEASUREMENT AND PAYMENT

303.03.01 CEMENT TREATED BASE

Measurement and payment for CTB will be made on a square-yard, in-place basis. The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Measurement will be based on the surface length and width of the CTB measured to the nearest 0.1 of a foot.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade, furnish CTB mixture at the site, place and compact the mixture, and to furnish and apply a bituminous curing seal in conformance with the contract documents.

CTB placed under curbs, gutters, and combination curb and gutter will not be included in this pay item.

303.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

304 ASPHALT CONCRETE PAVEMENT

304.01.00 MATERIALS

304.01.01 ASPHALT

Asphalt products, and component parts thereof, shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

304.01.02 STRIPING MATERIALS

Unless otherwise specified, thermoplastic striping materials shall be used. Lane line markings shall be extruded profiled or extruded non-profiled (Method A) thermoplastic as specified in Section 00865 of the *Oregon Standard Specifications for Construction*. Markings used for legends, symbols, crosswalks, and stop bars shall be PreMark as manufactured by Flint Trading, Inc., or approved equal. Pavement markings shall be installed in accordance with the *Manual on Uniform Traffic Control Devices*.

Where approved by the City Engineer, Stamark brand as manufactured by 3M or approved equal may be substituted for thermoplastic striping materials. Stamark Series 380I ES shall be used for lane lines and Stamark Series 420 shall be used for crosswalks, symbols, and legends.

Striping material shall be applied in strict adherence to the manufacturer's specifications.

304.01.03 RAISED, REFLECTORIZED PAVEMENT MARKERS

Raised, reflectorized pavement markers and adhesive shall conform to applicable requirements of ODOT's *Oregon Standard Specifications for Construction* and shall be installed accordance with the manufacturer's recommendations and the *Manual on Uniform Traffic Control Devices*. Raised reflectorized pavement markers shall be placed as shown on the Construction Drawings and as directed by the City Engineer.

304.02.00 CONSTRUCTION

304.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

304.02.02 PREPARATION OF PAVEMENT BASE

Pavement bases shall be constructed in conformance with Section 302 AGGREGATE BASES and the applicable standard details.

Manholes, inlets, and other such structures shall be completed, cured as applicable, and otherwise prepared prior to construction of asphalt pavement.

Manhole frame and cover assemblies shall be adjusted such that they can be paved over and then later adjusted to final grade as shown on the standard details.

Tack coat shall be applied to vertical surfaces that will come in contact with asphalt pavement to provide a good bond and seal.

Top surfaces of structures, such as manhole and valve box covers, shall be covered with paper, a light coating of fuel oil, or other approved materials to prevent adherence of asphalt pavement or tack coat.

304.02.02A RECONDITIONING EXISTING AGGREGATE BASE

The contractor shall not recondition existing aggregate bases or make use of existing aggregate base material unless such work is authorized by the contract documents or approved by the City Engineer.

When authorized by the contract documents or approved by the City Engineer, existing aggregate bases or aggregate material shall be graded and compacted in conformance with requirements of Section 302 AGGREGATE BASES, the contract documents, or as directed by the City Engineer.

304.02.03 MIXING

Asphalt and aggregate shall be mixed at a central mixing plant equipped as necessary to accurately measure, monitor, and control the various components and temperature of the mix to produce a uniform, homogeneous mixture that conforms to the mix formula.

Mixing temperatures shall be sufficient to provide thorough mixing and coating of the asphalt and aggregate and to provide a mass viscosity of the mix on the grade that will permit compaction to required density.

Mix temperatures and asphalt in storage shall meet requirements of the approved, certified mix design.

304.02.04 SURFACE AND WEATHER LIMITATIONS

Operations associated with the construction of the pavement shall be so coordinated that regardless of daily or seasonal variations in weather, temperature, and humidity such work shall result in a completed pavement that conforms in every respect to specified requirements.

Asphalt pavement shall not be constructed when the atmospheric temperature is lower than 40° F in the shade, during rainfall, or when the surface upon which the paving material is to be placed is frozen or damp unless precautionary measures have been taken and are approved by the City Engineer.

Class D asphalt wearing surfaces shall be placed when the existing pavement temperature is 60° F or higher. The contractor shall be solely responsible for any damage that occurs to the subgrade, aggregate base, asphalt mixture, or the completed pavement that is a result of the contractor's operations. Subgrade, aggregate base, asphalt mixture, or the completed pavement so damaged shall be restored, removed, or reconstructed as determined to be applicable by the City Engineer, at the contractor's expense.

304.02.05 ASPHALT TACK COAT

Tack coat shall be applied to all edges of existing pavement, gutter face, manhole castings, inlet boxes, and like items prior to placement of the first lift of asphalt. Surfaces that are to receive a tack coat shall be thoroughly cleaned of dust, dirt, and loose debris. Tack shall be applied in a manner that ensures complete, uniform coverage of all surfaces.

Tack coat shall be applied to the previous lift of asphalt when more than twelve hours have elapsed before the time of placing the subsequent lift.

Asphalt tack coat shall be applied to the base lift of asphalt at a rate of 0.15 of a gallon per square yard.

The tack coat shall not be applied during wet weather, when the temperature is below 40° F, or during darkness, and shall be applied in advance of paving operations as is appropriate to maintain a tacky, sticky condition of the asphalt.

304.02.06 PLACING

The contractor shall not schedule delivery of asphalt so late in the day as to prevent the spreading and compacting of the mixture during daylight.

The contractor shall not allow motor vehicle traffic, including dump trucks and other construction equipment, to travel over any lift of asphalt pavement until the mixture has been compacted and has cooled sufficiently to preclude tracking or displacement of the mixture.

Paving operations shall progress continuously. Should operations be stopped for a length of time sufficient for uncompacted mixture to harden, the contractor shall remove such mixture to the extent necessary to construct a transverse construction joint at the end of the work as specified herein.

304.02.06A TEMPERATURE OF MIX

With the exception of Class D mix, the temperature of hot mix asphalt at the time it is spread into final position shall be between 275° and 325° F. The temperature of Class D mix at the time of placing shall be between 200° and 250° F.

If the temperature of any quantity of asphalt mixture is allowed to fall below 275° F, or 200° F for Class D mix, the mixture shall be removed from the job site.

304.02.06B SPREADING

Bituminous paving machines shall be capable of spreading and finishing layers of bituminous mix material in lane widths to the thicknesses, lines, grades, and cross sections specified in the contract documents. The paving machine shall be operated at a speed that provides for uniform spreading and finishing of the mix.

Care shall be taken at all times to prevent segregation of any component parts of the mixture. Areas with segregated materials shall be removed and replaced with fresh mixture prior to compaction. At no time shall course aggregate segregated from the mix by hand spreading or raking of joints be scattered across the pavement mat.

304.02.06C THICKNESS OF LIFTS

The thickness of the completed asphalt pavement will be specified in the contract documents.

The maximum thickness for any one lift of pavement shall not exceed three inches. The minimum thickness for placement of pavement shall not be less than 1½ inches.

304.02.06D TRANSVERSE AND LONGITUDINAL JOINTS

The configuration, location, and other details relating to the construction of transverse and longitudinal joints requires the approval of the City Engineer.

The contractor shall schedule and conduct paving operations in a manner that limits the number of transverse and longitudinal joints to a practical minimum.

Longitudinal cold joints are not permitted. For the purpose of this requirement, a cold joint is defined as one found between compacted mixture that has cooled overnight or longer and mixture that is placed at the resumption of the paving operation.

The contractor shall divide paving projects into full-width sections of a length that will allow for the entire width and length of a section to be paved on the same day.

The configuration and construction of transverse and longitudinal joints shall be in accordance with the following requirements:

TRANSVERSE JOINTS: The Contractor shall provide and install a form to match the height of the existing asphalt lift at all course or strip transverse cold joints. The joint shall be carefully formed and compacted to provide a straight and vertical edge that will match the newly laid asphalt panel and to provide a smooth riding surface over the joint.

As an alternative, a transverse joint may be formed by cutting back the leading edge of the asphalt to expose the full depth of the layer or course. A tack coat shall be applied to the contact surfaces just before the mixture is placed against the previously compacted mat.

Where the end of a course or strip of asphalt concrete is to be subjected to traffic, the end shall be left on a bevel of approximately 20:1 (horizontal to vertical).

LONGITUDINAL JOINTS: The mixture shall be placed in strips of sufficient width to limit to a practical minimum the number of longitudinal joints required.

The longitudinal joints in any lift of pavement shall offset the joint in the preceding lift by not less than six inches. Longitudinal joints in the wearing course shall not be located within the wheel path.

Longitudinal joints shall be constructed in a manner that will achieve maximum density of the joint. The course aggregate in the material overlapping the edge of the previous panel shall be removed, leaving only the finer portion of the mixture to be compacted into the joint.

304.02.06E COMPACTION AND COMPACTION EQUIPMENT

Asphalt shall be compacted with vibratory, drum-type compactors capable of providing compaction effort of 200 to 300 pounds per linear inch. Compaction equipment shall be capable of compacting the mixture to the specified density without crushing the aggregate to any extent.

Roller wheels shall be moistened with water or other approved material as necessary to prevent pickup of the mixture by the roller.

Compaction equipment shall be operated in accordance with the roller manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

Compaction equipment shall be operated in a manner that will remove all roller marks and produce a smooth, uniform surface. Any displacement of the mixture occurring as a result of the reversing of the direction of a roller, or from any other cause, shall be corrected immediately.

304.02.07 DENSITY REQUIREMENTS

The density of asphalt concrete pavement shall be no less than 92 percent, and no more than 95 percent of the maximum density of the asphalt concrete.

304.02.08 SURFACE FINISH

The finished surface of each course or layer of asphalt shall be of uniform texture, smooth, free of all defects, and shall parallel the line and grade specified for the top surface of the finished pavement. The finished surface of the pavement shall provide for positive drainage and shall not impound water to any extent.

The surface of each layer shall be tested for trueness to specified line, grade, and transverse slope at selected locations with a 12-foot straightedge. Any variations of the pavement surface from the testing edge of the straightedge between any two contact points with the pavement surface shall at no point exceed 0.01 of a foot on the underlying courses or the top course or wearing surface of the pavement.

If the surface smoothness of the finished pavement is found to exceed the tolerance permitted, the pavement shall be brought into conformance with the specified tolerances in a manner approved by the City Engineer.

Repair or replacement of such defective work shall be at the sole expense of the contractor.

304.02.09 SAMPLING AND TESTING

The contractor shall collect samples of asphalt mixture, and component parts thereof, for testing and conduct subsequent analysis of the samples as provided for in Subsection 106.03.00 SAMPLING AND TESTING.

The asphalt mixture, and component parts thereof, shall be subject to testing at the time of delivery to the job site and during placing and compaction operations to ensure compliance with the mix formula and other requirements specified herein.

Testing for density of asphalt concrete shall be performed using a calibrated nuclear densometer in backscatter mode. Sampling frequency and location shall be as determined by the City Engineer to verify conformance to these specifications.

304.03.00 MEASUREMENT AND PAYMENT

304.03.01 ASPHALT CONCRETE PAVEMENT

Measurement and payment for asphalt concrete pavement will be made on a ton or square-yard, in-place basis. The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade and aggregate base, furnish asphalt concrete mixture at the site, and to place and compact the mixture in conformance with the contract documents.

No additional payment over the contract unit price will be made for pavement having a thickness greater than shown in the contract documents.

304.03.01A SQUARE-YARD BASIS

Measurement will be based on the surface length and width of the asphalt pavement measured to the nearest 0.1 of a foot.

304.03.01B TON BASIS

Measurement will be based on the number of tons of asphalt concrete required to complete the work in conformance with the contract documents.

Asphalt mixture and the hauling vehicles shall be weighed on scales that are licensed for commercial use by the Weights and Measures Division of the Oregon State Department of Agriculture.

Trip tickets shall be given to the City Engineer as the material is delivered to the job site. Each trip ticket shall show the date and time of delivery, truck number, driver's name, net weight of the material, grade of asphalt, and the City's project number. Trip tickets shall be considered valid only when approved by the City Engineer.

No material will be considered for payment without a trip ticket being available at the time of delivery.

304.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

305 PORTLAND CEMENT CONCRETE PAVEMENT

305.01.00 MATERIALS

305.01.01 PORTLAND CEMENT CONCRETE

Portland cement concrete, and component parts thereof, shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

305.01.02 CURING MATERIALS

Curing materials shall conform to applicable requirements in Section 206 CONCRETE STRUCTURES.

305.02.00 CONSTRUCTION

305.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

305.02.02 PREPARATION OF PAVEMENT BASE

Pavement bases shall be constructed in conformance with Section 302 AGGREGATE BASES and the applicable standard details.

Manholes, inlets, and other such structures shall have been completed, cured as applicable, and otherwise prepared for construction of the pavement.

Top surfaces of structures, such as manhole and valve box covers, shall be protected from the concrete.

Pavement bases that are damaged during the course of the work, regardless of cause, shall be repaired far enough in advance of the paver so as to cause the least disruption of the paving operation.

305.02.02A RECONDITIONING EXISTING AGGREGATE BASE

Reconditioning of existing aggregate bases shall conform to provisions of Section 304 ASPHALT CONCRETE PAVEMENT.

305.02.03 MIXING

Mixing of portland cement concrete shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

305.02.04 SURFACE AND WEATHER LIMITATIONS

The contractor shall conform to applicable provisions of Section 206 CONCRETE STRUCTURES and the following requirements relating to weather limitations.

The contractor shall schedule and coordinate all operations involved in constructing the pavement so that regardless of the daily or seasonal variations in weather, temperature, and humidity such work shall result in a finished pavement conforming in all respects to the specified requirements.

Concrete pavement shall not be constructed during rainfall or when the surface upon which the concrete is to be placed is frozen or has impounded water unless precautionary measures have been taken and are approved by the City Engineer.

The contractor shall be solely responsible for any damage that occurs to the subgrade, aggregate base, concrete, or the completed pavement that is a result of the contractor's operations. Subgrade, aggregate base, concrete, or completed pavement so damaged shall be restored, removed, or reconstructed as determined to be applicable by the City Engineer, at the contractor's expense.

305.02.05 HAULING

Hauling of portland cement concrete shall conform to applicable provisions in Section 206 CONCRETE STRUCTURES.

305.02.06 FORMS

Form work shall conform to applicable requirements in Section 206 CONCRETE STRUCTURES.

305.02.07 PAVING MACHINES

The concrete shall be placed with paving machines that are designed to spread, screed, and float finish the freshly placed concrete in one complete pass of the machine in such a manner that a minimum of hand finishing shall be required to provide a dense and homogeneous pavement in conformance with the specified thickness, grade, and cross section.

Paving machines shall be operated in a manner that shall cause minimal displacement of the base.

Portions of paving machines or other equipment that ride on pavement, concrete gutter, or other improved surfaces shall be offset sufficiently to prevent breakage of the edges of these structures. The contractor shall provide supports, protective pads, or other suitable means to prevent the paving machine from marring or chipping pavement, gutters, or other adjacent improved surfaces or structures.

305.02.08 PLACING

The contractor shall coordinate mixing, delivery, and spreading of the concrete to the extent necessary to provide for continuous progress of the paving operation.

The concrete shall be placed uniformly in final position in such a manner that a minimum of hand finishing shall be necessary to provide a dense and homogeneous pavement in conformance with the specified line, grade, and cross section.

If, for any reason, it is necessary to stop the forward motion of the paver, the vibratory and tamping elements shall be stopped immediately.

The contractor shall stop the paving operation if the pavement is not in conformance with specified requirements and shall resume operations only when the cause of the deficiency has been determined and corrective action has been taken.

The contractor shall not place concrete over a subgrade or pavement base that has been damaged such that it will not conform to the specified requirements for line, grade, and density. Subgrade or pavement bases so damaged shall be repaired prior to placing concrete.

When using slip-form pavers, the contractor shall be prepared to protect the edges of the pavement from slumping. Corrective action to prevent slumping shall be taken while the concrete is still plastic.

Pavement that is not in conformance with specified requirements shall be removed and replaced or repaired, whichever is determined applicable by the City Engineer, before the concrete starts to set.

305.02.08A COMPACTION, TAMPING, AND SCREEDING

The concrete shall be vibrated for the full depth and width of the pavement as it is being placed. The performance of such vibration shall be in accordance with applicable provisions of Section 206 CONCRETE STRUCTURES.

The surface of the concrete shall be consolidated by means of vibrating screeds, mechanical tampers, or other methods that have been approved by the City Engineer.

Equipment shall be operated in such a manner that a satisfactory compaction of the concrete is produced and the surface of the pavement is uniform and true to grade and cross section.

305.02.09 FINISHING

After the concrete is placed and compacted and is true to the specified line, grade, and cross section, the surface shall be brought to a smooth even texture with a float. The float shall be applied to the surface of the concrete with its length parallel to the centerline of the street. The completed float finish shall be free of soupy mortar and surface irregularities.

After the concrete has obtained the proper set, a roadway finish shall be applied to the surface of the concrete. The concrete surface shall be given a steel-tine broom finish using a broom that will mark the finished concrete to a depth not to exceed ⅛-inch. Markings shall be perpendicular to the roadway centerline and full roadway width, except for strips 16 inches wide along curb faces which shall be marked parallel to the curb face.

The edges of the new pavement and joints with previously placed concrete shall be finished with an approved edging tool to provide a clean, rounded edge to the new pavement. Edging tools shall be used in a manner that will not form ridges on the surface of the concrete.

Exposed edges of the new pavement that show evidence of honeycombing or other defects in composition of the concrete shall be filled with a stiff mortar or cement and fine aggregate applied to the moistened concrete and troweled smooth. Areas that show serious defects in composition of the concrete, as determined by the City Engineer, shall be removed and replaced with concrete to the nearest longitudinal and transverse contraction joints adjacent to the defective areas.

305.02.10 JOINTS

The contractor shall construct joints in concrete pavement in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES and the following additional requirements.

305.02.10A CONSTRUCTION JOINTS

Construction joints shall be constructed when there is an interruption of more than 30 minutes in the paving operation. The contractor shall provide and install dowels or other load transfer devices in construction joints as required by the City Engineer.

305.02.10B CONTRACTION JOINTS

Contraction joints shall be constructed by sawing the concrete to the depths and widths specified.

SAWED CONTRACTION JOINTS

Longitudinal and transverse contraction joints shall be sawcut to a minimum depth equal to ⅓ of the thickness of the pavement. The maximum width of the sawcuts shall not exceed ⅛ inch. Commencement of sawing the contraction joints is dependent upon the setting time of the concrete and

shall occur soon enough to prevent uncontrolled shrinkage cracking yet late enough to perform the sawing without tearing or raveling the surface of the concrete.

If the width of the sawcuts exceeds ⅛ inch, the contractor shall fill the joints with a joint filler approved by the City Engineer.

TOOLED CONTRACTION JOINTS

Where approved by the City Engineer, tooled contraction joints shall be installed in conformance with requirements in Subsection 206.03.06C CONTRACTION JOINTS.

305.02.11 CURING

After floating, final surface finishing and brooming, and edging have been completed, and while the pavement surface is still moist, the concrete shall be cured in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES.

305.02.12 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. Sentries shall be employed as necessary to ensure that barriers remain effective.

Wherever it is necessary that traffic, including contractor's vehicles, and equipment be carried from one side of the pavement to the other, the contractor shall construct and maintain suitable bridges over the pavement.

Prior to allowing equipment or traffic on the new surface, the concrete shall have attained the specified compressive strength and shall be free from scarring, abrasion, stones, loose mortar, and other matter apt to be deleterious to the concrete surface. Equipment shall be operated in a manner that will not damage the new pavement.

Prior to its acceptance, pavement that has been damaged by traffic or from any other cause shall be removed and replaced to the nearest longitudinal and transverse contraction joints adjacent to the damaged area. The contractor shall supply and install dowels as directed by the City Engineer. Costs associated with the removal and replacement of the pavement, the installation of dowels, and any other work or materials necessary to bring the work into compliance with specified requirements shall be at the sole expense of the contractor.

305.02.13 SURFACE TOLERANCE AND TESTING

The surface of finished pavement shall not deviate from longitudinal and transverse smoothness more than the prescribed limits. Testing shall be done under the supervision of the City Engineer with equipment furnished and operated by the contractor at the contractor's expense as soon as the hardness of the concrete permits. Surface smoothness shall meet both of the following specifications:

305.02.13A STRAIGHTEDGE TESTING AND TOLERANCE

Testing for longitudinal and transverse smoothness for travel lanes shall be done with a 12-foot straightedge. The extent of the testing will be determined by the City Engineer. The pavement shall not deviate from the straightedge at any point by more than 0.01 of a foot for all areas constructed by the prescribed machine methods, including all traffic lanes and bike lanes.

305.02.13B GRAPHIC PROFILE TESTING AND TOLERANCE

The longitudinal surface of all travel lanes, including ramps, of the concrete pavement shall be tested for smoothness by the graphic profile method according to ODOT TM 770. The profilograph shall be the California-type complete with recorder for determining the profile index of highway pavement. The pavement shall have a profile index of 7.0 in./mile or less for each wheelpath in each 600-foot segment or partial segment, and shall have no individual deviation of .025 of a foot.

305.02.14 CORRECTION OF DEFICIENCIES

If the pavement does not conform to the prescribed limits of deviation, the following corrections shall apply:

305.02.14A PLASTIC PCC FAILURE TO MEET STRAIGHTEDGE

The paving operations shall be stopped until revised methods, changes in equipment, or correction of procedures are made or proposed for trial and are approved by the City Engineer.

305.02.14B HARDENED PCC FAILURE TO MEET SMOOTHNESS REQUIREMENTS

For any segment or partial segment failing to meet the straightedge or profilograph test requirements, the contractor shall take corrective action as follows:

- Remove the nonspecification concrete pavement as determined by the City Engineer and replace with specification concrete pavement.
- Profile with abrasive grinder(s), equipped with a cutting head comprised of multiple diamond blades. The contractor shall determine and mark the areas to be profiled. Areas corrected by grinding shall have the required surface texture as specified in 206.03.07B and shall have the transverse joints restored to contract specifications by sawing with diamond blade saws.
- Retest the entire length with the graphic profile testing method of all segments requiring corrective work with the profilograph by the contractor under the supervision of the City Engineer. Perform all corrective work and graphic profiling at the contractor's expense, including traffic control.

305.03.00 MEASUREMENT AND PAYMENT

305.03.01 PORTLAND CEMENT CONCRETE PAVEMENT

Measurement and payment for portland cement concrete pavement will be made on a square-yard, in place basis. The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Measurement will be based upon the surface length and width of the pavement measured to the nearest 0.1 of a foot.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade and pavement base, furnish portland cement concrete mixture at the site, and to place, consolidate, finish, and cure the concrete in conformance with the contract documents.

305.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

306 CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APPROACHES, AND ACCESS RAMPS

306.01.00 MATERIALS

Curbs, gutters, sidewalks, driveway approaches, and wheelchair ramps shall be constructed of portland cement concrete.

Materials shall conform to requirements of Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

306.02.00 CONSTRUCTION

For new construction projects, specific types of curbs, gutters, sidewalks, driveway approaches, and wheelchair ramps will be specified in the contract documents or as approved by the City.

Unless otherwise directed by the City Engineer, horizontal concrete sawcutting equipment shall be used to create new points of accesses (e.g. driveways) in existing curbs. Sawcutting shall extend full depth through the curb and shall result in a smooth top face. Sawn edges shall be ground to a rounded edge.

For smaller improvement projects, such as those undertaken by private homeowners, specific construction requirements pertaining to the construction or modification of these structures, that are not covered in the

Standard Construction Specifications or included as a part of the encroachment permit, will be determined by the City Engineer.

306.02.01 WHEELCHAIR RAMPS

Wheelchair ramps shall be installed in all new curb return construction and in all existing curb returns that are to undergo reconstruction.

306.02.02 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

306.02.03 PREPARATION OF BASE

Bases shall be constructed in conformance with Section 302 AGGREGATE BASES and the applicable standard details.

Reconditioning of existing aggregate bases shall conform to provisions of Section 304 ASPHALT CONCRETE PAVEMENT.

306.02.04 WEATHER LIMITATIONS

The contractor shall conform to applicable provisions of Section 206 CONCRETE STRUCTURES.

306.02.05 FORMS

Form work shall conform to applicable requirements in Section 206 CONCRETE STRUCTURES and the standard details.

Completed form work for curbs, gutters, sidewalks, driveway approaches, and wheelchair ramps shall be approved by the City Engineer prior to placing concrete.

306.02.06 PLACING CONCRETE

Concrete shall be placed with equipment that will provide a dense and homogeneous concrete structure in conformance with the specified thickness, grade, and cross section.

Concrete shall be placed and consolidated in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES.

Concrete shall not be placed until the base and forms have been inspected and approved by the City Engineer.

306.02.07 FINISHING

306.02.07A SIDEWALKS, DRIVEWAY APPROACHES, AND ACCESS RAMPS

Edges, contraction joints, and panel divisions shall be finished with an approved edging tool to provide a clean, rounded edge to the new concrete. Edging tools shall be used in a manner that shall not form ridges on the surface of the concrete.

Sidewalk surfaces shall be divided into panels by marking the surface of the concrete with an appropriate jointing tool. In new construction, the length of the panels shall be equal to the width of the sidewalk, not to exceed 10 feet. Panel division markings shall be straight lines installed transverse to the length of the sidewalk. Contraction joints shall penetrate at least one third the depth of the concrete. Joints shall not exceed ¼" width at the surface.

While the concrete is still green, a light broom finish shall be applied to the surface of driveways, wheelchair ramps, and sidewalks.

Where sections of existing sidewalk are to be removed and replaced, the contractor shall reproduce the existing panel division markings as directed by the City Engineer.

Valve box assemblies, meter boxes, manhole frame and cover assemblies, and similar structures shall be adjusted to the finish surface grade prior to placing the concrete.

306.02.07B CURBS AND GUTTERS

Curbs and gutters shall be constructed independently of, and separated by a cold joint from adjacent concrete construction including sidewalks, driveways, curb ramps, etc. Forms shall be removed after the concrete has taken initial set and while the concrete is still green.

Unless otherwise directed by the City Engineer, horizontal concrete sawcutting equipment shall be used to create new points of accesses (e.g. driveways) in existing curbs. Sawcutting shall extend full depth through the curb and shall result in a smooth top face. Sawn edges shall be ground to a rounded edge.

Honeycombed and other defective concrete shall be removed and replaced as directed by the City Engineer at the contractor's expense.

While the concrete is still green, a broom finish shall be applied to the exposed surfaces of the curb. The broom finish shall be applied parallel to the longitudinal axis of the curb.

306.02.08 CURB DRAINS

The contractor shall furnish and install a minimum of two, three-inch minimum diameter PVC Schedule 40 pipe curb drains to serve each lot. For undeveloped property, the curb drains shall be installed five feet from each property corner or at locations determined by the City Engineer. For developed property, curb drains shall be installed opposite all existing drainage outlets serving the property, or as directed by the City Engineer. Wherever possible, curb drain locations shall be adjusted to coincide with contraction joints in the curb and/or sidewalk.

Curb drains shall be constructed through the curb section and extended to the property line using three-inch Schedule 40 PVC pipe. Curb drains shall be installed transverse to the length of the curb without the use of intermediate angle fittings between the face of the curb and the property line.

The curb drain shall be installed through the sidewalk section such that positive flow from the property line to the gutter is maintained.

PVC pipe shall conform to ASTM D 2241.

306.02.09 CURING

After floating, final surface finishing and brooming, and edging have been completed, and while the pavement surface is still moist, the concrete shall be cured in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES.

306.02.10 JOINTS IN PORTLAND CEMENT CONCRETE

306.02.10A CONTRACTION JOINTS

CURB AND GUTTER

In straight curb, contraction joints shall be installed to a minimum depth equal to one-half the height of the curb. In combination curb and gutter, the contraction joint shall be installed to a minimum depth equal to one-half the thickness of the gutter section.

DRIVEWAY APPROACHES

Contraction joints shall be installed in driveway approaches when the length or width of the approach exceeds 15 feet.

Contraction joints in driveway approaches shall be located as specified in the standard details or as directed by the City Engineer.

CURB DRAINS

Contraction joints shall be installed in curb sections and sidewalks over curb drains. The installation of these joints shall not affect specified minimum contraction joint spacing in the sidewalk or curb.

306.02.10B COLD JOINTS

Concrete pavement, curbs, driveway approaches, wheelchair ramps, and sidewalks shall be separated by cold joints when constructed concurrently.

306.02.11 DOWELS, TIE BARS, REINFORCING

Steel, reinforcing dowels and tie bars shall be placed in conformance with the contract documents, applicable requirements in Section 206 CONCRETE STRUCTURES, or as required by the City Engineer.

306.02.12 PROTECTION OF CONCRETE

The contractor shall protect the concrete in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES.

306.03.00 MEASUREMENT AND PAYMENT

306.03.01 CURBS AND COMBINATION CURB AND GUTTER

Measurement of curb and combination curb and gutter will be made on a linear-foot basis as measured along the face of the curb.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade; supply aggregate; construct base; construct and remove forms; furnish portland cement concrete at the site; and place, consolidate, finish, and cure the concrete in conformance with the contract documents.

306.03.02 SIDEWALKS AND DRIVEWAY APPROACHES

Measurement of sidewalks and driveway approaches will be made on a square-yard basis as determined by surface measurements.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade; supply aggregate; construct base; construct and remove forms; furnish portland cement concrete at the site; and place, consolidate, finish, and cure the concrete in conformance with the contract documents.

306.03.03 WHEELCHAIR RAMPS

306.03.03A PER-EACH BASIS

The construction of wheelchair ramps in existing curb and/or sidewalk will be paid for on a per-each basis as stated in the contract documents.

Payment for each wheelchair ramp will constitute full compensation for materials, labor, and equipment necessary to sawcut the existing concrete; excavate and remove excavated materials; prepare the subgrade and aggregate base; construct and remove forms; furnish portland cement concrete at the site; and to place, consolidate, finish, and cure the concrete in conformance with the contract documents.

306.03.03B INCIDENTAL BASIS

The construction of wheelchair ramps will be considered incidental to other items of work when installed during the construction of new curb and/or sidewalk and no separate payment will be made.

306.03.04 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

307 PAVEMENT MARKINGS

307.01.00 MATERIALS

Pavement markings shall be thermoplastic unless otherwise directed by the City Engineer.

307.01.01 MATERIALS

Acceptable products for extruded thermoplastic shall conform to the approved ODOT Qualified Products List for Longitudinal Markings – A or B as applicable.

307.01.02 PREFORMED THERMOPLASTIC PRODUCTS

Preformed thermoplastic material shall be a resilient white product conforming to AASHTO M249 (except as it is preformed). It shall be capable of conforming to pavement contours, and shall be resistant to motor fuels, lubricants, and hydraulic fluids.

The thermoplastic product shall be capable of fusing to previously applied thermoplastic, and/or fusing to itself when heated with a torch in accordance with manufacturer's instructions.

The product shall contain a minimum 30 percent by weight glass beads, uniformly distributed throughout the entire cross sectional area. Glass beads shall conform to AASHTO M247, Type 1, with a minimum refractive index of 1.50. The surface of the product shall reveal sufficient glass beads, without hand application of additional beads to demonstrate a uniform retroreflection when tested in accordance with ASTM E 1710, with an initial minimum intensity reading of 500 $mcd \cdot m^{-2} \cdot lx^{-1}$ as measured with an LTL-2000 or LTL-X Retroreflectometer.

The finished surface shall provide a minimum resistance value of 45 BPN when tested in accordance with ASTM E303.

Preformed thermoplastic products shall present visual indicators to demonstrate correct installation with proper molten state fusion and surface adhesion achieved.

Acceptable preformed thermoplastic for pavement markings: PreMark as manufactured by Ennis-Flint.

307.02.00 CONSTRUCTION

307.02.01 GENERAL CONDITIONS

307.02.01A MANUFACTURER'S REPRESENTATIVE

The Contractor shall apply pavement markings only under the direct observation of a manufacturer's representative. Application of pavement markings shall proceed only upon the satisfaction of the manufacturer's representative and the Engineer as to surface and environmental conditions.

307.02.01B COMPLETION TIME

Pavement markings shall be completed within 48 hours of the final placement of the asphalt concrete wearing surface. Timing of placement on Portland cement concrete surfaces shall conform to manufacturer's recommendations. Curing time delays, if any, shall not be cause for an extension of contract time.

307.02.01C SURFACE PREPARATIONS

The Contractor shall ensure the pavement surface is dry and free of dirt, dust, chemicals, and oily surfaces at the time of application of pavement markings.

The Contractor shall remove painted pavement markings prior to application of thermoplastic pavement markings at any location where the thermoplastic will be applied.

307.02.01D ENVIRONMENTAL CONDITIONS

Pavement markings shall not be applied within 24 hours of rainfall in any amount. Pavement markings shall not be applied when rainfall is forecast during the time of marking operations.

Surface temperatures shall be at least 40 degrees Fahrenheit and rising prior to application of pavement markings.

307.02.01E PORTLAND CEMENT CONCRETE SURFACES

Application of pavement markings on Portland cement concrete surfaces shall be in accordance with

manufacturer's instructions, and shall utilize such sealants, primers, microgrinding, or other surface treatments as may be required or recommended by the manufacturer.

307.02.02 LONGITUDINAL PAVEMENT MARKINGS

Construction of longitudinal pavement markings shall conform to the requirements of Section 00865 of the *Oregon Standard Specifications for Construction* Method A (Profiled) and/or Method B (Non-Profiled).

Applied longitudinal pavement markings shall not deviate by more than one half inch from the design layout on straight runs, and no more than one inch from design layout along curves, as measured from centerline of stripe to the design location.

Longitudinal pavement markings shall maintain unwavering alignments with smooth transitions. Offsets from parallel pavement markings shall be maintained at a consistent distance. Markings shall be applied without splatter, and shall have clean edges, and start and stop ends.

307.02.03 STOP BARS AND CROSSWALK MARKINGS

Stop Bars and Crosswalk Markings shall be constructed using preformed thermoplastic products measuring no less than 125 mils (3.15 mm) in thickness.

307.02.04 SYMBOLS, AND LEGENDS

Symbols and legends shall be constructed using preformed thermoplastic products measuring no less than 125 mils (3.15 mm) in thickness.

As an exception to the above, bicycle lane symbols located entirely within a defined bicycle lane shall measure no less than 90 mils (2.29 mm) in thickness.

307.03.00 MEASUREMENT AND PAYMENT

307.03.01 LONGITUDINAL PAVEMENT MARKINGS

Longitudinal pavement markings will be paid on a linear foot basis, identified separately for each size (width) of striping, unless otherwise identified in the contract documents.

Longitudinal pavement markings will be measured for the length of material actually applied. Gaps or spacings between pavement markings will not be included in the measurement.

307.03.02 STOP BARS AND CROSSWALK MARKINGS

Stop Bars and Crosswalk Markings shall be paid for on a square-foot basis, unless otherwise identified in the contract documents.

307.03.03 SYMBOLS AND LEGENDS

Symbols and legends shall be paid for on a per-each basis, unless otherwise identified in the contract documents.

**** END OF DIVISION ****

401 PIPE AND FITTINGS FOR SANITARY SEWERS AND STORM DRAINS

401.01.00 MATERIALS

It is not intended that materials listed herein are to be considered equal or generally interchangeable for all applications. The type, class, and size of pipe, as applicable, will be specified in the contract documents for all City improvement projects. The City Engineer will determine material specifications for other applications.

401.01.01 CERTIFICATION OF MATERIALS

The contractor shall furnish certification for construction materials when such information is requested by the City Engineer. Certification submitted to the City Engineer shall be sufficient to show the materials meet the specified requirements. Costs associated with providing certification, including materials and testing, shall be borne by the contractor.

401.01.02 PIPE

401.01.02A DUCTILE IRON PIPE

Ductile iron pipe shall conform to Subsection 501.01.01 DUCTILE IRON PIPE.

401.01.02B CONCRETE PIPE

NON-REINFORCED CONCRETE PIPE

Non-reinforced concrete pipe shall conform to ASTM C 14 and the following additional requirements:

(1) Cement shall be Type II conforming to ASTM C 150.

(2) The minimum portland cement content shall be 564 pounds per cubic yard.

(3) The water/cement ratio shall not exceed 0.49.

REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall conform to ASTM C 76 with Wall B design and the following additional requirements:

(1) Cement shall be Type II conforming to ASTM C 150.

(2) The minimum portland cement content shall be 564 pounds per cubic yard.

(3) The water/cement ratio shall not exceed 0.49.

(4) The pipe shall have circular reinforcement.

(5) The area of the outer circular reinforcing cage shall not be less than 75 percent of the inner cage on pipes 27 inches in diameter and larger.

401.01.02C POLYVINYL CHLORIDE (PVC) PIPE

NON-PRESSURE PVC PIPE

PVC pipe for non-pressure applications shall conform to ASTM D 3034 SDR 35 for pipe sizes 4” through 15” diameter and ASTM F 679 SDR 35 for pipe sizes 18” through 27” diameter.

PRESSURE PVC PIPE

PVC pipe for pressure applications shall conform to AWWA C900.

401.01.02D STEEL AND ALUMINUM ALLOY PIPE

Steel and aluminum alloy pipe are not used for standard applications. Designs for special applications will be reviewed for approval on a case-by-case basis.

401.01.02E SANITITE HP POLYPROPYLENE PIPE

SaniTite HP polypropylene pipe shall be for storm drain applications. Designs for sanitary sewer applications shall be considered on a case-by-case basis.

12-inch through 30-inch SaniTite HP dual pipe shall have a smooth interior and annular exterior corrugations; 30-inch through 60-inch SaniTite HP triple wall pipe shall have a smooth interior and exterior surfaces with annular inner corrugations.

(1) 12-inch through 30-inch (300 to 750 mm) dual wall pipe shall meet ASTM F2736

(2) 30-inch through 60-inch (750 to 1500 mm) triple wall pipe shall meet ASTM F2764

(3) 12-inch through 60-inch (300 to 1500 mm) pipe shall have a minimum pipe stiffness of 46 pii when tested in accordance with ASTM D2412.

Polypropylene compound for pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2736, ASTM F2764, and AASHTO M330, for the respective diameters.

401.01.03 FITTINGS

Fittings shall be of sufficient strength to withstand all handling and load stresses, including pressure testing, that will be encountered in the work.

Fittings shall be supplied with joint connections of the same type used on the pipe.

401.01.03A CONCRETE FITTINGS

Concrete fittings shall be fabricated by the manufacturer of the concrete pipe using materials conforming to applicable requirements in Subsection 401.01.02B CONCRETE PIPE. Concrete fittings shall have the same strength classification as the concrete pipe on which the fittings are being used.

401.01.03B DUCTILE AND CAST IRON FITTINGS

Ductile and cast iron fittings shall conform to applicable requirement in Subsection 501.01.04 DUCTILE AND CAST IRON FITTINGS.

401.01.03C PVC FITTINGS

PVC fittings shall conform to requirements for PVC pipe in Subsection 401.01.02 PVC NON-PRESSURE PIPE.

Ductile iron fittings conforming to requirements in Subsection 501.01.04 DUCTILE AND CAST IRON FITTINGS shall be used with PVC C900 pressure pipe.

401.01.03D FITTINGS FOR STEEL AND ALUMINUM ALLOY PIPE

Fittings used on steel and aluminum alloy pipe shall conform to AASHTO M 196.

The type and configuration of fittings used with steel and aluminum alloy pipe will be specified in the contract documents.

401.01.03E FITTINGS FOR SANITITE HP POLYPROPYLENE PIPE

Fittings shall conform to ASTM F2736, ASTM F2764, and AASHTO M330, for the respective diameters. Bell and spigot connections shall utilize a welded or integral bell and spigot with gaskets meeting ASTM F477. Fittings and connections shall provide a watertight connection according to the requirements of ASTM D3212.

401.01.04 PIPE AND FITTING CONNECTIONS

401.01.04A LUBRICANTS FOR JOINT GASKETS

Lubricants used for jointing materials shall be approved by the manufacturer of the gasket and/or pipe and shall be consistent with the intended use of the piping system.

401.01.04B CONCRETE PIPE

Concrete pipe shall be supplied with bell and spigot-type joint connections. Bell and spigot pipe joints shall be sealed with O-ring style rubber gaskets conforming to ASTM C 443. Joints shall be able to withstand hydrostatic pressures to 13 psi (30 ft.). Spigot pipe ends with a confined O-ring gasket design shall be used for pipe 24 inches in diameter and larger.

Concrete pipe with tongue and groove-type joints shall be used only where approved by the City Engineer. Where approved for use, tongue and groove pipe joints shall be sealed with mortar. Mortar shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

401.01.04C DUCTILE IRON PIPE

The type of joint connection for ductile iron pipe will be specified in the contract documents. Rubber gaskets shall conform to applicable requirements in Subsection 501.01.06 PIPE JOINTS.

401.01.04D PVC PIPE

PVC pipe shall have push-on-type joint connections. Rubber gaskets for PVC pipe shall conform to ASTM F 477 with joints capable of withstanding hydrostatical testing to 10.8 psi (25 feet) for 10 or more minutes by the criteria defined in ASTM D 3212.

For PVC pipe six inches in diameter and smaller, where a plain end of PVC pipe is to be connected to the plain end of another type of plastic pipe, a solid sleeve, gasketed coupler shall be used. Flexible and/or mechanical couplers shall be prohibited from this application.

401.01.04E STEEL AND ALUMINUM ALLOY PIPE

Couplings and bands used with steel and aluminum alloy pipe shall conform to AASHTO M 196.

401.01.04F SANITITE HP POLYPROPYLENE PIPE

Bell and spigot connections shall utilize a welded or integral bell and spigot with gaskets meeting ASTM F477. Fittings and connections shall provide a watertight connection according to the requirements of ASTM D3212.

401.01.05 FLEXIBLE, MECHANICAL COUPLINGS AND ADAPTERS

Flexible, mechanical couplers and adapters shall be used for connecting plain ends of non-compatible types or sizes of pipe and for the installation of tee connections and other fittings in existing lines.

Couplers and adapters shall be supplied with No. 305 stainless steel bands.

Acceptable flexible mechanical couplers and adapters:

Calder
Fernco, Inc.

401.01.06 STANDARD CLEANOUT FRAME AND COVER

Standard frame and cover assemblies shall be cast iron. "SEWER" shall be cast into the cover for sanitary sewer service lateral cleanouts. "STORM" shall be cast into the cover for storm drain service cleanouts. The height of the assembly frame shall be 18 inches as measured from the bottom of the assembly sleeve to the top of the flange face. Adjustable valve boxes shall be supplied without bottom flanges.

Acceptable valve box assemblies:

Olympic Foundry, Inc.	Part No. VB 910
Kiswok Industries Pvt. Ltd.	Part No. 910
East Jordan Iron Works	Part No. 00363912

401.02.00 CONSTRUCTION

401.02.01 EXCAVATION AND BACKFILL

Excavation and backfill shall conform with applicable requirements of Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

401.02.02 TOLERANCES IN SPECIFIED LINE AND GRADE

The maximum allowable deviation from specified line and grade for sanitary sewers and storm drains is 0.05 of a foot for line and 0.02 of a foot for grade, provided such variations in grade do not result in a pipe or run of pipe having a level or reverse slope.

Impounding of water, regardless of amount, will not be permitted in any section of the completed sanitary sewer or storm drain system.

Any pipe or run of pipe that has not been installed within the allowable tolerance for line and grade or impounds water to any extent shall be removed and reinstalled or replaced as necessary to bring the work into compliance with the specified requirements.

401.02.03 DELIVERY AND ACCEPTANCE OF MATERIALS

Construction materials that are damaged or do not have approved certification shall be immediately removed from the job site or stockpiled in a location away from, or separate from, the work area.

401.02.04 PIPE INSTALLATION

Sheet shoring and movable trench shields shall be placed, removed, and/or operated in conformance with applicable requirements in Subsection 204.04.03 TRENCH EXCAVATION AND SHORING.

Cracked, broken, or otherwise defective pipe and fittings shall not be used. Pipe shall be lowered into the trench by slings or other suitable means.

Pipe and fittings with damaged protective coatings shall be repaired using methods and materials recommended by the manufacturer of the pipe and/or fittings.

Sewer pipes 36 inches or smaller in diameter entering or leaving manholes or other structures shall have a flexible joint within 18 inches of the exterior wall. Pipes larger than 36 inches in diameter shall have this flexible joint within a distance from the exterior wall equal to one-half the inside pipe diameter.

Fittings shall not be installed closer than 12 inches to any joint in a main line sewer that is 12 inches or less in diameter.

401.02.04A PIPE LAYING

The pipe laying operation shall proceed upgrade with the spigot or plain ends of the pipe pointing in the direction of flow.

When pipe laying operations are not in progress, the open end of the pipe shall be covered to prevent entry of rock and debris. Each section of pipe shall be cleaned as necessary to remove excessive amounts of dirt or other debris that may not be removed during the flushing operation.

Pipe alignment shall not be deflected from a straight line, in either the vertical or horizontal plane, unless such deflections are specified in the contract documents or approved by the City Engineer.

After installation, each length of pipe shall be covered with a sufficient amount of backfill to maintain the pipe at the specified line and grade during subsequent construction operations.

401.02.04B CUTTING PIPE

All types of pipe shall be sawcut when special lengths or end configurations are needed to complete the work as specified. Striking concrete pipe with hammers or other similar tools to induce transverse cracking of the pipe barrel is not permitted. PVC and ductile iron pipe ends that have been sawcut shall be beveled as necessary to prevent damage to the gaskets in push-on joint connections.

Sawcut ends on steel and aluminum alloy pipe shall be filed or trimmed as necessary to remove all sharp edges and slivers of metal.

401.02.04C SEWER SERVICE AND STORM DRAIN SERVICE LATERALS

Sewer service laterals shall have a minimum diameter of four inches and shall be installed with a minimum slope of ¼ inch per foot of run. Minimum depth of service laterals at the edge of the easement or public right-

of-way shall be 4½ feet below finish surface grade. More depth may be required to accommodate existing site conditions.

Individual sewer service laterals shall not be connected to manholes unless specified as such in the contract documents or approved by the City Engineer.

The maximum line or grade change made with any one fitting shall not exceed 45°.

Ends of service lines and service fittings shall be provided with approved watertight plugs, caps, or stoppers, suitably braced to prevent blowoff during internal air testing. Such plugs or caps shall be removable without damage to the pipe or fitting.

Cleanout risers shall be installed plumb and centered on the tee.

Service laterals installed other than perpendicular to the public main shall have 12-gauge minimum thickness tracer wire installed. Tracer wire shall be accessible from the property line cleanout and shall extend to the public main, centered over the service lateral pipe.

Deep trench service connections shall be constructed as specified in the contract documents and the applicable standard detail.

401.02.04D LOCATING SEWER FORCE MAINS

Sanitary sewer force mains shall be located by installing Omni MarkerTM locate balls, Model 162, green in color. Locate balls shall be placed every 40 feet along the length of the pipe in tangent sections; and every 20 feet along the length of the pipe where the pipe is deflected along a curve. Locate balls shall be located over tees, elbows, and other appurtenances except where a structural component is identifiable at the surface. Locate balls shall be installed within four feet of finished grade, centered over the pipe.

401.02.05 PIPE AND FITTING CONNECTIONS

Pipe and fitting ends shall be cleaned and properly aligned before making the joint connection.

Joints shall be fitted together as tightly as the joint design will permit. Gaps at pipe joints shall not exceed one half inch or that recommended by the manufacturer of the pipe and fittings, whichever is more restrictive.

Pipe and fitting connections shall not be deflected in excess of that recommended by the manufacturer of the pipe and fittings.

Fabricated fittings and connections incorporating materials or methods of construction not specified herein or in the contract documents shall not be used in the work.

401.02.05A CONCRETE PIPE

When mortared joints are specified for tongue and groove pipe connections, the entire joint for the full circumference of the pipe shall be brushed clean and completely filled with mortar.

Bell ends of pipe with bell and spigot joints shall be cleaned of rock and other debris prior to assembly of the joint. Spigot ends of pipe with a confined-gasket design shall be cleaned and the gasket lubricated prior to assembly of the joint.

401.02.05B DUCTILE IRON PIPE

Ductile iron pipe and fitting connections shall be made in conformance with Subsection 501.02.07C PIPE CONNECTION PROCEDURES.

401.02.05C STEEL AND ALUMINUM ALLOY PIPE

Rock and dirt shall be removed from between the connecting band and the pipe ends prior to tightening the connecting band bolts.

When installing saddle-type fittings, all connecting bolts shall be installed through the pipe wall such that the threaded ends of the bolts will be on the outside of the pipe.

401.02.06 MECHANICAL PIPE COUPLERS AND ADAPTERS

Prior to installing mechanical couplers and adapters, pipe ends shall be sawcut as necessary to produce an edge that is free of cracks or other irregularities. Pipe ends shall be cut perpendicular to the length of the pipe.

After installation of the coupler or adaptor, pipe zone materials shall be thoroughly compacted to maintain proper alignment of the flow line and to prevent any movement of the pipe ends.

401.02.07 REPAIR OF EXISTING UTILITIES

Existing utilities damaged as a result of the contractor's operations shall be repaired in conformance with applicable requirements in Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

401.02.08 WATER LINE CROSSINGS

In locations where new sanitary sewers cross over an existing water line or under an existing water line with less than 1½ feet of clearance between the two pipes, the contractor shall substitute the specified sewer pipe with a full length (20 feet minimum) of Class 50 ductile iron pipe of equivalent size, centered at the crossing point.

Watertight, mechanical couplers or adapters shall be used to connect the sewer pipe to the ductile iron pipe.

401.02.09 CONCRETE PIPE ENCASEMENT AND ARCH SUPPORT

The installation of concrete encasement and arch support for sanitary and storm drain pipe shall conform to applicable requirements in Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK and as shown on the appropriate standard detail.

401.02.10 CONCRETE CLOSURE COLLARS

The use of concrete closure collars in lieu of mechanical-type couplers or other specified or approved connection materials and procedures is not permitted unless specified in the contract documents or approved by the City Engineer.

Where specified in the contract documents or approved by the City Engineer, concrete closure collars shall be constructed in conformance with the details provided and the following additional requirements:

(1) Concrete shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

(2) Concrete shall be contained in forms constructed in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES. Backfill materials or earth shall not be used in lieu of forms.

Concrete shall be confined to the specified dimensions of the collar. Forms shall be constructed such that the concrete will not be allowed to enter the pipe or structure around which the collar is being constructed.

(3) Concrete reinforcement materials shall be supplied and placed in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES.

(4) Surfaces of pipe and fittings that are to come into contact with the concrete shall be thoroughly washed to remove all dirt and loose material.

(5) Concrete shall not be placed on non-compacted base materials or in water.

(6) The entire amount of concrete necessary to construct the collar shall be placed in one continuous operation. If the concrete is allowed to harden or obtain initial set prior to completion of the collar, the contractor shall remove the concrete and reconstruct the collar.

(7) Concrete shall be consolidated in conformance with applicable requirements in Subsection 206.03.05 HANDLING AND PLACING.

The concrete shall be thoroughly consolidated around the pipe or structure as necessary to ensure no voids will be formed in the collar.

(8) Concrete shall be allowed to obtain initial set prior to placing backfill over the collar. Concrete shall be allowed a minimum of seven days of cure time prior to compacting the backfill over and adjacent to the collar.

401.02.11 MARKERS

Pipe ends that are to be covered with backfill shall be marked with a 2" × 4" lumber marker.

Markers shall be in one piece. Splicing of lumber used for markers is only permitted in situations where the depth of the pipe is in excess of standard lumber lengths.

Markers shall be installed in a vertical position with the bottom end of the marker against the end of the pipe. Markers shall be extended a minimum of 12 inches above finish grade of the ground surface. Markers that are broken, too short, or are not installed vertically in the ground shall be replaced by removing the backfill and replacing and/or repositioning the marker.

The entire portion of the marker above ground level shall be painted with weatherproof white paint. After the paint has dried, weatherproof black paint or other permanent materials shall be used to neatly indicate the distance from the ground surface at the marker to the top of the pipe.

In areas where it is not practical to extend markers above the ground surface, as determined by the City Engineer, the tops of the markers shall be installed flush with the ground surface.

401.02.12 SURFACE RESTORATION

Surface restoration shall be in conformance with applicable requirements of Section 208 RESURFACING and Section 209 CLEANUP AND SITE RESTORATION.

401.02.13 TESTING SANITARY SEWERS AND STORM DRAINS

Gravity sanitary sewers including service laterals and appurtenances shall successfully pass the air test prior to final acceptance and shall be free of leakage and visible infiltration of water. Pressure sewer lines shall be tested in accordance with the contract documents.

Sewer pipe 30 inches in diameter and larger may be tested using an approved pneumatic joint testing device. Such testing methods and equipment shall meet the approval of the City Engineer.

Sanitary sewers shall not be coated internally or externally with any substance of any kind in an effort to improve the performance of the pipe when tested.

The City Engineer may require testing of manhole-to-manhole sections as they are completed in order to expedite the acceptance of completed portions of the system and allow connections prior to the whole system being completed.

Deflection testing shall be performed on sanitary sewers and storm drains when such systems are constructed of PVC pipe.

401.02.13A AIR TESTING GRAVITY SANITARY SEWERS

The entire sewer system shall be cleaned prior to air testing. The system shall be flushed as many times as necessary to remove all debris.

Air testing shall be accomplished after all service connections, manholes, and backfilling and compaction operations have been completed between the stations to be tested.

The contractor shall furnish all necessary testing equipment and shall perform the tests in a manner satisfactory to the City Engineer. Testing equipment shall provide observable and accurate measurements of air leakage under the specified conditions. A pressure gauge having minimum divisions of 0.10 psi and an accuracy of 0.0625 psi shall be used for testing. Air used for testing shall pass through a single control panel. The City Engineer may require, at any time, a calibration check of the instrumentation used.

The testing equipment shall include a pressure relief device designed to relieve pressure in the sewer under test at 10 psi or less and shall allow for continuous monitoring of the test pressures in order to avoid excessive pressure.

The City Engineer will determine the height of the water table at the time of testing.

TESTING METHOD

The time-pressure drop method shall be used for all air testing. The test shall be conducted in conformance with the following procedures:

(1) The sewer system shall be cleaned prior to testing.

(2) The required test pressure shall be increased 0.433 psi for each foot of average water depth over the invert of the pipe at the time of testing.

(3) Air shall be added slowly to the section of sewer being tested until the internal air pressure is raised to 4.0 psi plus additional pressure as calculated in number (2) above.

(4) After the specified test pressure is reached, the internal air temperature shall be allowed to stabilize for at least two minutes prior to adding additional air to maintain test pressure.

(5) The air supply shall be disconnected after the temperature stabilization period has passed and the pressure has been elevated to the specified test pressure.

(6) The City Engineer will determine and record the amount of time in seconds that is required for the internal air pressure to drop from 3.5 psi to 2.5 psi greater than the average back pressure of any ground water that may be over the pipe.

BASIS OF ACCEPTANCE

The sewer system shall be considered acceptable if the test section does not lose air at a rate greater than 0.003 cfm per square foot of internal sewer surface, or two cfm, whichever is greater.

This specification shall also be considered as satisfied if the time, as measured by the preceding described method, is not less than the time as computed according to the following procedure:

(1) Record the diameter in inches (d) and the length in feet (L) of all pipe in the section to be tested, including the house branches, in a table similar to the one shown below:

Diameter Inches	Length Feet	$K = 0.011\ d^2L$	$C = 0.0003882dL$
_____	_____		
Total K and C values =		_____	_____
Time required by specification		=	_____ Seconds
Actual time as determined by test		=	_____ Seconds

(2) Compute values for K and C by using the above formulas (d=inside diameter in inches and L=length in feet) and record them in the table.

(3) Add all values of K and all values of C for the section being tested.

(4) If the total of all the C values is less than one, the time required by the specifications shall be the total of the K values.

(5) If the total of all the C values is more than one, the time required by the specifications shall be found by dividing the total of all the K values by the total of all the C values. The quotient is the time required by the specifications.

401.02.13B DEFLECTION TEST FOR PVC PIPE

A deflection test shall be performed for sanitary sewers and storm drains constructed of PVC and other flexible conduits. Deflection testing shall be performed by the contractor and shall be conducted after the trench backfill and compaction operations have been completed.

The deflection test shall be conducted by pulling an approved solid, pointed mandrel or a variable deflection measuring gauge through the completed pipeline. The diameter of the mandrel shall be 95 percent of the internal pipe diameter as calculated per the methodology described in ASTM D3034/ASTM F679.

401.02.13C TELEVISED INSPECTION OF SANITARY AND STORM SEWERS

The owner will conduct a television inspection of all sewer and storm drain lines upon successful completion of required testing and cleaning. A video recording will be submitted to the Engineer in a digital DVD format.

Any discrepancies noted by the City Engineer during the television inspection shall be corrected by the contractor prior to acceptance of the system. The contractor shall submit testing documentation and a new video recording to the City Engineer in a digital DVD format, which demonstrates the correction of the discrepancies.

Contractors, when hired to inspect newly constructed or rehabilitated pipe for the City's sewer or storm system, shall be certified operators per the National Association of Sanitary Sewer Companies (NASSCO) Pipe Assessment Certification Program (PACP). Inspections, the inspection report, and CCTV data shall be provided as NASSCO compliant export files and shall be easily transferrable to the City's asset management system.

401.02.13D NON-COMPLIANCE WITH SPECIFIED TEST REQUIREMENTS

The contractor shall replace or repair, in a manner satisfactory to the City Engineer, any section of pipe not meeting the specified test requirements.

Infiltration of ground water in an amount greater than 3.84 gallons per day per inch diameter per 100 feet, following a successful air test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the pipeline has occurred. The contractor shall locate and correct such failures occurring within the warranty period in a manner satisfactory to the City Engineer and at the contractor's sole expense.

401.03.00 MEASUREMENT AND PAYMENT

401.03.01 SANITARY SEWER AND STORM DRAIN PIPE

Measurement and payment for installation of sanitary sewer and storm drain pipe will be made on a linear-foot basis within the limits shown in the contract documents.

Pipe will be measured horizontally from center-to-center of manholes, inlets, catch basins, and similar structures, or to the ends of the pipe, whichever is applicable.

Payment for pipe installation shall constitute full compensation for all labor; equipment; materials; clearing and grubbing; trench excavation; provision and installation of pipe bedding, pipe zone material, and backfill; compaction operations; anchorage and reaction blocking for pressure systems; flushing and cleaning; testing; all fittings, spools, and mechanical couplings required to complete the pipeline as designed; connection to and abandonment of existing pipe systems; installation of markers; and any other incidental expenses necessary to construct the pipeline in conformance with the contract documents.

401.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

402 MANHOLES, INLETS, AND CATCH BASINS

402.01.00 MATERIALS

402.01.01 BASE ROCK

Base rock shall conform to requirements for aggregate base materials in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

402.01.02 PORTLAND CEMENT CONCRETE AND MORTAR

Portland cement concrete and mortar shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

402.01.03 NON-SHRINK GROUT

Non-shrink grout shall conform to applicable requirements in Subsection 205.01.04 PORTLAND CEMENT GROUT.

Non-shrink grout shall be placed with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout being used. Water shall not be used as a substitute for the commercial bonding agent.

402.01.04 MANHOLES

Precast, reinforced concrete manhole bases, barrel sections, cones, flat slab tops, and grade rings shall conform to ASTM C 478 and shall be used in the construction of all manholes.

Standard, 48-inch diameter manhole components shall be used for pipe that is 24 inches in diameter or smaller. Manhole diameter and requirements for components for larger pipe will be specified in the contract documents.

Permeability tests of manhole components may be required by the City Engineer. When such testing is required, the materials to be tested will be selected at random by the City Engineer from stockpiled materials that are to be supplied for the job. Permeability testing shall be conducted at the location where the materials were manufactured. Test specimens shall meet permeability test requirements of ASTM C 14 and ASTM C 497.

402.01.04A CONES AND FLAT SLAB MANHOLE TOPS

Concentric cones with precast keyway grooves shall be used in the construction of manholes that are over six feet in depth. Cones shall have the same wall thickness and reinforcement as the manhole riser sections.

Concentric short cones (18" or 24") or concentric flat slab manhole tops with precast keyway grooves shall be used in the construction of manholes that are six feet deep and less. Flat slab manhole tops shall be reinforced to withstand AASHTO H-20 loadings.

402.01.04B MANHOLE BASES

Manhole bases shall be manufactured such that the base riser section is integral with the base slab.

Manhole bases shall be provided with core-drilled openings and flexible, manhole-to-pipe connectors for the connection of stubouts.

Openings for stubouts in storm drain manhole bases shall be either core-drilled or formed by blocking out a section of the wall during the casting process.

402.01.04C MANHOLE GRADE RINGS

Concrete grade rings shall have precast keyway grooves and shall be a maximum of six inches in height.

402.01.04D JOINTING MATERIALS

Preformed, plastic gasket material conforming to requirements of AASHTO M-1-98 or confined O-ring-type joints with rubber gaskets conforming to ASTM C 990 shall be used in the assembly of manhole components.

402.01.04E MANHOLE FRAME AND COVER ASSEMBLIES

Castings shall be true to the size, weight, and tolerances shown on the standard details. Castings shall display the Fish Logo or the City Logo specified in Standard Detail No. 407 "Manhole Frame And Cover" Storm and Sanitary Sewers, respectively. Manholes requiring a lock-down lid will conform to the requirements of Standard Detail No. 405 "WATERTIGHT MANHOLE FRAME AND COVER".

The cover shall fit in the frame without binding and shall bear evenly on the seat without rocking. Frame and cover assemblies shall be able to sustain a concentrated load of 40,000 pounds applied at the center of the cover through a 2½-inch plug.

The castings shall be free of shrink cavities, cold shuts, cracks, excessive porosity, or any other defects that may impair serviceability. Frame and cover assemblies that have been repaired subsequent to casting, regardless of the type of defect or repair, shall not be used in the work. Castings shall be clean and shall be free of paint and other coatings.

Materials shall conform to ASTM A 48, Class 30B, with the following revisions:

Tensile Strength	30,000 psi
Traverse Strength (1.2-inch diameter bar – 18-inch centers):	
Load - Pounds	2,600 - 3,000
Deflection - Inches	0.22 - 0.34
Brinell Hardness (as cast)	173 - 200

The foundry shall certify as to the tensile and traverse properties and the Brinell hardness. The owner reserves the right to require a rough transverse bar (size of bar 1.2-inch diameter by 20 inches long) and/or a tensile bar as per ASTM A 48 for each 20 castings or for each heat when less than 20 castings are made.

Cap screws and washers for tamper proof and watertight manhole covers shall be stainless steel with 60,000 psi minimum tensile strength conforming to ASTM A 4 53.

402.01.05 STORM DRAIN INLETS AND CATCH BASINS

Precast, reinforced concrete storm drain inlet and catch basin bases, extension rings, and tops (for curb inlets) shall conform to ASTM C913. Concrete risers for extensions shall be a minimum of 4 inches in height and shall have the same wall thickness as the base section.

402.01.05A FRAME AND GRATE ASSEMBLIES FOR CATCH BASINS

Frame and grate assemblies for catch basins shall be fabricated of steel conforming to ASTM A 36 in accordance with the specifications shown on the standard details.

All connections shall be welded. Welding shall conform to applicable requirements of the American Welding Society.

The grate shall fit in the frame without binding and shall bear evenly on the seat without rocking.

402.01.05B TOP SECTIONS FOR CURB INLETS

Acceptable precast, reinforced concrete top sections for storm drain inlets:

Model No. CI-30-23FC as manufactured by Utility Vault Co., Wilsonville, Oregon.

402.01.06 PIPE AND FITTINGS

Pipe and fittings used in the construction of manholes, inlets, and catch basins shall conform to applicable requirements in Section 401 PIPE AND FITTINGS FOR SANITARY SEWERS AND STORM DRAINS.

402.02.00 CONSTRUCTION

402.02.01 EXCAVATION AND BACKFILL

Excavation and backfill shall conform with applicable requirements of Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

Backfill around manholes, inlets, catch basins, and other appurtenances shall be the same type as the adjacent trench backfill.

402.02.02 MANHOLES

Base rock shall be graded and thoroughly compacted before placing the precast base section. The manhole base shall be fully and uniformly supported by the base rock at the specified grade and alignment and shall be set such

that the top of the base section is level and plumb. The use of spacers between riser sections to accommodate an out-of-plumb base section is not permitted.

Cracked, broken, or otherwise damaged precast manhole bases, riser sections, and cones shall not be used in the construction of sanitary sewer manholes.

Components of sanitary sewer and storm sewer manholes shall be joined with the use of preformed, plastic gasket material, or butyl rubber gasket material. Gasket material shall be installed in accordance with the manufacturer's recommendations. Butyl rubber gasket materials shall conform to the requirements of AASHTO M-198, SS-S-00210 (210A), and ASTM C-990. Joint surfaces shall be cleaned and free of dirt and other debris prior to installing the gasket material.

Preformed, plastic gasket material shall be used in joining components of sanitary sewer manholes. Joint surfaces shall be cleaned of dirt and other debris prior to installing the gasket material. Preformed gaskets shall be installed in accordance with the manufacturer's recommendations. Mortar may be used in the assembly of storm drain manhole components.

Manhole channels shall be constructed in conformance with the appropriate standard detail. Water and debris shall be removed from precast base sections prior to placing concrete for the channel.

Channels shall be constructed with troweled surfaces and smooth transitions at all changes in direction. Channel bottoms shall not impound water. The channel configuration shall allow a three-foot long by six-inch diameter television camera assembly to be placed into, or removed from, the pipe without difficulty.

402.02.02A CAST-IN-PLACE MANHOLE BASES

Cast-in-place manhole bases shall be constructed only where specified in the contract documents or approved by the City Engineer.

Construction of cast-in-place manhole bases shall conform to the applicable standard detail and additional requirements specified herein.

The concrete for the base shall be contained in forms as necessary to conform to the specified requirements. Rock backfill, earth, or similar materials shall not be used as means to contain concrete.

Pipe stubouts shall be placed at the specified grade and alignment prior to placing concrete.

Concrete shall not be placed in water.

The concrete shall be consolidated as necessary to provide a watertight seal between the base and the first riser section and around all pipe connections.

The first precast riser section shall be placed in position on precast piers. The base riser section shall be level and plumb.

402.02.02B PIPE CONNECTIONS TO NEW MANHOLES

Openings for pipe connections shall be core-drilled, and shall be fitted with flexible, manhole to pipe connectors. Pipe connections to manholes shall be watertight.

402.02.02C DROP CONNECTIONS

Where possible, drop connection assemblies shall be installed on the outside of the manhole. Outside drop connections shall be constructed in conformance with the contract documents and the appropriate standard detail.

Inside drop connection assemblies will only be permitted where specified in the contract documents or approved by the City Engineer. Where permitted, inside drop assemblies shall be constructed in conformance with details contained in the contract documents and as approved by the City Engineer.

402.02.02D ADJUSTMENT OF MANHOLES TO GRADE

The frame and cover assembly shall be adjusted to finish grade with precast concrete grade rings. The maximum distance between the top of the manhole cone section and final surface grade shall not exceed 15 inches. The joints between grade ring extensions shall be watertight.

After final surface restoration, finish elevation of the manhole frame and cover assemblies shall be within .01 of a foot of the adjacent street grade.

If the difference in elevation exceeds .01 of a foot, a four-foot by four-foot square of asphalt shall be removed and the entire area excavated to a depth of ten inches below finish grade of the street. Concrete shall be placed to a depth of eight inches within the entire cut out area. The concrete shall be covered with a two-inch lift of class C asphalt.

See the appropriate standard detail for additional requirements.

CONCRETE SURFACES

When located in concrete surfaces, manhole frame and cover assemblies shall be adjusted to finish grade prior to replacing the concrete surface.

The frame and cover assembly shall be adjusted to finish grade with precast concrete grade rings. Grade rings shall be limited to a maximum height of 12 inches. Grade rings shall be set in mortar with sides plumb and tops level. The joints between grade ring extensions shall be watertight.

402.02.02E LEAKAGE TESTING OF MANHOLES

Completed sanitary sewer and storm drain manholes shall be subjected to leakage testing when such testing is determined to be necessary by the City Engineer.

Any visible infiltration of water in sanitary sewer manholes will be considered unacceptable.

Sanitary sewer manholes that exhibit visible water infiltration or do not pass leakage testing shall be repaired by the contractor using materials and/or methods approved by the City Engineer.

Any repairs made necessary by a leakage test failure or the presence of visible water infiltration shall be effective in preventing the infiltration of water under a pressure consistent with that which is obtained by filling the manhole with water.

The contractor shall conduct leakage testing using the following method:

VACUUM TESTING

Contractor shall plug all openings to the manhole and conduct vacuum testing in conformance with the requirements of ASTM 1244 and this Section.

The manhole shall be evacuated to create a minimum vacuum of 10" mercury (Hg). The vacuum shall be maintained for the minimum times indicated on the chart below. The test shall fail if the vacuum loss is greater than 1" Hg. (Note: 1" Hg = 0.4898 psi at 60˚ F)

Test Times By Manhole Depth And Diameter					
Depth, Feet	**Diameter**, Inches				
	48	54	60	66	72
	Time, Seconds				
8 or less	20	23	26	29	33
10	25	29	33	36	41
12	30	35	39	43	49
14	35	41	46	51	57
16	40	46	52	58	67
18	45	52	59	65	73
20	50	53	65	72	81
22	55	64	72	79	89
24	59	64	78	87	97

26	64	75	85	94	105
28	69	81	91	101	113
30	74	87	98	108	121

402.02.03 CONSTRUCTION OF INLETS AND CATCH BASINS

Base rock shall be graded and thoroughly compacted before placing the base section. The base section shall be evenly supported by the base rock. The base section shall be set such that the tops of the base section, riser sections, and extensions are level and plumb.

The curb and gutter top section over catch basins shall be cast-in-place. Frames shall be cast in the concrete when forming the top section. Frame anchors shall be firmly embedded in the concrete. Frame-bearing surfaces shall be clean and provide for uniform contact with the grate.

See the appropriate standard detail for additional requirements.

402.02.03A PIPE CONNECTIONS TO INLETS AND CATCH BASINS

Openings for pipe connections to precast structures shall be core-drilled. Openings for stubouts shall be the minimum size necessary to accept the pipe. All pipe connections shall be made to the base section.

Pipe connections shall typically be made in the center of a side wall of the base section. Pipe penetrations shall be located centered on a corner of the structure where pipes enter at an angle between 36˚ and 54˚ from perpendicular to the base side wall.

Pipes shall be installed flush with the inner wall of the structure. Pipe to structure connections shall be sealed with non-shrinking grout.

402.02.03B INLET AND CATCH BASIN EXTENSIONS

The number of precast extensions necessary to adjust the structure to the specified grade shall be kept to a practicable minimum. The use of several shorter extensions where a fewer number of taller extensions could be used is not permitted.

Extensions shall be set in mortar with sides plumb and tops to grade. The interior and exterior of the mortared joints shall be troweled smooth.

Extensions shall be watertight.

402.02.04 CLEANING

Upon completion of the work, all structures shall be cleaned of silt, rock, and other debris.

Where possible, such materials shall be removed through the top of the structure. When flushing is required to completely remove the materials, appropriate precautions shall be taken to trap the debris at the nearest downstream structure.

402.03.00 MEASUREMENT AND PAYMENT

402.03.01 MANHOLES

Measurement and payment for manholes will be made on a unit-price basis for each type shown in the proposal for manholes six feet deep and less, plus the unit price per foot shown in the proposal for extra depth of manholes over six feet. No deduction will be made for depths less than six feet. Measurement of manhole depth will be from the top of the manhole frame and cover to the manhole invert at the center of the manhole to the nearest foot.

Payment shall include full compensation for materials, labor, and equipment necessary for excavation and disposal of excess materials; preparation of aggregate base; construction of the manhole including installation of the channel, pipe connections, and installation of the frame and cover assembly to finish grade; and acceptance testing.

402.03.02 DROP ASSEMBLIES

Measurement and payment for drop assemblies will be made on a linear-foot basis as shown in the proposal for drop assemblies three feet in height, plus the unit-price-per-foot shown in the proposal for extra height over three feet. No deduction will be made for heights less than three feet. Drop assemblies will be vertically measured from the invert of the pipe at the top of the assembly to the invert of the pipe into the manhole base to the nearest foot.

Payment shall include full compensation for materials, labor, and equipment necessary to construct the drop assembly.

402.03.03 CATCH BASINS AND INLETS

Measurement and payment for catch basins and inlets will be made on a unit-price basis.

Payment shall include full compensation for materials, equipment, and labor necessary for excavation and disposal of excess materials; preparation of aggregate base; and construction of the catch basin or inlet including installation of the pipe connections and the frame and grate assembly to finish grade.

402.03.04 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

403 WORK ON EXISTING SANITARY SEWERS AND STORM DRAIN STRUCTURES

403.01.00 MATERIALS

Materials used on existing sanitary sewers, storm drains, and related structures shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS, Section 401 PIPE AND FITTINGS FOR SANITARY SEWERS AND STORM DRAINS, Section 402 MANHOLES, INLETS, AND CATCH BASINS, the contract documents, and additional requirements contained herein.

403.02.00 CONSTRUCTION

403.02.01 EXCAVATION AND BACKFILL

Excavation and backfill shall conform to applicable requirements of Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

Backfill around manholes, inlets, catch basins, and other appurtenances shall be the same type as the adjacent trench backfill.

The contractor shall be responsible for maintaining flow through existing sewer and storm drain lines at all times in conformance with applicable requirements in Subsection 107.17.00 PUBLIC HEALTH and Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

403.02.02 MANHOLES CONSTRUCTED OVER EXISTING STRUCTURES

The type of manhole construction will be specified in the contract documents. Cast-in-place manholes shall not be constructed unless specified in the contract documents or approved by the City Engineer.

Precast and cast-in-place manholes shall be constructed in conformance with applicable requirements in Section 401 PIPE AND FITTINGS FOR SANITARY SEWERS AND STORM DRAINS; Section 402 MANHOLES, INLETS, AND CATCH BASINS; the standard details; the contract documents; and to applicable requirements specified herein. The contractor shall take preventive measures to ensure that backfill, concrete, and other construction materials and debris do not enter the existing pipes.

When constructing cast-in-place manholes over clay or non-reinforced concrete pipe, the manhole base shall be constructed prior to opening the pipe. A minimum clear space of six inches shall be obtained under the pipe prior to placing the concrete for the base. The contractor shall take adequate precautions to prevent the pipe from breaking or settling due to removal of underlying material.

After completion of manhole, the top section of the existing pipe shall be sawcut and removed to the full width of pipe and diameter of the manhole. Exposed edges of the pipe shall be trimmed and covered with mortar as necessary to provide a smooth surface.

403.02.03 CONNECTIONS TO EXISTING STRUCTURES

The connection of new pipes to existing manholes, catch basins, inlets, and similar structures shall be in conformance with the contract documents and to applicable requirements specified herein.

The contractor shall take preventive measures to ensure that backfill, concrete, and other construction materials and debris do not enter the existing pipes.

Openings for pipe connections to existing sanitary sewer manholes shall be core-drilled and fitted with flexible, manhole-to-pipe connectors. Pipe connections shall be watertight.

Openings for pipe connections to existing storm drain manholes, catch basins, inlets, and related structures shall be core-drilled. Pipe ends shall be installed flush with the interior surface of the structure. Pipe connections shall be sealed with non-shrink grout. Interior surfaces of the grout seal shall be smooth and free of surface irregularities that may trap debris.

The contractor shall not disturb the base portion of any cast-in-place manhole or similar structure unless such work is specified in the contract documents or approved by the City Engineer. Where pipe connections or other modifications to a cast-in-place base are required and core drilling is not possible, the concrete shall be removed with hand tools, small pneumatic hammers, or other methods that will limit the possibility of damaging the structure beyond that necessary to install the pipe stubout or make the modification. After the stubout is set to specified grade and alignment, non-shrink grout shall be used to fill the annular space between the pipe and the base.

403.02.04 REMOVAL AND ABANDONMENT OF EXISTING STRUCTURES

Manholes, catch basins, inlets, and similar structures shall be completely removed in situations where the structures will not serve any future use. These structures shall be abandoned in place only when such methods are specified in the contract documents or approved by the City Engineer.

Removal and abandonment in place of manholes, catch basins, inlets, and similar structures shall conform to the contract documents and to applicable requirements specified herein.

403.02.04A REMOVAL

The entire structure, including the bases of cast-in-place and precast manholes and similar structures, shall be completely removed and the ends of exposed pipes plugged with concrete. The excavation shall be backfilled with materials as specified in the contract documents or approved by the City Engineer.

403.02.04B ABANDONMENT IN PLACE

Where abandonment in place is specified or approved for manholes and similar structures, the frame and cover assembly, cone, and intermediate riser sections shall be removed to a depth of eight feet below finish surface grade. Exposed pipe ends shall be plugged with concrete and the remainder of the structure filled with ¾-inch or one-inch minus crushed aggregate.

Where abandonment in place is specified for inlets, catch basins, and similar structures, all exposed pipe ends shall be plugged with concrete and the structure filled with ¾-inch minus or one-inch minus crushed aggregate. The top six inches of the structure shall be filled with concrete after removal of the grate and frame assembly. The concrete shall be finished in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES.

Crushed aggregate backfill shall be compacted in conformance with Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

403.02.05 PERMANENT PLUGS

The interior surfaces of the ends of pipes to be abandoned shall be cleaned prior to constructing permanent plugs.

Concrete plugs shall be constructed in the ends of all pipe 18 inches or less in diameter. Minimum length of concrete plugs shall be eight inches.

For pipe 21 inches and larger, the plugs may be constructed of common brick or concrete block. The exposed face of the concrete block or brick plugs shall be sealed with mortar.

403.02.06 ADJUSTMENT OF EXISTING CONCRETE STRUCTURES TO GRADE

Existing manholes, inlets, catch basins, and similar structures shall be brought to the specified finished grade by methods of construction as specified in Subsection 206.03.10 ADJUSTMENT OF EXISTING CONCRETE STRUCTURES TO GRADE.

403.02.07 CONNECTIONS TO EXISTING SEWER AND STORM DRAIN PIPES

The methods and materials used in tapping existing sanitary sewer and storm drain pipes shall conform to requirements specified in the contract documents and to applicable requirements specified herein.

Tap connections shall not protrude beyond the interior wall surface of the existing pipe.

403.02.07A SANITARY SEWER TAPS

Connections to sanitary sewer pipes shall be made with approved mechanical taps or tees that are compatible with the size and type of pipe being tapped.

Tee installations shall utilize solid-sleeve gasketed couplers compatible with the size and type of pipe being joined.

Core-drilled holes shall be used for mechanical taps in all types of sanitary sewer pipe.

Connections made to sanitary sewer pipe shall be watertight.

403.02.07B STORM DRAIN TAPS

Connections to storm drain pipes shall be made with approved fittings and materials that are compatible with the size and type of pipe being tapped.

Connections to aluminum or steel pipe shall be made by sawcutting a hole in the pipe and installing a prefabricated tapping saddle over the opening in accordance with the manufacturer's recommendations. Stainless steel nuts and bolts shall be used for the installation of these saddles. Bolts shall be installed through the pipe from the inside to avoid unnecessary protrusions on the interior wall of the pipe.

Concrete storm drain pipe shall be sawcut and the pipe wall removed only to the extent necessary to tap the pipe. After the tap is set to specified grade and alignment, grout shall be used the fill the annular space between the pipe and the tap.

Mechanical taps, saddles, or tees shall be used to tap PVC storm drain pipe.

403.03.00 MEASUREMENT AND PAYMENT

403.03.01 MANHOLES CONSTRUCTED OVER EXISTING STRUCTURES

Measurement and payment for manholes constructed over existing sanitary sewer and storm drain pipe will be made in conformance with Subsection 402.03.01 MANHOLES.

Payment shall also include full compensation for materials, labor, and equipment necessary for maintaining flow through the existing pipe and for removal, replacement, or reconstruction of the existing pipe during construction of the manhole.

403.03.01A DROP ASSEMBLIES

Measurement and payment for drop assemblies will be made in conformance with Subsection 402.03.02 DROP ASSEMBLIES.

403.03.02 CONNECTIONS TO EXISTING MANHOLES, INLETS, AND CATCH BASINS

Measurement and payment for connections to existing manholes, inlets, and catch basins will be made on a unit-price-each basis.

Payment shall include full compensation for materials, labor, and equipment necessary for excavation and disposal of excess materials; core drilling and/or sawcutting of the existing structure as specified; preparation of aggregate base; construction of a grout seal or installation of flexible mechanical connectors where required; and installation of the stubout.

403.03.03 CONNECTIONS TO EXISTING SEWER AND STORM DRAIN PIPES

Taps, tees, and similar connections to existing sewer and storm drain pipes will be considered incidental to other appropriate bid items and no separate payment will be made.

403.03.04 ABANDONMENT OF MANHOLES, INLETS, AND CATCH BASINS

Measurement and payment for abandoning manholes, inlets, catch basins, and similar structures will be made on a unit-price-each basis.

Payment shall include full compensation for materials, labor, and equipment necessary for excavation and disposal of excess materials; removal and disposal of abandoned concrete structures where specified; plugging of exposed pipes; backfill and compaction operations; and resurfacing as specified.

403.03.05 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

**** END OF DIVISION ****

DIVISION 5 – WATER

501 WATER PIPE AND FITTINGS

501.00.00 GENERAL

All materials and products which come into contact with drinking water shall meet the requirements of the current addition of NSF Standard 61 Drinking Water System Components – Health Effects. All materials and products shall be of domestic manufacture. Any pipe, solder, or flux which is used in the installation or repair of pipe or material providing water for human consumption shall be lead free.

501.01.00 MATERIALS

501.01.01 DUCTILE IRON PIPE

Pipe for water lines, with the exception of one-inch and two-inch copper service lines, shall be ductile iron of domestic manufacture, centrifugally cast of 60-42-10 iron, and shall conform to ANSI A21.51 or AWWA C 151.

The minimum thickness class for all sizes of ductile iron pipe shall be class 52. Ductile iron pipe that is to be threaded for flanges shall be class 53.

The pipe shall be cement-mortar lined and seal coated in accordance with ANSI A21.4.

The rubber-ring gaskets shall be suitable for the specified pipe sizes and pressure, shall conform to applicable parts of the latest Federal Specification WW-P-421, and shall be furnished by the pipe manufacturer. A nontoxic vegetable soap lubricant shall be supplied with the pipe in sufficient quantities for installing the pipe. Materials and installation requirements for electrical continuity or bond bars, as may be necessary in corrosive soils, shall be specified in the contract documents.

Acceptable ductile iron pipe:

Griffin Ductile Iron Pipe
Pacific States
McWane
U.S. Pipe
American

501.01.01A DUCTILE IRON PIPE JOINTS

Ductile iron pipe shall be supplied with push-on joint connections. All ductile iron pipe joints shall be restrained.

PUSH-ON JOINTS

Single, rubber gasket, push-on joints shall conform to AWWA C 111 (ANSI A21.11). Unless otherwise specified, gaskets and lubricant shall be of domestic manufacture provided by the manufacturer of the pipe on which they are to be used.

THRUST RESTRAINT

Where thrust restraint is required or specified, new water mains shall be constructed using ductile iron pipe with an internal, push-on joint restraint system.

LOCKING GASKETS

Ductile iron pipe 12 inches in diameter and smaller shall be restrained through the utilization of locking gaskets in push-on joint connections. Acceptable locking gaskets for ductile iron pipe include:

Locking gaskets for “Tyton” style joints shall be Piranha as manufactured by Romac; or Sure Stop 350 as manufactured by McWane Cast Iron Pipe Co. (Pacific States Cast Iron Pipe Co.)

Locking gaskets for American ductile iron pipe shall be "Fast-Grip" brand as manufactured by American.

POSITIVE AXIAL LOCK JOINT RESTRAINT

Internal restraint for ductile iron pipe larger than 12 inches in diameter shall be achieved using a push-on joint restraint system that provides a positive axial lock between the interior surface of the bell and the spigot end of the pipe. Acceptable positive axial lock restraint systems include:

TR Flex brand as manufactured by U.S. Pipe.

Thrust Lock brand as manufactured by Pacific States Cast Iron Pipe Company.

Flex-Ring brand as manufactured by American

MECHANICAL JOINTS

Mechanical joint ends on ductile iron pipe shall not be used without the approval of the City Engineer. Where approved, components of mechanical joints shall be in conformance with AWWA C 111 (ANSI A21.11).

Gaskets and glands shall be of domestic manufacture and provided by the manufacturer of the pipe or fitting on which they are to be used.

Bolts and nuts shall be of domestic manufacture and made of low carbon steel conforming to ASTM A 307, Grade B, or ductile iron. Bolts shall be provided with factory applied coating for corrosion protection.

RETAINER GLANDS

The use of retainer glands is limited to applications specified in the contract documents. Retainer glands shall be epoxy coated.

Approved retainer glands:

Mega-Lug brand as manufactured by EBAA Iron, Inc., Eastland, Texas

Uni-Flange Series 1400 as manufactured by Ford Meter Box Co., Inc.

Romagrip Brand as manufactured by Romac Industries, Inc.

Romagrip Romabond w/R-Blue B&N as manufactured by Romac Industries, Inc.

TufGrip brand as manufactured by Tyler Pipe Co. and Union Foundry Co.

FLANGED JOINTS

Flanged connections on ductile iron pipe shall not be used without the approval of the City Engineer. Where approved, flanged joints for ductile iron pipe shall be in conformance with AWWA C 115 (ANSI A21.15).

Gaskets shall be ⅛-inch thick rubber, either ring or full face, conforming to the pipe manufacturer's requirements.

Bolts and nuts shall be of domestic manufacture and made of low carbon steel conforming to ASTM A 307, Grade B, or ductile iron, when used with flat ring gaskets that extend only to the bolts. Higher strength bolts and nuts conforming to ASTM A 307, Grade A, or ductile iron, shall be used where flanges are installed with full-face gaskets.

Threaded flanges for use in making custom ductile iron spools shall be forged steel, Class D, hub-type and shall conform to AWWA C 207-86 specifications.

501.01.02 RED-BRASS PIPE

Seamless, red-brass pipe shall be of domestic manufacture and supplied in conformance with ASTM B 43. Diameter of brass pipe used in the installation of air valves, blowoff assemblies, and other applications will be specified in the contract documents.

501.01.03 GALVANIZED STEEL PIPE AND FITTINGS

Galvanized steel pipe and fittings shall not be used unless specified in the contract documents.

Hot-dipped, zinc-coated (galvanized), welded, or seamless steel pipe and galvanized steel fittings shall be of domestic manufacture and supplied in conformance with ASTM A 120.

501.01.04 FITTINGS

501.01.04A DUCTILE AND CAST IRON FITTINGS

Tees, crosses, elbows, reducers, sleeves, adapters, combinations thereof, and other miscellaneous iron fittings shall be ductile or cast iron, of domestic manufacture, and shall be in conformance with ANSI/AWWA C 110/A 21.10 and ANSI/AWWA C 153/A 21.53. Fittings shall be supplied with mechanical joint connections unless specified otherwise in the contract documents.

Fittings, with the exception of solid sleeve couplers, shall be cement lined. Cement lining shall be in conformance with AWWA C 104 (ANSI A 21.4).

Fittings that have a damaged cement lining or no cement lining will be rejected at the job site. Cement linings installed or repaired by the distributor/supplier shall be completed in strict accordance with AWWA C 104. Cement linings shall not be repaired at the job site.

Fittings shall have minimum pressure ratings that will accommodate maximum pressures expected to be experienced during pressure and leakage testing.

Acceptable ductile and cast iron fittings, couplers, and adapters:

American
Mueller
U.F.C.
U.S. Pipe
Tyler
Star Pipe Products

501.01.04B STEEL COMPONENTS AND FITTINGS

Backing rings, flanges, bolts, nuts, and other steel component parts or fittings shall be of domestic source and manufacture.

501.01.05 LIGHTWEIGHT MECHANICAL COUPLINGS AND ADAPTERS

Lightweight, multipurpose, mechanical couplings and adapters are limited in their application to connection of new pipe work to existing water lines, temporary installations, and where specifically called for in the contract documents.

Lightweight, multipurpose, mechanical couplings and adapters shall consist of a ductile iron sleeve, ductile iron follower rings, rubber gaskets, and corrosion-resistant bolts and hex nuts.

Mechanical couplings and adapters shall have minimum pressure ratings that will accommodate maximum pressures expected to be experienced during pressure and leakage testing.

Acceptable mechanical couplings and adapters:

Ford; Romac; Smith Blair (Rockwell); EBAA Iron, Inc.

501.01.06 BACKFILL

Backfill material shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

501.01.07 POLYETHYLENE ENCASEMENT

Ductile iron pipe and fittings shall be encased in tube-form polyethylene in conformance with AWWA C105 (ANSI A21.5). This requirement includes but is not limited to ductile iron pipe and fittings, valves, and fire hydrants.

Acceptable polyethylene encasement:

V-Bio Enhanced Polyethylene Encasement and Corrosion Control

501.01.08 CATHOTIC PROTECTION

Cathotic protection shall be installed on all stainless steel tapping sleeves and all copper services.

Cathotic protection shall be FARWEST UltraMag High Potential 17D3with the standard, 10-foot #12thhn solid wire as manufactured by Farwest Corrosion Control Company or approved equal.

Anode shall be installed in native soil at a minimum of 5 feet from the tapping sleeve or service and the highest point of anode shall have a minimum of 5 feet of cover. On tapping sleeve installation, the anode wire shall be wrapped around a single bolt on the tapping sleeve in between two (2) stainless steel washers held in place with an additional nut. On service installations, the anode wire shall be wrapped around an Erico CWP1JU water pipe ground clamp or approved equal. Clamp shall be installed on the copper service at the angle stop.

501.02.00 CONSTRUCTION

501.02.01 EXCAVATION AND BACKFILL

The trench shall be prepared for pipe laying and backfill as specified in Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK and applicable standard details.

The trench bottom shall conform to the line and grade to which the pipe is to be laid, allowing for pipe thickness and bedding material, and shall form a continuous uniform bearing and support for the pipe between bell holes.

501.02.01A WORKING AROUND EXISTING AC WATER LINES

The actual location of AC water lines shall be determined ahead of the excavator. Hand excavation shall be used in conjunction with excavating equipment when working around or looking for AC water lines.

Compaction equipment shall not be operated directly over or immediately adjacent to AC water lines, regardless of methods used to stabilize backfill and to support appurtenances. Traffic or construction equipment shall not be permitted to pass over temporarily backfilled excavations containing AC pipe.

501.02.01B LOCATING

Water mainlines shall be located by installation of Omni Marker™ locate balls, Model 161 as manufactured by Tempo, every 40 feet along the length of the pipe in tangent sections; and every 20 feet along the length of the pipe where the pipe is deflected along a curve. Locate balls shall be located over tees, elbows, and other appurtenances except where a mainline valve is present. Locate balls shall be installed within four feet of finish grade, centered over the pipe

501.02.02 OPERATION OF EXISTING VALVES

The City Engineer will operate or supervise the operation of existing valves during the course of the work. The contractor shall not operate any existing valve unless specifically instructed to do so by the City Engineer.

The contractor shall be responsible for coordination of the work with the City Engineer to provide for the timely operation of existing valves.

When so instructed by the City Engineer, the contractor shall provide assistance in operating existing valves.

501.02.03 GRADE AND ALIGNMENT

Water mains shall be installed with a minimum depth of bury of three feet as measured from the top of pipe to finish grade. A greater depth may be necessary to avoid underground obstructions. A minimum of six inches of clearance shall be maintained between the pipe and obstructions.

When water lines are designed to be laid in a straight line and/or at a specific grade, the deviation from line and grade shall not be in excess of 0.2 of a foot horizontally for line and 0.1 of a foot vertically for grade.

501.02.04 UTILITY CONFLICTS

The contractor shall be responsible for exposing potential utility conflicts far enough ahead of pipeline construction sufficient to make necessary adjustments in grade and alignment of the new work within the specified limits of pipe and fitting deflection and/or the lines and grades stated in the contract documents. The intent of this requirement is to preserve the option of adjusting the horizontal and vertical alignment of the new water line to avoid such utilities without the need for additional fittings and thrust restraint.

The contractor shall be responsible for performing this work and for informing the City Engineer of the need for a grade and/or alignment adjustment.

The contractor shall not deviate from the design line and grade stated in the contract documents or pipe and fitting deflection requirements specified herein without the approval of the City Engineer.

Special care shall be taken to avoid compromising concrete thrust restraint on the existing water system. Where existing thrust restraint is compromised, the contractor shall provide and install appropriate temporary blocking and maintain such blocking until the existing water line is properly abandoned.

501.02.05 CONNECTION TO EXISTING, IN-SERVICE MAINS

Existing water mains or individual service lines shall not be taken out of service without proper notification to the City Engineer and affected water users. Generally, scheduled interruptions of water service shall not occur on Fridays, weekends, holidays, and on days immediately preceding holidays.

As a general rule, scheduled interruptions of local water service shall not occur prior to 9:00 a.m. or after 2:00 p.m. The Contractor shall give written notice to each affected water customer a minimum of 48 hours in advance of a scheduled interruption of water service. Commercial and industrial water customers require a minimum 72-hour advance notice prior to scheduled interruption of water service. In addition a representative of the Contractor shall personally visit each affected business to deliver the notice to the owner or a responsible employee, and answer any questions regarding the shutdown. The Contractor shall coordinate with affected businesses to make meter switch-overs and mainline connections at times convenient for their normal operation. In some circumstances it may be necessary to schedule water shutdown outside of normal working hours. No extra compensation will be due the Contractor for work performed outside of normal working hours.

Each situation involving a scheduled interruption of water service shall be limited to four hours, unless extended by the Engineer. If the Contractor does not complete the work within the allotted time, mitigating circumstances notwithstanding, the City will impose liquidated damages of $225 per each hour, or fraction therof, beyond the time limit established by the Engineer.

Due to varying outside pipe diameters and the incompatibility of AC pipe fittings with modern waterworks materials, AC pipe shall be excavated and examined at each location where connections are to be made to existing pipe or fittings.

The contractor shall be prepared to begin work immediately after the scheduled beginning of the water shutoff. The excavation shall be completed and materials preassembled as much as possible prior to the scheduled time for the water shutoff. Scheduled water shutoffs will be cancelled by the City's project manager if the contractor is not prepared to begin cutting and draining the existing water line at the designated time for the work to begin. A scheduled water shutoff may also be cancelled if the project manager determines that the contractor does not have adequate equipment, including pumps and cut-off saws, to complete the work within the allotted time.

Once service has been turned off for scheduled work, the contractor shall work continuously, without interruption, and as expeditiously as possible to perform the required work. In every instance of a water shutoff, water service shall be restored as quickly as possible, regardless of the scheduled duration of the shutoff. To that end, it is expected that scheduled breaks, including lunch breaks, shall occur before or after such work.

Existing valves may not fully shut off water to the desired area. The contractor shall be expected to make required connections in situations where there is still a partial flow of water after the appropriate valves have been closed.

In situations where an existing pipe joint is found adjacent to a proposed cut-in and the City Engineer determines that construction operations may compromise the joint, the contractor shall remove the existing pipe between the joint and the new work, or as directed by the City Engineer, and replace that section with new materials.

501.02.06 SANITARY SEWER CROSSINGS

In locations where the new water line crosses over or under an existing sanitary sewer pipe with less than 1½ feet of clearance between the two pipes, the contractor shall replace the sewer pipe with a 20-foot minimum length of equivalent size ductile iron or C-900 PVC pressure pipe centered on the new water line.

Watertight, mechanical couplers shall be used to reconnect the existing sewer pipe to the new ductile iron or C-900 PVC pipe section.

501.02.07 PIPE AND FITTING INSTALLATION

501.02.07A SANITARY PRACTICES DURING INSTALLATION

Pipe shall not be laid in standing water. Every precaution shall be taken to prevent dirt, debris, or other foreign materials from entering the pipe during all phases of construction. Tools, rags, and other materials shall be kept out of the pipe work at all times.

Whenever the trench site is left unattended, the open ends of the pipe shall be sealed with a watertight plug to prevent trench water and foreign materials from entering the pipe. If water is in the trench, the seal shall remain in place as long as water is able to enter the pipe.

501.02.07B PIPE AND FITTING INSTALLATION

Pipe, fittings, and hydrants shall be lowered into the trench in such a manner that will preclude the possibility of the materials being damaged.

Pipe shall be laid and joined one length at a time to the required line and grade. Pipe shall be placed with the bell end facing the direction of laying except for lines on a grade in excess of 15 percent in which case bells shall face upgrade.

Excess tar coating shall be removed from the bell and spigot end of each pipe and fitting prior to installation. The outside of the spigot and the inside of the bell shall be cleaned before the pipe or fittings are installed. If the pipe contains excessive dirt or other foreign matter that will not be removed during the flushing operation, the interior of the pipe shall be cleaned as necessary to remove the material.

After the first length of pipe is installed in the trench, the pipe shall be secured in place with approved backfill material tamped under and along sides to prevent movement. Pipe ends shall be kept clear of backfill. Backfill shall be placed after each section of pipe is joined to prevent movement of the previously laid pipe.

501.02.07C PIPE CONNECTION PROCEDURES

Connection procedures shall be in accordance with the manufacturer's recommendations.

Lubricant for push-on joint and mechanical joint pipe shall be of a nontoxic vegetable soap type provided by the pipe manufacturer.

The use of slip-on flanges with retaining screws is not permitted unless specifically called for in the contract documents.

Coupling of ductile iron pipe with plain ends of the same diameter in new construction shall be accomplished with ductile iron, solid sleeve couplers with mechanical joints. Coupling of plain ends to flange ends during new construction shall be accomplished with solid ductile iron mechanical joint × flange (MJ × FLG) adapters/reducers.

The following are given as general guidelines for each type of pipe joint:

FLANGED JOINTS

Contact faces and gaskets for flanged connections shall be cleaned as necessary to remove any foreign matter before the connection is made.

Flanged joints shall be fitted so the contact faces bear uniformly on the gasket. Bolts shall be tightened progressively in a sequential, uniform manner to torque values recommended by the manufacturer of the flange and/or fitting.

Flanged fittings shall be properly anchored, supported, or restrained during installation to prevent bending or torsional strains at the connection during and after the jointing procedure.

MECHANICAL JOINTS

The pipe shall be inserted in the socket and supported as necessary to keep the pipe centered in the joint and to maintain uniform exposure of the gasket recess. The gasket shall be pressed firmly and evenly into the gasket recess prior to installing the bolts through the gland.

Bolts shall be tightened progressively in a sequential, uniform manner to torque values recommended by the manufacturer of the fitting. The gland shall not be allowed to deform during the tightening process.

Any required deflection of joints shall be made after the joint is assembled, but before final tightening of the bolts.

The jointing procedure shall be repeated if effective sealing is not attained at the maximum torque. Bolts shall be tightened to manufacturer's specifications. Bolts shall not be overstressed to compensate for ineffective sealing or poor installation practices.

THREADED JOINTS

Threaded joint connections shall be made after all threaded surfaces have been thoroughly cleaned and prepared with sealing tape or pipe jointing compound approved by the manufacturer for use in potable water systems. Sealing tape and pipe jointing compound shall be applied in strict accordance with the manufacturer's instructions. Excessive use of sealing materials will not be permitted.

501.02.07D CUTTING DUCTILE IRON PIPE

Cutting of ductile iron pipe for inserting valves, fittings, or closure pieces shall be done with a milling-type cutter or saw and in a manner that precludes damage to the pipe or cement lining and leaves a smooth end at right angles to the axis of the pipe. Flame cutting ductile iron pipe will not be permitted.

The cut end of the pipe shall be ground smooth and for push-on joint connections shall be beveled as necessary to remove sharp edges that may damage the gasket. The width and general appearance of the bevel shall closely resemble the bevel on an original pipe end.

Any lining or coating damaged to a significant degree during the cutting process, as determined by the City Engineer, shall be cause for removing the damaged section by recutting the pipe or for rejecting the pipe altogether.

501.02.07E ALLOWABLE DEFLECTION OF PIPE

When push-on or mechanical joint pipe is to be laid on a curve, either in the horizontal or vertical plane, the amount of deflection shall not exceed the maximum limits recommended by the manufacturer.

If any joint in any run of pipe appears be deflected in excess of those specified herein, as determined by the City Engineer, the contractor shall, upon request of the City Engineer, expose a sufficient length of the newly laid pipe for the purpose of determining the actual deflection at any joint. The contractor shall take up and reinstall pipe that is found to have joint deflection in excess of that specified herein.

501.02.08 STANDARD DEAD-END MAIN BLOWOFFS

Dead-ends on new water lines shall be closed with a cast iron, mechanical-joint plug threaded to accept a two-inch blowoff assembly in conformance with the applicable standard detail. Valve boxes (and meter boxes for blowoffs in non-traffic areas) shall be kept free of rocks and debris and shall be installed flush with finished grade.

501.02.09 ANCHORAGE

501.02.09A GENERAL

Water pipe and fittings shall be mechanically restrained in lieu of using conventional concrete blocking. New water mains shall not be restrained with concrete blocking without specific approval of the City Engineer. Calculations for determining restrained lengths of pipe to protect specified bends and other assemblies shall be based on the following general parameters: 1) minimum 2:1 safety margin, 2) minimum 150 PSI test pressure, 3) minimum three feet of cover at the time of pressure testing, and 4) marginal trench and backfill conditions. Details relative to materials and length of pipe runs to be restrained will require review and approval by the City Engineer.

501.02.09B MECHANICAL THRUST RESTRAINT

New water mains shall be mechanically restrained through utilization of internal, push-on joint restraint (pipe) and retainer glands for mechanical joint connections (fittings, valves, and pipe).

Mechanical joint bends 22½° and larger shall be restrained. Tees shall be restrained with a run of restrained pipe consistent with the length required to restrain a dead-end run of pipe.

The use of tie-back rods will require approval of the City Engineer. Where approved, tie-back rod assemblies shall be ⅝-inch minimum diameter galvanized steel.

501.02.09C CONCRETE THRUST BLOCKING

Concrete used for thrust blocking shall have a minimum compressive strength of 3,000 psi within 28 days.

Concrete thrust blocking shall be poured in place between undisturbed earth and the fittings to be anchored.

If, in the opinion of the City Engineer, the undisturbed earth against which the bearing surface has been established is compromised by adjacent trenches or excavations, the contractor shall, as directed by the City Engineer, excavate additional material as required to establish a new bearing surface that is consistent with the size, configuration, and location of the piping.

The area where the blocking is to be placed shall be sufficiently excavated to receive the concrete so that the proper shape and bearing surface is attained. The bearing surface shall be placed so that the pipe and fitting joints will be accessible for repair. Concrete shall in no case extend around more than one-half the circumference of the fitting at any point.

A plastic sheet or other similar protection shall be placed between the concrete and any portions of the valve, fitting, or nuts and bolts with which the concrete comes in contact.

The size of thrust blocks shall be determined by the size, configuration, and location of the piping. Minimum bearing areas for thrust restraint are outlined in the standard details. The contractor shall not increase the size of the bearing area or volume of concrete without the approval of the City Engineer. Thrust blocks with volumes of concrete that are in excess of or less than that specified for the size and configuration of the piping shall be removed by the contractor, at the contractor's expense, when directed to do so by the City Engineer.

Concrete gravity blocking is not permitted under any circumstances.

Joints between thrust collars and fitting assemblies shall be mechanically restrained.

501.02.10 REPAIR OF DAMAGED WATER LINES

It is the contractor's responsibility to make emergency repairs to existing water lines that are damaged during construction.

Procedures and materials used in repair work of this nature shall be as approved by the City Engineer.

This requirement shall apply to existing water lines that have been previously located and marked by the owner prior to commencement of construction operations.

501.02.11 SURFACE RESTORATION

Surface restoration shall be in conformance with applicable requirements of Section 208 RESURFACING and Section 209 CLEANUP AND SITE RESTORATION.

501.03.00 MEASUREMENT AND PAYMENT

501.03.01 PIPE INSTALLATION

Measurement and payment for installation of water line pipe will be made on a linear-foot basis within the limits shown in the project plans for the actual footage of pipe installed. Pipe that has been installed but not successfully pressure tested and disinfected will be paid in an amount equal to 50 percent of the length of the untested pipe.

Payment for pipe installation shall constitute full compensation for all labor; equipment; materials; clearing the construction area; trench excavation; pipe bedding, pipe zone material, backfill, and compaction operations; thrust blocking, flushing, testing, and disinfection; all fittings, spools, and mechanical couplings required to complete the pipeline as designed; connection to and abandonment of existing water lines; and any other incidental expenses necessary to prepare the constructed water line for use.

501.03.02 ASSEMBLIES

Assemblies (including blowoff assemblies) shall be paid for on a lump-sum basis as stated in the contract documents. Payment for each assembly shall constitute full compensation for furnishing and installing the fitting assembly, complete, including mechanical couplings, joint restraint, and any other incidental expenses or materials necessary to complete the installation.

501.03.03 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

502 VALVES AND RELATED EQUIPMENT

502.01.00 MATERIALS

502.01.01 RESILIENT-SEATED, IRON BODY GATE VALVES

Gate valves shall be used on eight-inch diameter and smaller pipe lines.

Resilient-seated gate valves shall meet or exceed the provisions of either AWWA C 509 (iron body) or AWWA C 515 (ductile iron body) and shall be a non-metallic seat, non-rising stem-type with O-ring seals and a two-inch square operating nut that opens the valve when turned counter-clockwise. With the valve fully open, an unobstructed waterway not less than the full nominal diameter of the valve shall be provided.

Acceptable resilient-seated gate valves:

American "Resilient Wedge"
Clow "Resilient Wedge"
J & S Valve, Inc.

Kennedy "Ken-Seal" U.S. Pipe
M & H

Mueller
U.S. Pipe
Val-matic
Waterous "Series 500"

502.01.02 BUTTERFLY VALVES

Butterfly valves shall be used on 10-inch diameter and larger pipe lines.

Butterfly valves shall meet or exceed the provisions of AWWA C 504, Class 150B. Butterfly valves shall be short-bodied, cast iron construction.

Valves shall be of the watertight closing type with two-way thrust bearing and shall be equipped with a two-inch square operating nut that opens the valve when turned counterclockwise.

Acceptable butterfly valves:

Dresser "450"
Kennedy
M & H
Mueller "Lineseal III"
Pratt "Ground Hog"
U.S. Pipe
Val-Matic

502.01.03 TAPPING VALVES AND SLEEVES

502.01.03A TAPPING VALVES

Tapping valves shall have a flange on one end for bolting to the sleeve and a flanged or mechanical joint outlet.

The valves shall accommodate full-sized cutters.

In all other respects, tapping valves shall meet the requirements specified herein for iron-body gate valves.

Acceptable tapping valves:

Clow
Kennedy
M & H
Mueller
U.S. Pipe

502.01.03B TAPPING SLEEVES

Tapping sleeves shall be two-piece, epoxy-coated, fabricated steel; full-circle stainless steel with stainless steel flange; or fabricated steel with mechanical joints. The type of tapping sleeve required is dependent upon the type of pipe material being tapped and the size of the tap relative to the receiving pipe. Where the City approves the use of a tapping sleeve, the type of sleeve for each application will be indicated on the construction permit or within the contract documents.

Generally, full-circle stainless steel sleeves shall be used on all asbestos-cement and cast iron water lines and on ductile iron water lines with size-on-size taps. Where stainless steel sleeves are indicated, the entire sleeve assembly, including body, outlet flange, and nuts and bolts shall be stainless steel.

Size-on-size taps on O.D. steel pipe water lines shall be weld-on style. In applications where the tap is smaller than the receiving O.D. steel pipe, a two-piece fabricated steel sleeve may be used. Due to the possible presence of a bead weld on this type of pipe, full-circle, stainless steel sleeves shall not be used on O.D. steel pipe.

Fabricated steel, mechanical joint tapping sleeves are generally used in larger diameter pipe applications where there is no stainless steel tap alternative.

Tapping sleeves shall be supplied with ¾-inch test ports and flanged outlets.

Nuts and bolts used for the installation of the sleeves shall be stainless steel and supplied by the sleeve manufacturer. All tapping sleeves install shall have cathotic protection as specified in Section 501.01.08 CATHOTIC PROTECTION.

Fabricated steel, mechanical joint tapping sleeves shall be supplied with a fusion-bonded epoxy coating.

Acceptable tapping sleeves:

Two-Piece Fabricated Steel	Full-Circle Stainless Steel	Fabricated Steel, Mechanical Joint
Ford FTSC	Mueller H-304 w/SS FLG.	Romac FTS 425
JCM	JCM 432	JCM 414
Romac	Romac SST III w/SS FLG.	
Smith Blair	Ford FAST w/SS FLG.	
Kennedy		

502.01.04 VALVE OPERATOR EXTENSIONS

A valve operator extension shall be provided for every valve where the operating nut is in excess of three feet below finished grade. The extension shall be of such length that its operating nut in place is within two to three feet of finished grade.

Valve operator extensions shall consist of one-inch round or square bar stock with a valve wrench cup attached to one end and a two-inch square operating nut to the other. The valve wrench cup and operating nut shall be attached to the ends in such a manner as to withstand, without damage, an input torque of 300 foot-pounds.

Valve operator extensions shall be equipped with a plate at the upper end to catch rocks and debris and to maintain central alignment of the extension within the valve box. See the appropriate standard detail drawing.

502.01.05 ADJUSTABLE VALVE BOX ASSEMBLIES

Standard valve box assemblies shall be cast iron of domestic manufacture. Assemblies shall consist of a maximum of two components; the adjustable cast iron valve box (frame and cover) and a six-inch diameter 3034 PVC spool in one piece from the valve to the box. Adjustable valve boxes shall be supplied without bottom flanges.

The height of the valve box shall be 18 inches as measured from the bottom of the assembly sleeve to the top of the flange face. Adjustable valve boxes shall be supplied without bottom flanges. The valve box cover shall have the word “WATER” or “W” cast into it.

Acceptable adjustable valve box assemblies:

Olympic Foundry, Inc.	Part No. VB910
East Jordan Iron Works	Product No. 00363912

502.01.06 AIR VALVES

Air valves shall be combination air-release type that permits entrained air to escape from the line while retaining water upon filling and under pressure and which permit a reverse flow of air into the line upon draining.

The valve body, cover, and lever frame shall be cast iron or approved alloy. The float shall be stainless steel and shall close against a rubber valve seat. Other internal parts shall be either stainless steel or bronze or other approved non-corrosible material.

Acceptable combination air release valves:

ARI USA Inc.	D-040

502.01.07 HAND VALVES FOR AIR VALVE ASSEMBLIES

Acceptable valves:

A.Y. McDonald	No. 6102T with Hand Lever 6120B
Mueller	No. B-25172 with hand lever B-20298-99000 or approved equal

502.02.00 CONSTRUCTION

502.02.01 VALVES AND VALVE BOXES

502.02.01A VALVE INSTALLATION

Valves that are 12 inches and larger shall be set to grade on a precast concrete pad placed on undisturbed earth such that the pipe will not be required to support the weight of the valve.

Following installation, the valve shall be operated from the fully open to fully closed position to ensure the valve does not bind during operation.

502.02.01B VALVE BOX INSTALLATION

A valve box assembly shall be installed over every valve.

Valve box assemblies shall be set such that the completed assembly is straight and plumb with a minimum overlap of six inches between the frame and riser section. The completed valve box assembly shall be centered over the operating nut of the valve and shall not transmit shock or stress to the valve, operating nut, or valve operator extension.

The exposed end of the valve box assembly shall remain accessible at all times. The contractor shall be responsible for keeping the valve box assembly free of rocks and other debris for the duration of the project.

Valve box assemblies shall be set flush with finish grade during final surface restoration. Where valve boxes are located adjacent to Portland cement concrete (PCC) or asphalt concrete (AC) surfaces, those surfaces shall be extended to construct a collar around the valve box. Where valve boxes are located outside of PCC or AC surfaces, a PCC collar shall be constructed around the valve boxes. This collar shall measure a minimum 18 inches long, by 18 inches wide, by four inches deep. The nearest edge of the collar shall be no less than four inches from the edge of the nearest valve box flange edge.

Misalignment of the valve box assembly components or misalignment of the valve box assembly over the operating nut shall be corrected by the contractor prior to final surface restoration. Damaged riser ends and frame and cover assemblies shall be replaced by the contractor prior to final surface restoration.

502.02.02 TAPPING VALVES AND SLEEVES

Tapping sleeves and valves shall be installed in accordance with the manufacturer's requirements by a tapping contractor approved by the City Engineer. Generally, provision and installation of tapping sleeves and valves and the actual tap shall be by contractors who are solely engaged in this type of work.

With the exception of size-on-size taps, full-size cutters shall be used in making taps.

Tapping valves shall be supported by concrete blocks placed on compacted backfill material or undisturbed, stable subgrade to preclude rotation or settlement of the sleeve on the pipe being tapped.

Live-tap assemblies shall be supported at all times when working with AC pipe. Permanent support by means of precast or cast-in-place concrete is required. Precast support blocking shall utilize permanent hardwood shims to transfer the load to the blocks. Cast-in-place concrete support will require temporary support that is shimmed to support the assemblies prior to placing concrete. To reduce potential for shear, the size of the excavation shall be strictly limited to that required to install the improvements. The methods used to meet these requirements will require review and approval by the project City Engineer prior to construction.

502.02.03 AIR VALVES

Piping for air valves shall be threaded-brass pipe or one-inch copper service pipe connected to a corporation stop installed in the main by the contractor. If one-inch copper service pipe is used, there shall be no intermediate couplings between the corporation stop and the ball valve. Fittings shall be cast bronze.

The supply line shall be on a positive slope of at least two percent from the main to the air valve and shall be supported by a precast concrete block set directly below the valve. A hand operated valve shall be provided out the bottom of the air valve.

The assembly shall be protected by two, stacked Brooks No. 66 concrete meter boxes set so the lid is flush with finished grade. The vertical clearance between the top of the air valve and the Brooks No. 66 large meter box cover shall not exceed six inches. The inner box area shall be kept free of backfill material or other foreign matter at all times so the valve is readily accessible.

Drainage shall be accomplished by placing one-inch minus crushed gravel to a depth of at least six inches below the supply line pipe for the full trench width from the air valve to the main.

The air valve vent shall be extended above grade to prevent backflow contamination. The air valve vent shall be installed in an insulated enclosure mounted to a Brooks No. 66 traffic rated cover.

Details relative to installations located in streets, driveways, or other areas subject to vehicular traffic will require review and approval of the City Engineer.

See appropriate Standard Detail Drawing.

502.03.00 MEASUREMENT AND PAYMENT

502.03.01 VALVE ASSEMBLIES

Valves shall be paid for on a per-each basis as stated in the contract documents.

Payment for each valve shall constitute full compensation for furnishing and installing the valve complete, including concrete valve pad, valve box, mechanical couplings, concrete thrust blocking, and any other labor, materials, and equipment required to complete the installation.

502.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

503 FIRE HYDRANTS

503.01.00 MATERIALS

503.01.01 FIRE HYDRANTS

Fire hydrants shall be manufactured in accordance with AWWA C 502, be of center-stem and safety-flange construction with a 5¼-inch main valve opening against the pressure, and the inlet connection shall be a six-inch mechanical joint.

Operating nuts shall be national standard, pentagon shape, 1½-inch point to flat and shall turn counterclockwise to open.

Hydrants shall have two 2½-inch hose nozzles with national standard threads (7½ threads per inch), one 4½-inch pumper nozzle with national standard threads (four threads per inch).

Hydrants shall be “high gloss safety yellow” in color, painted by the manufacturer.

A five-inch storz adapter shall be installed on the main pumper nozzle. Storz adapter shall be Hydra Shield model HYST-5045-ST CAP.

Acceptable fire hydrants:

Clow	Medallion
American Flow Control	American-Darling & Waterous-Pacer
Mueller	#A-423
Kennedy	K-81D Guardian

503.01.02 FIRE HYDRANT EXTENSIONS

Extension assemblies for fire hydrants shall be supplied by the manufacturer of the hydrant for which the extension is required.

503.01.03 BACKFILL

Backfill material shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

503.02.00 CONSTRUCTION

503.02.01 EXCAVATION AND BACKFILL

The trench shall be prepared for pipe laying and backfill as specified in Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK and applicable standard details.

The trench bottom shall conform to the line and grade to which the pipe is to be laid, allowing for pipe thickness and bedding material, and shall form a continuous uniform bearing and support for the pipe between bell holes.

503.02.02 FIRE HYDRANTS

Fire hydrant assemblies shall be installed as shown on the applicable standard detail at locations shown in the contract documents and marked at the job site.

When an existing hydrant is placed out of service for any reason, or for any length of time, the Contractor shall immediately place and secure a bag over the hydrant. Following installation of a new hydrant, the contractor shall place and secure a bag over the hydrant. Hydrants shall remain covered until placed into service.

Drainage shall be provided for the hydrant by placing one to 1½-inch drainage rock from the bottom of the trench at the base of the hydrant to at least six inches above the inlet pipe. Crushed gravel (one-inch minus) shall be placed in the inlet pipe trench for the full length from the hydrant to the main. Hydrants shall stand plumb and shall have the main pumper nozzle facing in the direction specified in the contract documents. Hydrants shall be set so that the bottom of the safety breakaway flange is located a minimum of two inches and a maximum of eight inches above finished sidewalk or ground level.

When placed in the open area between the curb and sidewalk or directly behind the curb where no sidewalk is proposed, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than 12 inches nor more than 18 inches from the gutter face of the curb. When set behind the sidewalk, no portion of the hydrant or nozzle cap shall be less than six inches or more than 18 inches from the sidewalk.

It shall be the contractor's responsibility to ensure such horizontal clearances are satisfied regardless of approximate distances from the main as may be noted on the drawings. The contractor shall make any necessary horizontal adjustment to properly set hydrants at the contractor's sole expense.

Hydrants set too high shall be removed and replaced with an appropriate hydrant by the contractor at contractor's own expense. Extensions required for hydrants set too low shall be supplied and installed by the contractor at contractor's own expense. Extensions shall be installed per manufacturer's recommendations.

The face of the curb shall be painted yellow for a distance of 10 feet in either direction, or to the nearest curb return, whichever is closer. Paint material shall conform to the requirements of the ODOT Qualified Products List for centerline striping paint.

Marring, chipping, or other damage to the factory paint shall be repaired to the extent necessary to restore the hydrant to as-new condition. Paint meeting the manufacturer's specification shall be used to touch up or restore the factory finish.

503.02.03 SURFACE RESTORATION

Surface restoration shall be in conformance with applicable requirements of Section 208 RESURFACING and Section 209 CLEANUP AND SITE RESTORATION.

503.03.00 MEASUREMENT AND PAYMENT

503.03.01 HYDRANT ASSEMBLIES

A complete fire hydrant assembly includes the mainline tee and hydrant valve, all ductile iron pipe between the hydrant valve and the hydrant, hydrant, and associated internal thrust restraint.

Payment for fire hydrant assemblies shall be paid for on a per-each basis as stated in the contract documents.

Payment for each hydrant assembly shall constitute full compensation for costs of labor, materials, equipment, and excavation and backfill.

503.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

504 WATER SERVICE INSTALLATION

504.01.00 MATERIALS

504.01.01 GENERAL

Water service components shall have minimum pressure ratings that will accommodate maximum pressures expected to be experienced during pressure and leakage testing.

The use of flared type connections to copper service pipe will be permitted only where approved by the City Engineer or when so specified in the contract documents for a specific project.

Private water service pipe (on the customer side of the meter) shall be Schedule 80 PVC sized to match the existing service. An approved trace wire shall be installed with PVC water service. The trace wire shall be bonded to existing metallic service piping, where found. The trace wire shall be accessible within the meter box.

504.01.02 WATER SERVICE LINES

Tubing for water service lines shall be one inch or two inch diameter, depending on application.

504.01.02A COPPER WATER SERVICE LINES

Seamless copper tubing for use in the installation of water service lines shall be Type K, soft, supplied in conformance with ASTM B 88.

Copper tubing shall be of domestic manufacture.

504.01.02B PLASTIC WATER SERVICE LINES

Use of HDPE for water service line installation shall only occur with the prior approval or direction of the City Engineer. Plastic water service lines shall be HDPE material conforming to the following:

HDPE service shall be blue in color and have a pressure rating of 200 psi at 70°F. Services shall meet requirements of ASTM D2737, AWWA C901 and NSF Standards 14 and 61. Dimensioning shall meet Copper Tubing Size (CTS) standards. Material Properties shall meet minimum requirements of classification 345464E as defined and described in ASTM D3350. Resin shall have material designation code of PE4710 or PE3608 (formerly PE3408).

HDPE services shall be installed with the use of polypropylene thermoplastic insert stiffeners, as manufactured by MARS Company or approved equal, at the curb stop and corporation stop. Stainless steel stiffeners shall be used on two-inch plastic lines.

Tracer wire with a minimum thickness of 12 gauge shall be installed with HDPE service lines. The tracer wire shall be installed along the same horizontal alignment and at the same depth as the water service line. Tracer wire shall be obvious and easily accessible within the meter box and shall extend without break to the corporation stop. Tracer wire shall be solidly connected to the corporation stop to provide an uninterrupted signal to be transmitted through the tracer wire and into and through the water main.

504.01.03 BRASS/BRONZE FITTINGS

The brass alloy used for all surfaces coming in contact with potable water shall meet the requirements of UNS/CDA number C89833 as listed in ANSI/AWWA C800 Standard and complying with the Safe Drinking Water Act. The products produced with this alloy shall meet NSF/ANSI Standard 61 and/or NSF/ANSI

Standard 372 as applicable.

Components shall include "No Lead" or "Low Lead" designation as follows:

Ford – NL
Mueller – LL
AY McDonald – NL

Brass components that do not come in contact with potable water shall meet the requirements of AWWA C800, ASTM B62, and ASTM B584, using UNS/CDA number C83600.

504.01.03A CORPORATION STOPS

Corporation stops for services, air valves, and pressure testing shall be supplied in conformance with AWWA C 800-66.

Corporation stops for service installations shall be one-inch or two-inch diameter, depending on application. Sizing for corporation stops used in air valve applications will be specified in the contract documents. Corporation stops used for pressure testing shall be replaced with a threaded brass plug with AWWA taper threads after completion of chlorination and pressure testing of the water line.

Acceptable corporation stops:

Ford	A. Y. McDonald	Mueller
FB-1000-4-Q (for 1" service)	4701BT	B-25008
FB-1000-7-Q (for 2" service)		

504.01.03B ANGLE METER VALVES

Angle meter valves shall be supplied in conformance with ASTM B 62.

Angle meter valves shall be full port and have one-inch inlet and outlet with padlock wings.

Acceptable angle meter valves:

One-Inch Meter	
Ford	BA 43444 WQ
Mueller	B-24258
A.Y. McDonald	4602 BT

504.01.03C 1½ INCH AND TWO-INCH METER SETTER

For 1½-inch and 2-inch meter installations, a meter setter shall be used in lieu of an angle meter valve.

Acceptable meter setters:

Ford	A. Y. McDonald	Mueller
VBB77-18HB-44-77Q	720R718WWFF776	B-2423-99000
1½" – 2" Meter Setter	4753 T Coupling*	H-15428 Coupling*

*NOTE: These couplings are required to adapt female IPT inlet on the setter to compression inlet. The Ford setter comes supplied with the appropriate coupling (that is the "Q" portion of the part number). These meter setters have a height of 18-inches and have a high-offset bypass.

504.01.03D COPPER SERVICE COUPLINGS

Intermediate couplings for copper water service tubing are not permitted unless specified in the contract documents or approved by the City Engineer.

When authorized for use, brass and bronze couplings for copper tubing shall have compression joint connections as specified for corporation stops and angle meter valves.

Acceptable copper water service couplings:

Ford	C44-44Q for 1" and C44-77Q for 2"
Mueller	H-15403
A.Y. McDonald	4758T

504.01.03E CUSTOMER SERVICE VALVES

A customer service valve shall be installed between the meter and the private service line and shall be located within the meter box. Customer service valves shall be constructed of waterworks brass with lever or hand wheel operation. Valve connections shall be consistent with the type of existing private service line encountered. Brass components shall be used between the meter and the customer service valve.

Acceptable customer service valves:

Ford SG 13-332 (¾" straight) or approved equal.
Ford GA 13-332 (¾" angle) or approved equal.
Ford GA 13-444 (1" angle) or approved equal.
Ford SG 13-444 (1" straight) or approved equal.

504.01.04 SERVICE SADDLES

Bronze service saddles (bronze double straps, bronze bodied) will be required for one-inch service taps on four-inch ductile iron pipe; for all service taps on steel, cast iron pipe, and AC Pipe; and for service taps greater than one-inch regardless of pipe type.

Service saddles, when required, shall be bronze service saddles (bronze double straps, bronze bodied). Model numbers for bronze saddles are:

Ford	Style 202B
A. Y. McDonald	3825
Mueller	BR2B Series

Service saddles shall be supplied with AWWA taper thread.

504.01.05 METERS

The City will supply meters as required.

504.01.06 CONCRETE METER BOXES

Concrete meter boxes shall not be used except as approved or directed by the City Engineer.

504.01.07 RESIN CAST METER BOXES

Meter boxes will be supplied without cutouts for service line penetrations.

Meter box covers shall include a hinged cast iron reading lid. Covers shall be constructed with a recessed circle and hole to receive "touch read" sensor housings. All meter boxes and covers shall be supplied with "20k" covers.

Acceptable resin cast meter boxes and covers:

Model	Size	Part Number
Armorcast #38	13 × 24 × 12 box	A6001946PCx12
	13 × 24 cover "20k"	A6001969TRCI-H7
Armorcast #66	17 × 30 × 18 box	A6001640PCx28
	17 × 30 cover "20k"	A6001947TRCI-H7

504.01.08 BACKFILL

Backfill material shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

504.02.00 CONSTRUCTION

504.02.01 EXCAVATION AND BACKFILL

The trench shall be prepared for pipe laying and backfill as specified in Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK and applicable standard details.

The trench bottom shall conform to the line and grade to which the pipe is to be laid, allowing for pipe thickness and bedding material, and shall form a continuous uniform bearing and support for the pipe between bell holes.

504.02.02 TUBING AND FITTING INSTALLATION

504.02.02A SERVICE LINE INSTALLATION

Water service lines shall be of the size shown in the contract documents.

Water service lines shall be installed with a minimum depth of bury of 30 inches as measured from the top of the service line to finished grade. A greater depth may be necessary to avoid existing underground utilities or other obstructions. When extending new services across existing streets, the minimum cover shall be established at the gutter elevation and the service extended across the street at a flat grade.

Copper services shall be direct buried and bedded in select rock backfill such that no portion of the service assembly is in contact with native soil. Copper service lines shall be installed with cathotic protection meeting the requirements of Section 501.01.08 CATHOTIC PROTECTION. Copper service lines shall not be installed by jacking or other methods which will result in the completed service assembly being in contact with native soil. Copper services may be installed in PVC casings where approved by the City Engineer.

When two or more water services are installed in a common trench, the minimum spacing between services shall be one foot.

Water service lines shall extend from the corporation stop at the water main to the angle meter valve by use of a single, continuous length of copper or plastic tube, and without the use of intermediate couplers.

Copper or plastic tubes shall be carefully deflected as necessary to complete the service connection, but at no time shall the tube be allowed to become kinked so as to reduce its cross-section. Damaged service lines shall be replaced by the contractor at the contractor's expense in their entirety from the corporation stop on the water main to the angle meter valve.

Tracer wire with a minimum thickness of 12-gauge shall be installed with plastic water service lines. The tracer wire shall be installed along the same horizontal alignment and at the same depth as the water service line. Tracer wire shall be obvious and easily accessible within the meter box, and shall extend without break to the corporation stop. Tracer wire shall be solidly connected to the corporation stop to provide an uninterrupted signal to be transmitted through the tracer wire and into and through the water main.

Individual service assemblies, including the service tap, copper piping, and angle meter valve shall not be backfilled until they have been inspected and approved by the City Engineer. The contractor shall coordinate the inspection of service assemblies with the City Engineer.

504.02.02B CUTTING, SIZING, AND BENDING COPPER TUBING

Copper tubing shall be cut, reamed, sized, and configured using tools and practices specific to those operations.

504.02.02C SERVICE TAPS

Service taps required on new water mains shall be performed by the contractor. Service taps required on existing water mains will be constructed by the City. Tapping operations shall be performed with industry standard equipment manufactured solely for the purpose of tapping potable water lines.

Generally, ductile iron water lines shall be direct tapped with AWWA taper threads. Service saddles are required in some applications. See subsection 504.01.04 SERVICE SADDLES and the appropriate standard detail drawing for specific applications for service saddles.

Service taps shall be located at 10:00 or 2:00 on the circumference of the pipe.

Taps shall be made with a minimum clear distance of 18 inches from any pipe joint or between taps on the water main.

Tapping lubricant shall be food grade lubricant as approved by the City Engineer. Acceptable lubricants:

Romac Tapping Compound 353-10-1
Mueller Cutting Grease #88366

504.02.02D CORPORATION STOPS AND ANGLE METER VALVES

Threaded joint connections shall be made after all threaded surfaces have been thoroughly cleaned and prepared with sealing tape or pipe jointing compound approved for use in potable water systems. Corporation stops shall be installed with the valve operating nut located at the top of the corporation stop. When installed, the corporation stop shall have three to five threads remaining exposed where it penetrates the pipe wall of the water main.

Water service lines including the angle meter valves shall be installed prior to pressure and leakage testing. Angle meter valves shall not be repositioned, removed, or the copper tubing recut after final acceptance of pressure and leakage testing. Removal and/or relocation of the angle meter valve, or any other components, after pressure and leakage testing shall require retesting of the new water main prior to acceptance by the City. Details relative to the retesting of water mains will be determined by the City Engineer.

504.02.03 METER AND METER BOX INSTALLATION

The contractor shall install the angle meter valve such that the operating nut is six to eight inches below the top of the meter box cover.

Both the angle meter valve and customer service valve operating nuts/handles shall operate freely without striking the inside of the meter box.

Reconnection of existing house service lines to new meters shall be made with Schedule 80 PVC pipe and appropriate fittings sized to match the existing service.

Each angle meter valve or meter assembly shall be covered by a meter box. Each meter box shall be set on four inches of compacted one-inch minus crushed aggregate at an elevation that places the top of the meter box cover flush with the existing or proposed grade.

Meter box locations shall be kept clear of pedestrian hazards during the different phases of service installation. Open excavations shall be kept covered with plywood or other approved materials. Water system components, meter boxes, and other debris shall be not be allowed to accumulate in the parking strip.

504.02.04 REPAIR OF DAMAGED WATER LINES

It is the contractor's responsibility to make emergency repairs to existing water lines damaged during the course of construction.

Procedures and materials used in repair work of this nature shall be as approved by the City Engineer.

This requirement shall apply to all existing water lines located and marked by the owner prior to commencement of construction operations.

504.02.05 SURFACE RESTORATION

Surface restoration shall be in conformance with applicable requirements of Section 208 RESURFACING and Section 209 CLEANUP AND SITE RESTORATION.

504.03.00 MEASUREMENT AND PAYMENT

504.03.01 SERVICES

Payment for installation of services shall be made on a linear-foot basis as stated in the contract documents. Pipe will be measured horizontally from the center of the water line to the angle meter valve.

Payment for copper service installation shall constitute full compensation for labor; equipment; materials; trench excavation, backfill, and compaction operations; installation of copper service line including service saddle, corporation stop, and the angle meter valve; flushing, testing, and disinfection; and any other incidental expenses necessary to prepare the constructed service line for use.

504.03.02 METER ASSEMBLIES

Payment for meter assemblies and installation will be made on a unit-price basis per assembly and will include all labor; materials; equipment; trench excavation, bedding, and backfill operations; providing and installing the meter, any required adapters, meter setter, customer service valve, and meter box; connection to and abandonment of the existing service; and restoration of the ground surface to original condition.

504.03.03 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

505 HYDROSTATIC PRESSURE/LEAKAGE TESTING AND DISINFECTION

505.01.00 PRESSURE AND LEAKAGE TESTING

505.01.01 GENERAL

Hydrostatic pressure and leakage tests shall be made on all sections of the new water line including hydrant assemblies and copper service lines. Depending on the diameter, length, and number of appurtenances that comprise the new water line, the City may require the water line be tested for acceptance in sections rather than in its entirety. New valves shall be tested in the closed position against test pressure at some point during acceptance testing. The City Engineer will monitor all final testing of the completed system.

The contractor shall be reasonably sure the system will pass the required testing prior to scheduling an appointment with the City Engineer to witness testing.

Testing shall be against closed hydrants with hydrant valves open and against the closed angle meter valve with the corporation stop open.

Backfill shall be in place and compaction requirements satisfactorily met and approved by the City Engineer prior to conducting final pressure and leakage testing.

Concrete thrust blocking required for any reach of pipe shall be allowed a minimum of five days cure time prior to pressure testing. If high-early concrete is used, the time may be reduced to two days.

The leakage test shall be conducted concurrently with the pressure test. The contractor shall furnish all necessary apparatus and shall conduct the test.

Pressure testing and disinfection operations shall not be conducted concurrently unless there is a physical separation between the new and existing water lines or there is an approved backflow device installed between the new and existing water lines.

Testing equipment shall be set up in a manner that will ensure an accurate method of measurement for the amount of water required to maintain the specified test pressure for the duration of the test.

505.01.02 PRESSURE AND LEAKAGE TESTING

The minimum test pressure shall be 150 psi. The test pressure shall not be allowed to drop below 150 psi for the duration of the test. The test pressure shall be applied and maintained for a two-hour duration. If the test pressure drops below 150 psi at any time, the test will be void.

The test pressure shall be calculated for the point of highest elevation of the water line but shall not exceed 200 psi at any point.

Any defective components of the new water system shall be removed and replaced by the contractor and the tests repeated until test results meet the specified requirements.

The use of bell repair clamps or other similar devices to stop leaks due to defective materials or poor workmanship will not be permitted.

505.01.02A ISOLATED LOCATIONS

New pipe and fittings not subjected to standard pressure testing procedures shall be tested at system pressure after final connections to the existing water system have been made. Pipe and fittings at these locations shall be kept open until the City Engineer can conduct a visual inspection for leaks.

505.01.02B ALLOWABLE LEAKAGE

Leakage shall be defined as the quantity of water necessary to maintain the specified test pressure for the duration of the test period.

Leakage shall not exceed the number of gallons per hour as determined by the following formula:

$$L = \frac{N \cdot D \cdot (P)^{1/2}}{8400}$$

L = Allowable leakage in gallons per hour
N = Number of joints in the length of pipe tested
D = Nominal diameter of the mainline pipe in inches
P = Test pressure during the leakage test in psi
(= Each service installation completed shall constitute one joint)

The allowable leakage at various pressures for pipe of various diameters is shown in Table II below.

TABLE II
ALLOWABLE LEAKAGE PER 100 JOINTS – gph

	PIPE DIAMETER – INCHES									
AVERAGE TEST PRESSURE	4	6	8	12	16	20	24	30	36	42
200	0.67	1.00	1.35	2.02	2.69	3.37	4.04	5.05	6.06	7.07
195	0.67	0.99	1.33	2.00	2.66	3.33	3.99	4.99	5.98	6.98
190	0.65	0.98	1.31	1.97	2.63	3.28	3.94	4.92	5.90	6.89
185	0.65	0.97	1.30	1.94	2.59	3.24	3.89	4.86	5.83	6.80
180	0.64	0.96	1.28	1.92	2.55	3.20	3.83	4.79	5.75	6.71
175	0.63	0.94	1.26	1.89	2.52	3.15	3.78	4.73	5.67	6.61
170	0.62	0.93	1.24	1.86	2.48	3.10	3.73	4.66	5.59	6.52
165	0.61	0.92	1.22	1.83	2.45	3.06	3.67	4.59	5.51	6.42
160	0.60	0.90	1.20	1.81	2.41	3.01	3.61	4.52	5.42	6.33
155	0.59	0.89	1.19	1.78	2.37	2.97	3.56	4.45	5.34	6.23
150	0.58	0.88	1.17	1.75	2.33	2.91	3.50	4.37	5.25	6.12

505.02.00 DISINFECTION OF WATER MAINS

505.02.01 GENERAL

New water mains, repaired portions of existing mains, and extensions to existing water mains shall be disinfected in strict accordance with AWWA C-651 and the Oregon Health Division. In situations where they differ, the Oregon Health Division shall supersede AWWA requirements.

Testing equipment, chlorination chemicals, temporary valves, temporary blow-off assemblies, backflow devices, or other water control equipment and materials required for proper disinfection of new water mains shall be furnished by the Contractor. No procedures or materials shall be used which may be injurious to the water main or compromise its long-term function.

505.02.02 FLUSHING

The contractor shall coordinate flushing operations with the City Engineer. The contractor shall give the City Engineer a minimum of 24 hours advance notice of the flushing schedule. Flushing operations shall not commence without the approval of the City Engineer.

Prior to chlorination, the main shall receive a complete flushing through all hydrants and blowoffs such that a minimum velocity of 2½ feet per second is developed in the main.

Valves shall be operated through their extreme open and closed positions during flushing. Each hydrant shall be inspected after flushing to see that the entire valve operating mechanism is in good condition.

Flushing water onto the street subgrade will not be allowed at any time. Prior to any flushing operations, the contractor shall make provisions for the disposal of the water onto areas where no damage will be caused.

505.02.02A WATER FOR FLUSHING

The City will provide the water necessary for a flushing duration of:

T (in sec.) = L, where L = the length of the line in feet.

Additional water for a flushing duration in excess of this time period shall be computed by the City and shall be provided at the contractor's sole expense. Water usage shall be computed by using an estimated main velocity of 2½ feet per second and the actual time of flushing beyond the allowed time (T). The charge for this extra use shall be at a rate of $.50 per 100 cubic feet of water.

505.02.03 CHLORINATION

The maximum allowable initial concentration of chlorine to be used in disinfecting new water lines shall be 50 milligrams per liter (mg/L).

The point of chlorine application shall be not more than 10 feet downstream from the beginning of the new main. If a corporation stop is utilized to feed the chlorine, it shall be located on the top of the pipe, and shall be removed and plugged with a brass plug prior to putting the line in service.

Chlorination shall be performed in such a manner that will prevent super-chlorinated water from backflowing into the City's potable water system.

A mixture of water and a chlorine-bearing compound of known chlorine content shall be used in disinfection. Acceptable compounds are calcium or sodium hypochlorite. Prior to use, these compounds shall be thoroughly mixed with water to yield a one percent chlorine solution. If powdered or granular chlorine is used, it must be fully dissolved before being introduced into the new water main.

The Continuous Feed Method shall be used to disinfect new water mains. The chlorine/water solution shall be uniformly introduced into the water main via an electronic metering pump as manufactured by Wallace & Turnin, or approved equal. The contractor shall meter the flow of chlorine/water solution being introduced into the water main and the flow of the water at the outlet point to ensure the proper chlorine content is obtained throughout the water main. Water from the existing distribution system shall be controlled so as to flow slowly into the main to be chlorinated. The feed rate of the chlorine mixture shall be in such proportion to the rate of flow of the water entering the pipe that a minimum free chlorine residual of 25 milligrams per liter (mg/L) will be introduced into the system in a manner that results in a complete distribution of the solution throughout the system.

The solution shall remain in place for 24 hours. Valves shall be operated through their extreme open and closed positions during chlorination.

After the 24-hour period, a free chlorine residual of not less than 10 mg/L shall remain in the water at all points. This residual may ordinarily be expected with an initial application of 25 mg/L although some conditions may require more.

505.02.03A DISPOSAL OF CHLORINATED WATER

Chlorinated water with concentrations greater than 0.1 mg/L shall not be discharged onto the ground or into other surface drainage ways unless an approved procedure is followed. Disposal of chlorinated water shall be in accordance with the following guidelines:

1. Chlorinated water with concentrations under 0.1 mg/L may be discharged onto the ground, into surface drainage ways, or into the storm drainage system.

2. Chlorinated water with concentrations between 0.1 mg/L and 4.0 mg/L may be discharged into storm drainage systems if the distance between the point of discharge and the receiving stream is over 1,000 feet. Generally, this requirement applies to water discharged during initial flushing of the water line. If the distance to the receiving stream is less than 1,000 feet, the chlorine concentration shall be reduced to 0.1 mg/L before being discharged into the storm drainage system. Methods and/or materials used to lower the chlorine concentration to acceptable limits shall require review and approval of the City of Albany. City of Albany drinking water has a chlorine concentration range of 0.4 mg/L to 1.2 mg/L depending upon the location within the system.
3. Chlorinated water with concentrations over 4.0 mg/L and up to 50.0 mg/L shall be discharged into sanitary sewer systems where approved by the City. Generally, this requirement applies to water discharged during the disinfection process and final flushing of the chlorine solution from the system. Chlorinated water shall be conveyed to the sanitary sewer in closed conduits. An air gap shall be maintained between the discharge conduit and the rim of the receiving manhole. The rate of discharge shall not exceed the capacity of the system.
4. Chlorinated water with concentrations over 50 mg/L shall require dechlorination prior to discharge into the sanitary sewer. Methods and/or materials used to lower the chlorine concentration to acceptable limits shall require review and approval of the City of Albany.

505.02.03B CONNECTION ASSEMBLIES AND EMERGENCY REPAIRS

Disinfection procedures will not be possible for some limited portions of new water line construction and for emergency repairs to in-service water lines. These situations include, but are not necessarily limited to, short runs of pipe and fittings used to connect newly disinfected water lines to existing laterals, emergency, or otherwise unscheduled work on existing water lines, and other similar situations.

The City Engineer will review and approve procedures used to meet specified disinfection requirements for connection assemblies prior to commencement of the work. The City Engineer will make timely on-site assessments of disinfection procedures for situations involving emergency and unscheduled work.

At a minimum, materials that will not be subject to standard disinfection procedures, regardless of the situation, shall be thoroughly cleaned and then washed with an application of 300 mg/L hypochlorite solution. Materials shall be sealed or similarly protected in a manner that will preclude the materials from being contaminated prior to installation. The local water system shall be flushed immediately following completion of the work.

505.02.04 BACTERIOLOGICAL TESTING

Following chlorination, chlorinated water shall be thoroughly flushed from the pipeline at all points including each individual service until the replacement water throughout its length shall, upon test, be 1 mg/L or less. Upon testing, this satisfactory chlorine residual level shall be found to exist in the main 24 hours after final flushing.

The minimum sampling frequency will be determined by the City Engineer.

The City Engineer will conduct all sampling and testing procedures required for testing the bacteriological quality and final chlorine residuals. Should the initial disinfection treatment fail to result in the specified conditions, the original chlorination procedure shall be repeated at the contractor's expense until satisfactory results are obtained. No extra payment or extension of contract time will be allowed the contractor for the time elapsed to achieve acceptable disinfection of the water system.

**** END OF DIVISION ****

DIVISION 6 – POST-CONSTRUCTION STORMWATER QUALITY FACILITIES

601 GROWING MEDIUM

601.01.00 MATERIALS

Growing medium shall be a blend of top soil, sand, and compost. It shall be well mixed and homogenous. The blended material shall be loose and friable, giving good tilth and aeration. The growing medium shall be a blend that is 30 to 40 percent compost by volume.

601.01.01 TOPSOIL

Topsoil shall be obtained from naturally well-drained construction or mining sites where topsoil occurs at least four inches deep. It shall not be obtained from bogs, wetlands, or marshes.

601.01.02 COMPOST

Compost shall be derived from plant material and provided by a member of the U.S. Composting Council Seal of Testing Assurance (STA) program. For a list of providers in the Willamette Valley, see the United States Composting Council, participants list for the state of Oregon.

Compost shall be the result of the biological degradation and transformation of plant- derived materials under conditions designed to promote aerobic decomposition. The material shall be well composted, free of viable weed seeds, and stable with regard to oxygen consumption and carbon dioxide generation. Compost shall have no visible free water and shall produce no dust when handled.

Compost shall meet the following criteria, as reported by the U.S. Composting Council STA Compost Technical Data Sheet provided by the vendor.

a. 100 percent of the material must pass through a 5/8-inch screen.
b. The pH of the material shall be between 6 and 8.
c. Manufactured inert material (plastic, concrete, ceramics, metal, etc.) shall be less than 1.0 percent by weight.
d. The organic matter content shall be between 30 and 70 percent.
e. The soluble salt content shall be less than 6.0 mmhos/cm.
f. Germination (an indicator of maturity) shall be greater than 80 percent for Germination and Vigor.
g. The stability shall be “Stable” to “Very Stable.”
h. Carbon/Nitrogen (C/N) ratio shall be less than 25:1.
i. The trace metals test result = “Pass.”

601.01.03 GRADATION

A particle gradation analysis of the blended material, including compost, shall be conducted in conformance with ASTM C1 17/C136 (AASHTO T11/T27). The analysis shall include the following sieve sizes with the material meeting the gradation criteria indicated herein.

Sieve Size	Percent Passing
1 inch	100
# 4	75 -100
# 10	40-100
# 40	15-50
# 100	7-25
# 200	7-15

The growing medium blend shall have a Coefficient of Uniformity (D60/D10) equal to or greater than 6 to ensure that it is well graded (has a broad range of particle sizes). The coefficient is the ratio of two particle diameters on a grain-size distribution curve; it is the particle diameter at 60 percent passing divided by the particle diameter at 10 percent passing.

601.01.04 ACIDITY AND ALKALINITY

The blended material shall have a pH of 6 to 8.

601.01.05 DELETERIOUS MATERIALS

The blended growing medium shall be free of deleterious materials including, but not limited to manure, wood pieces, including root material; plastic; plant material not conforming to 601.01.02; clods or lumps of clay; pockets of unmixed component materials; hydrocarbons (diesel, gasoline, paint thinner, etc.); building materials; paint; concrete slurry or washout; or any other material determined by the Engineer to be harmful to stormwater quality or to the promotion of plant growth.

The blended material shall be free of weeds including but not limited to: Cirsium arvense (Canadian Thistle), Convolvulus spp. (Morning Glory), Cytisus scoparus (Scotch Broom), Dipsacus sylvestris (Common Teasel), Festuca arundinaceae (Tall Fescue), Hedera helix (English Ivy), Holcus canatus (Velvet Grass), Lolium spp. (Rye Grasses), Lotus corniculatus (Bird's Foot Trefoil), Lythrium salicaria (Purple Loose Strife), Melilotus spp. (Sweet Clover), Myriophyllum spicatum (Eurasian Milfoil), Phalaris arundinaceae (Reed Canary Grass), Rubus discolor (Himalayan Blackberry), Solanum spp. (Nightshade), and Trifolium spp. (Clovers).

The blended growing medium shall not contain nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens.

601.02.00 CONSTRUCTION

Growing medium shall be no less than eighteen inches in depth unless otherwise shown on the project plans.

601.02.01 PLACEMENT

The blended growing medium shall have no visible, free water at time of placement.

The bottom of the excavated stormwater quality facility shall be surface roughened to facilitate water permeation into the native material. Lined facilities do not require surface roughening.

Growing medium shall be placed in even lifts no greater than eight inches in depth, as measured loosely. Lifts shall be moderately compacted by use of a sand- or water-filled lawn roller. Mechanical means of compaction ("jumping jacks," "plate whackers," etc.) shall not be used on growing medium.

601.02.02 CONDITIONS

The growing medium shall not be placed when the ground or growing medium is frozen or water saturated, nor when standing water exists within the stormwater quality facility. The growing medium shall not be placed when it is raining, or if rain is forecast within 12 hours of placement.

601.02.03 PROTECTION OF THE GROWING MEDIUM

The growing medium shall be protected from all sources of contamination, including weed seeds, while at the supplier, in conveyance, and at the project site.

Following placement of the growing medium, vegetated stormwater facilities shall be protected from pedestrian, vehicular, and equipment traffic. Traffic upon facilities shall be cause for removal and re-installation of growing medium and such other features as determined necessary by the Engineer.

Surface drainage shall be prevented from entering the facility during construction until surface treatments are fully installed. Facilities shall be protected from sedimentation during construction of other improvements draining to the facility.

The specified surface treatment shall be applied on the same day the growing medium is placed in the facilities.

601.03.00 TESTING

601.03.01 SUBMITTALS

At least 10 working days in advance of the construction of vegetated stormwater facilities the contractor shall submit the following:

a. Two five-gallon buckets of the blended material, upon request.

b. Documentation for conformance to the requirements for particle gradation with calculated coefficient of uniformity, content of organic compost, and pH. The analyses shall be performed by an accredited laboratory with current certification. The date of the analyses shall be no more than 90 calendar days prior to the date of the submittal. The report shall include the following information:

   1. Source of blended material (supplier)
   2. Name and address of the laboratory
   3. Phone contact and e-mail address for the laboratory
   4. Test data, including the date and name of the test procedure

   A list of soil testing labs serving Oregon can be found through the Oregon State University Extension Services, Department of Crop and Soil Sciences.

c. A compost technical data sheet from the vendor of the compost. The analysis shall be performed and reported by an approved independent US Composting Council STA program participant laboratory.

601.03.02 VERIFICATION

The City may, at its sole discretion, take a representative soil sample on site to check for conformance of the blended material with the requirements of this specification. Where tests indicate non-compliance, soil shall be amended to meet the requirements or replaced, as determined by the Engineer. Plants will be re-planted or replaced at the discretion of the Engineer.

601.04.00 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place growing medium shall be incidental to specified bid items, unless otherwise identified in the contract documents.

602 AGGREGATES

602.01.00 DRAIN ROCK

602.01.01 GRADATION

Drain rock shall be comprised of 1½" – ¾", washed, open graded rock as follows:

Screen Size	% Passing
1¾"	100
1½"	90-100
1"	30-50
¾"	15-35
½"	0-20
3/8"	0-10
No. 4	0-10
No. 8	0-5
No. 200	0-1

602.01.02 PLACEMENT

Drain rock shall be no less than nine inches in depth unless otherwise shown on the project plans.

602.01.03 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place drain rock shall be incidental to specified bid items, unless otherwise identified in the contract documents.

602.02.00 GRAVEL LENS

A gravel lens shall be placed to separate the growing medium from the drain rock. The gravel lens shall be placed to prevent growing medium from infiltrating and loading the void spaces in the drain rock.

602.02.01 GRADATION

Material for the gravel lens shall conform to the *Oregon Department of Transportation Standard Specifications For Construction*, Section 00710.10 – Aggregates, (a) Size Designation – Single Sized Medium consisting of 3/8"-¼" washed, open graded rock, or as follows:

Screen Size	**% Passing**
½"	90-100
3/8"	50-100
¼"	0-15
No. 30	0-2
No. 200	0-2

602.02.02 PLACEMENT

The gravel lens shall be no less than three inches in depth.

602.02.03 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place the gravel lens shall be incidental to specified bid items, unless otherwise identified in the contract documents.

602.03.00 AGGREGATE FOR GRAVEL BALLAST

602.03.01 GRADATION

Aggregates shall be comprised of 2" to 4" rock, crushed with 100 fractured faces. Aggregate shall be washed free of fine materials.

602.03.02 PLACEMENT

Place as shown on the standard drawings or as indicated in the contract documents.

602.03.03 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place the aggregates for splash pads or ballast shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603 STRUCTURAL COMPONENTS

603.01.00 PORTLAND CEMENT CONCRETE (PCC)

Concrete splash pads shall be installed at all inlets into vegetated stormwater facilities. PCC structures shall conform to the requirements of sections 206, CONCRETE STRUCTURES; and 306, CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APPROACHES, AND ACCESS RAMPS of these Specifications.

603.01.01 CONSTRUCTION

Splash pads shall measure 12 inches wider than the inlet opening or contributing pipe diameter, centered. Splash pads shall be no less than 18 inches long as measured along the flow path into the structure. All surfaces of PCC structures shall be smooth and free of defects, and shall have a light broom textured finish. For planter walls, contraction joint spacing shall be a maximum of 10 feet.

603.01.02 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place the PCC structures shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603.02.00 PIPES AND FITTINGS

603.02.01 GENERAL

603.02.01A PUBLIC RIGHT OF WAY FACILITIES

Pipes and piping components within public rights-of-way shall conform to Division 4 of these Specifications. Where the provisions of Division 6 may conflict with those of Division 4, the requirements of Division 6 supersede those of Division 4.

603.02.01B ONSITE FACILITIES

Pipes outside of public-rights-of way shall conform to the requirements of the Oregon Plumbing Specialty Code. The contractor shall obtain all necessary permits for construction and inspections, unless specified otherwise in the contract documents.

603.02.02 MATERIALS

603.02.02A PERFORATED PIPE

Drain pipe for stormwater quality facilities shall be perforated, as below, except where it is located under street trees planted within the facilities. Pipe in these locations shall be of the same material and manufacture as the perforated pipe. Connections between pipe lengths shall be made in accordance with manufacturer's recommendations.

603.02.02B POLYVINYL CHLORIDE (PVC) PIPE

Perforated PVC drain pipe shall be smooth wall, perforated, meeting the requirements of ASTM F782 for PVC underdrain systems. PVC drain pipe shall be manufactured of Polyvinyl compounds with a minimum cell classification of 12364-C as defined by ASTM D1784. Unless otherwise specified or shown, joint systems shall be solvent-cement type. Perforations shall be circular, on 3¼" centers. Hole size shall be a minimum of 3/16" and a maximum of ⅜" arranged in four rows along the full length of pipe below the spring line (midpoint height) of the pipe.

603.02.02C HIGH DENSITY POLYETHYLENE (HDPE) PIPE

HDPE drain pipe shall conform to ASTM F2648/F2648M-13. Perforations shall be slotted or circular, conforming to AASHTO M252 Class II Perforation requirements.

603.02.03 CONSTRUCTION

Drain pipe within stormwater quality facilities shall be laid flat, unless otherwise shown on the project plans.

603.02.04 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place pipes for vegetated stormwater facilities shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603.03.00 LINERS

Liners shall be 30 mil thickness, high-density polyethylene material, or approved equal.

603.03.01 CONSTRUCTION

603.03.01A PIPE PENETRATIONS

Pipe penetrations shall be made with the use of manufactured pipe boots of the same material as the liner provided. Pipe boots shall provide a continuously bonded seal to the liner. Pipe boots shall provide a chemically bonded or mechanical seal to the pipe to prevent passage of water or soils at the point of pipe penetration.

603.03.01B LINER ATTACHMENT

Liner shall be mechanically anchored with aluminum bar. Aluminum bar shall be 2" by ¼" and shall conform to ASTM B211.

603.03.02 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place liners for vegetated stormwater facilities shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603.04.00 OVERFLOW ASSEMBLIES

603.04.01 Beehive Inlet Grates (Large Overflow Assembly)

Approved "beehive" style inlet grates include the following:

Pacific Marine	model R-2510-A	Beehive Grate Heavy Duty
Pacific Marine	model R-1761	Frame Heavy Duty

Beehive inlet grates shall be secured to the vertical drain pipe to prevent theft. See Standard Construction Detail Number 620.

603.04.02 Atrium Inlet Grates (Small Overflow Assembly)

Approved 4" and 6" atrium inlet grates include the following:

NDS	part no. 75 (for 4" grate)
NDS	part no. 80 (for 6" grate)
Dura Plastic Products, Inc.	part no.040-A (for 4" grate)
Dura Plastic Products, Inc.	part no. 060-A (for 6" grate)

603.04.03 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place overflow assemblies for vegetated stormwater facilities shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603.05.00 CHANNEL GRATES

Channel grates shall be "Interlaken" 18" grates as manufactured by Iron Age Designs, Model IN18-18I13. Frames shall be type "E" embed style as provided by the manufacturer. Installation shall be per manufacturer's recommendation.

603.05.01 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place channel grates for vegetated stormwater facilities shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603.06.00 METAL FRAME FOR CURB OPENINGS

HSS channel shall conform to ASTM A-500 Grade B. End plates shall conform to ASTM A-36. Headed concrete anchors shall conform to ASTM A-108.

603.06.01 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place metal frame for curb openings for vegetated stormwater facilities shall be incidental to specified bid items, unless otherwise identified in the contract documents.

603.07.00 CHECK DAMS

603.07.01 WOOD BOARDS

Wood boards for check dams shall be constructed from wood naturally resistant to decay, such as cedar, redwood, or approved equal.

Wood shall be free of splits, holes, and/or other damage.

603.07.02 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place check dams for vegetated stormwater facilities shall be incidental to specified bid items, unless otherwise identified in the contract documents.

604 SURFACE TREATMENTS

604.01.00 JUTE MATTING

604.01.01 MATERIALS

Jute matting shall be woven coir fabric produced by BonTerra CF-7, DeKoWe 700, Nedia KoirMat 700, Rolanka BioDMat 70, or approved equal; a high strength 700 Weight (100 percent coconut fiber), continuously woven mat (i.e., without seams), with a measured maximum open area of 50 percent; tested in accordance with ASTM D1777 (Thickness), ASTM D4595 (Tensile Strength), and ASTM D3776 (Weight).

604.01.02 CONSTRUCTION

Use 1" × 2" × 18" Factor W wood stakes, or approved equal to anchor all coir fabrics. Stakes shall be solid and free of knots or defects.

604.01.03 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place jute matting shall be incidental to specified bid items, unless otherwise identified in the contract documents.

604.02.00 STRAW MATTING

604.02.01 MATERIALS

Straw matting shall be contained within bio-degradable netting on top and bottom. Straw matting shall be rated for application on slopes 2:1 or steeper, and/or flow velocities up to six feet per second. Testing shall be in accordance with ASTM D6525 (Thickness), ASTM D6818 (Tensile Strength), ASTM D6475 (Weight).

Products containing synthetic netting or other components shall not be used.

Acceptable straw matting:

Bionet S150BN as manufactured by North American Green or approved equal.

604.02.02 CONSTRUCTION

Use 1" × 2" × 18" Factor W wood stakes, or approved equal, to anchor all coir fabrics. Stakes shall be solid and free of knots or defects.

604.02.03 MEASUREMENT AND PAYMENT

Tools, equipment, labor, materials, and testing necessary to furnish and place straw matting shall be incidental to specified bid items, unless otherwise identified in the contract documents.

605 VEGETATION

605.01.00 TREE AND PLANT SELECTION

Where tree, plant, and shrub species are not identified on project plans approved by the City's Public Works Department, the Contractor, using the City's approved planting lists, shall propose a plant selection to the City Engineer for review and approval.

605.02.00 PLANTING PROCEDURES

Trees shall be planted according to Division 210. Plants and shrubs shall be in a healthy, growing condition and shall be planted upright and adjusted to set best appearance or relationship to adjacent plants and structures.

605.02.01 TIMING

Containerized stock shall be installed only from February 1 through November 15. Bare root stock shall be installed only from October 15 through April 15. Seeding shall occur only from March 15 to October 15. Planting or seeding outside these times may require additional measures to ensure survival.

605.02.02 PLANT PIT SIZE

605.02.02A BARE ROOT STOCK

Bare root stock shall be placed into a plant pit sufficient for root mass. Soil backfill shall be manually compacted around the plant.

605.02.02B CONTAINERIZED STOCK

Containerized stock shall be placed into a plant pit twice the size of container.

605.03.00 ESTABLISHMENT PERIOD

The establishment and warranty period for plantings is two years as identified in Division 1. Establishment period requirements for street trees installed in post-construction stormwater quality facilities are identified in Section 210 of these specifications.

605.03.01 MONITORING, WEEDING, AND PRUNING

Approval and acceptance of the completed post-construction stormwater quality facility will be conditioned upon the contractor providing a monitoring, weeding, and pruning schedule for the purpose of evaluating the ongoing function of the facility, and for the health and establishment of plants, shrubs, and trees. The schedule shall span the entire establishment period; shall identify the responsible party and his/her contact information; and shall identify the dates of inspection and weeding (minimum of three per growing season, evenly spaced, and one prior to onset of growing season) to be performed. The monitoring and weeding schedule shall be updated, revised, and resubmitted within five working days of any request by the City.

During the establishment period the contractor shall provide reporting documents to the City to demonstrate conformance with the monitoring and weeding requirements. Reporting documents shall include the name of the person performing the inspection and weeding; date and time; location; general condition of the facility; and the health, general condition, and number of plants, shrubs, and trees of each variety of planted species. Complete reporting documents shall be submitted to the City within five working days of each inspection.

605.03.02 IRRIGATION

Approval and acceptance of the completed post-construction stormwater quality facility will be conditioned upon the contractor providing an acceptable irrigation schedule. The contractor shall be responsible for irrigating all trees, shrubs, and plants to sustain an unstressed growing condition throughout the establishment period. Regardless of the submitted irrigation schedule, the contractor is ultimately responsible for plant survival throughout the establishment period and is required to increase the irrigation frequency as necessary to avoid stressing trees, shrubs, and plants.

605.03.03 PLANT REPLACEMENT

Plants and shrubs that have died, are dying, or are not demonstrating vibrant and healthy growth, as determined by the City, shall be replaced immediately upon discovery by the contractor or direction from the City Engineer within the establishment and warranty period. Replacement plants shall be of the same species and size as originally specified. Prior to replacement, the cause of loss (wildlife damage, poor plant stock, etc.) shall be documented with a description of the corrective actions taken. All plants being replaced shall be appropriately disposed of offsite.

605.04.00 MEASUREMENT AND PAYMENT

605.04.01 TREES

Trees shall be paid according the provisions identified in Division 210 of these Specifications.

605.04.02 PLANTS AND SHRUBS

Tools, equipment, labor, and materials necessary to furnish and place plants will be paid on a lump-sum basis unless otherwise specified in the contract documents.

605.04.03 ESTABLISHMENT PERIOD MAINTENANCE

Tools, equipment, labor, and materials necessary to provide maintenance for plants and trees throughout the establishment period shall be incidental to specified bid items, unless otherwise identified in the contract documents.

END OF DIVISION

STANDARD DRAWINGS

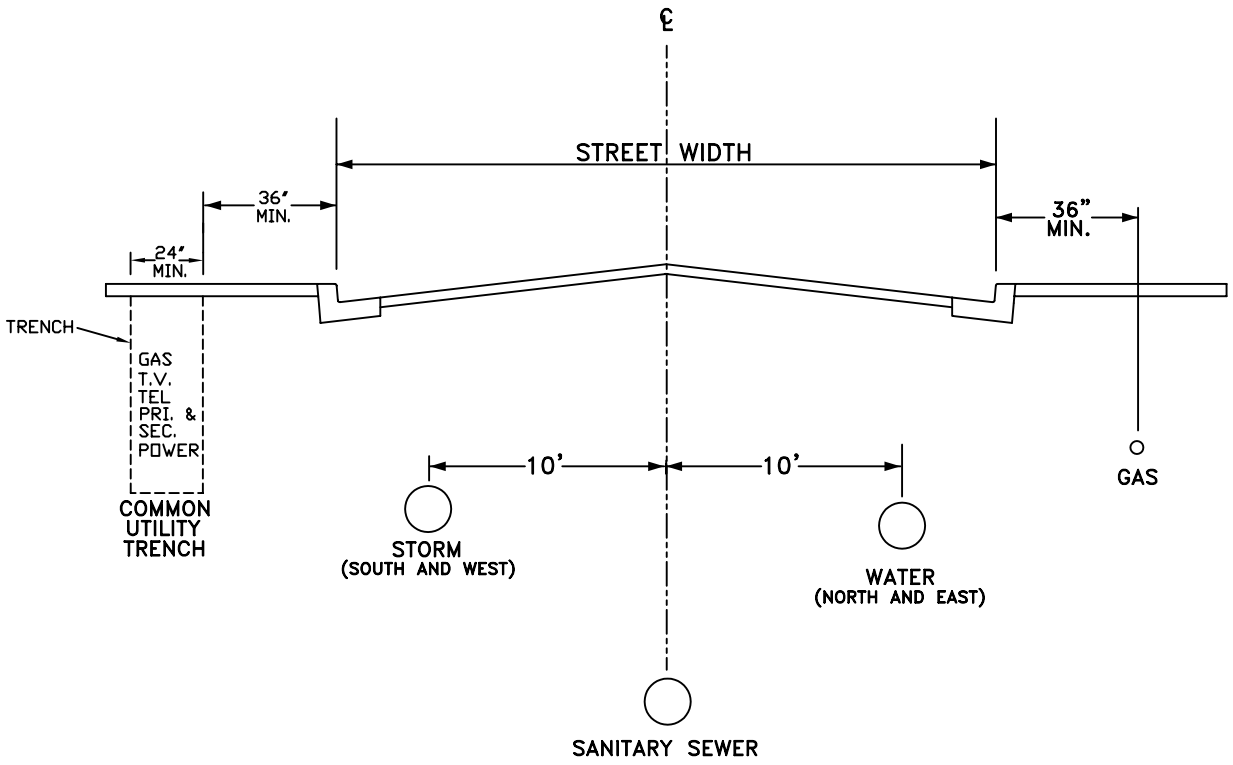
DIVISION 2 – GENERAL TECHNICAL REQUIREMENTS

DIVISION 3 – STREETS

DIVISION 4 – SANITARY SEWERS AND STORM DRAINS

DIVISION 5 – WATER

DIVISION 6 – POST-CONSTRUCTION STORMWATER QUALITY FACILITIES



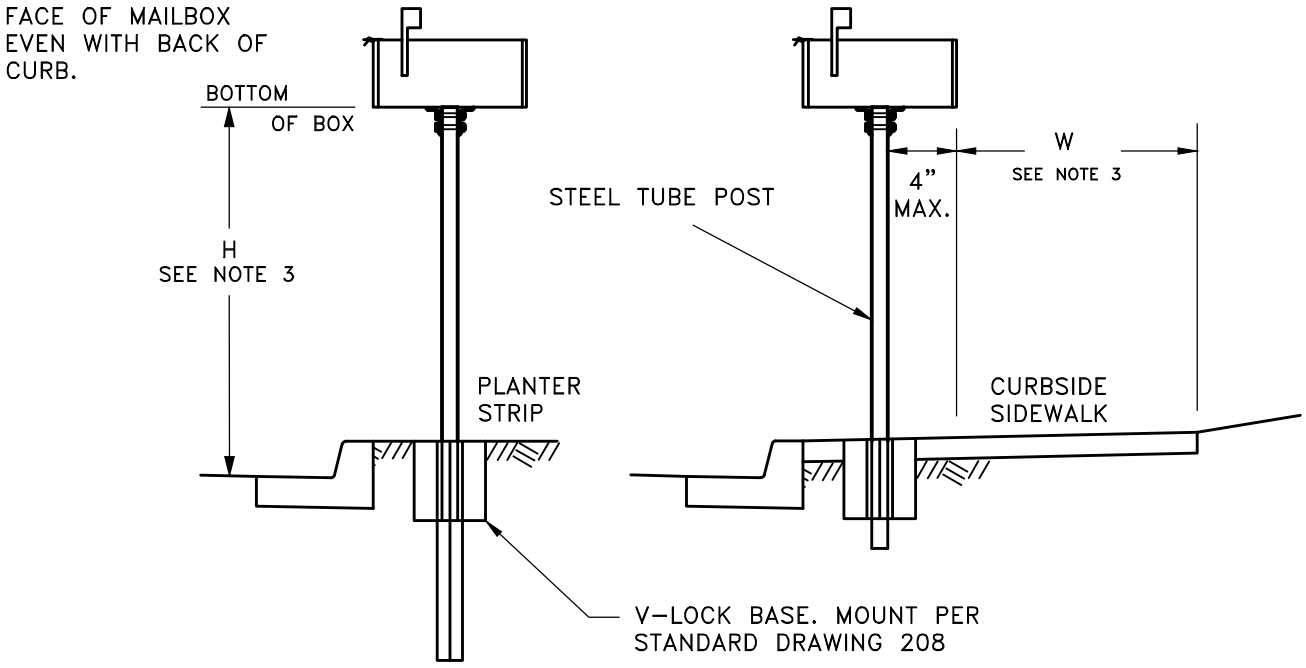
NOTES:

1. ALL PRIVATE UTILITIES TO BE LOCATED A MINIMUM OF 3' BEHIND THE CURB.
2. MINIMUM COVER FOR PRIVATE UTILITIES IS 30".
3. CONTACT RESPECTIVE PRIVATE UTILITY COMPANY FOR SPACING REQUIREMENTS WITH OTHER PRIVATE UTILITIES.
4. MAINTAIN A MINIMUM LATERAL CLEARANCE OF 7.5' BETWEEN WATER AND POWER.
5. AN INCREASE IN UTILITY SEPARATION MAY BE REQUIRED IF ANY UTILITY IS OVER 10' DEEP OR OVER 24" IN DIAMETER.
6. ANY VARIATIONS FROM THIS DESIGN MUST BE APPROVED BY THE CITY ENGINEER.

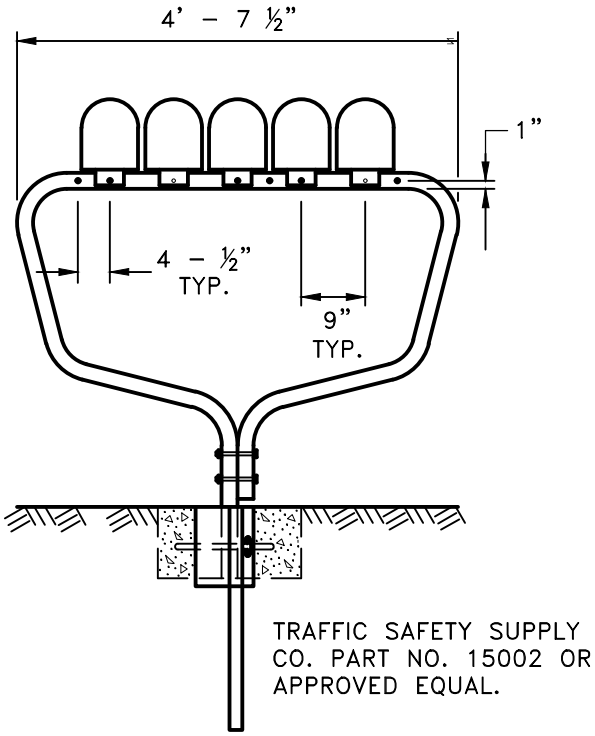
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

UNDERGROUND UTILITY LOCATIONS

NO SCALE	JULY 2005	NO. 201



SINGLE SUPPORT



MULTIPLE SUPPORT

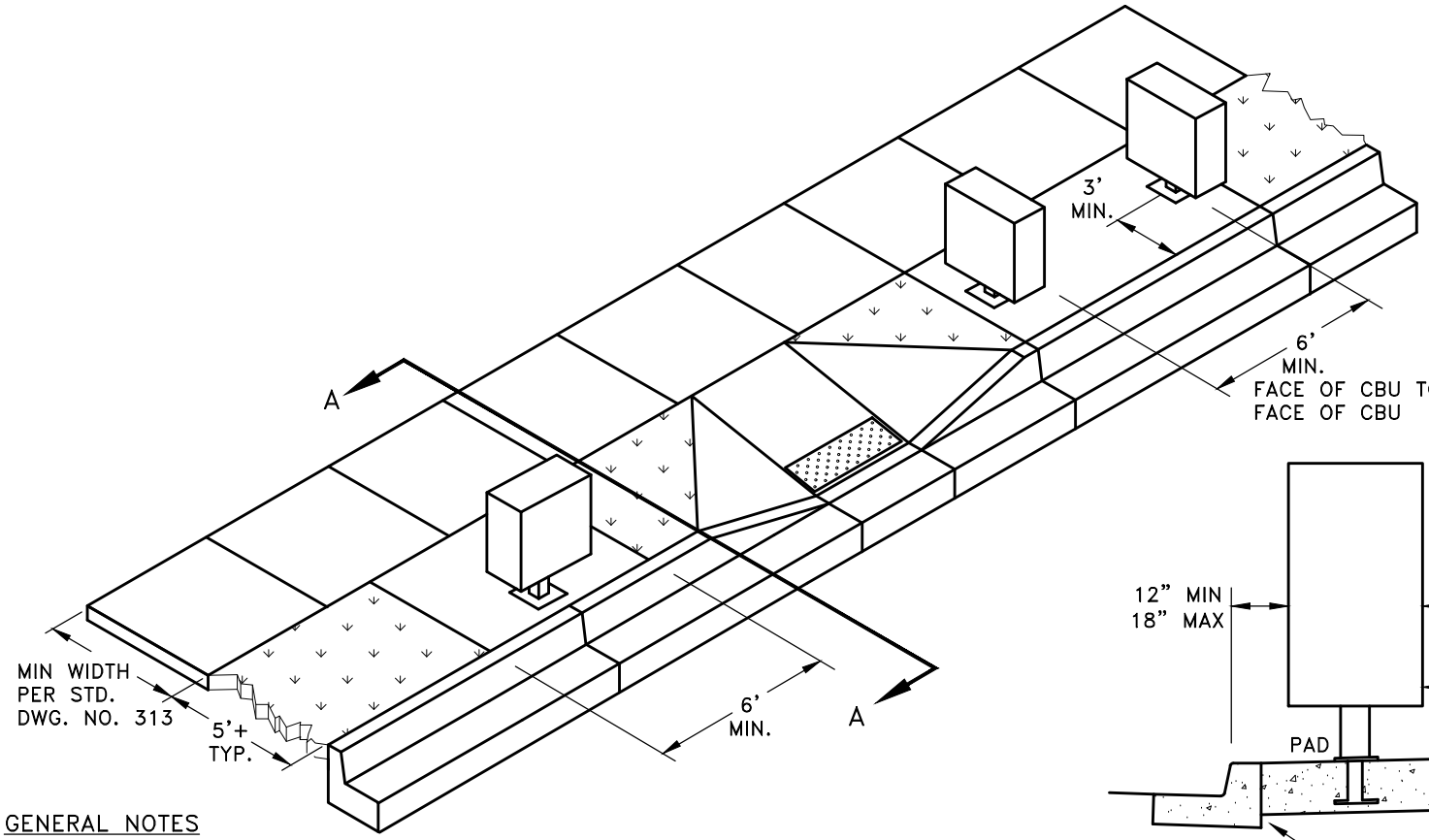
GENERAL NOTES

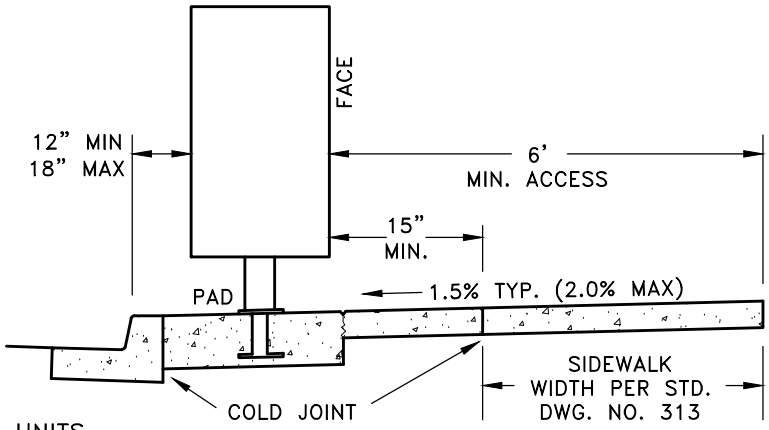
1. CONTACT THE UNITED STATES POSTAL SERVICE FOR LOCATION OF MAILBOX.
2. ON STREETS WITHOUT CURBS, THE FRONT OF THE MAILBOX SHALL BE LOCATED AT THE OUTSIDE EDGE OF THE SHOULDER.
3. W = 6' MIN. CLEAR SPACE FOR LOCAL STREETS.
   7' MIN. CLEAR SPACE FOR ARTERIAL AND COLLECTOR STREETS.
   4.0' MINIMUM WITH CITY ENGINEER APPROVAL
   H = 50" MIN., 52" MAX. ON IMPROVED STREETS.
   36" MIN., 38" ON NON–IMPROVED STREETS.
4. SEE DETAIL DWG. NO. 314 AND DETAIL DWG. NO. 317 FOR REQUIREMENTS RELATIVE TO CONSTRUCTION OF SIDEWALK AROUND OBSTACLES AND MAINTAINING REQUIRED PEDESTRIAN ACCESS CIRCULATION PATH.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

MAILBOX LOCATION

NO SCALE	JUNE 2023	NO. 202A





SECTION A–A

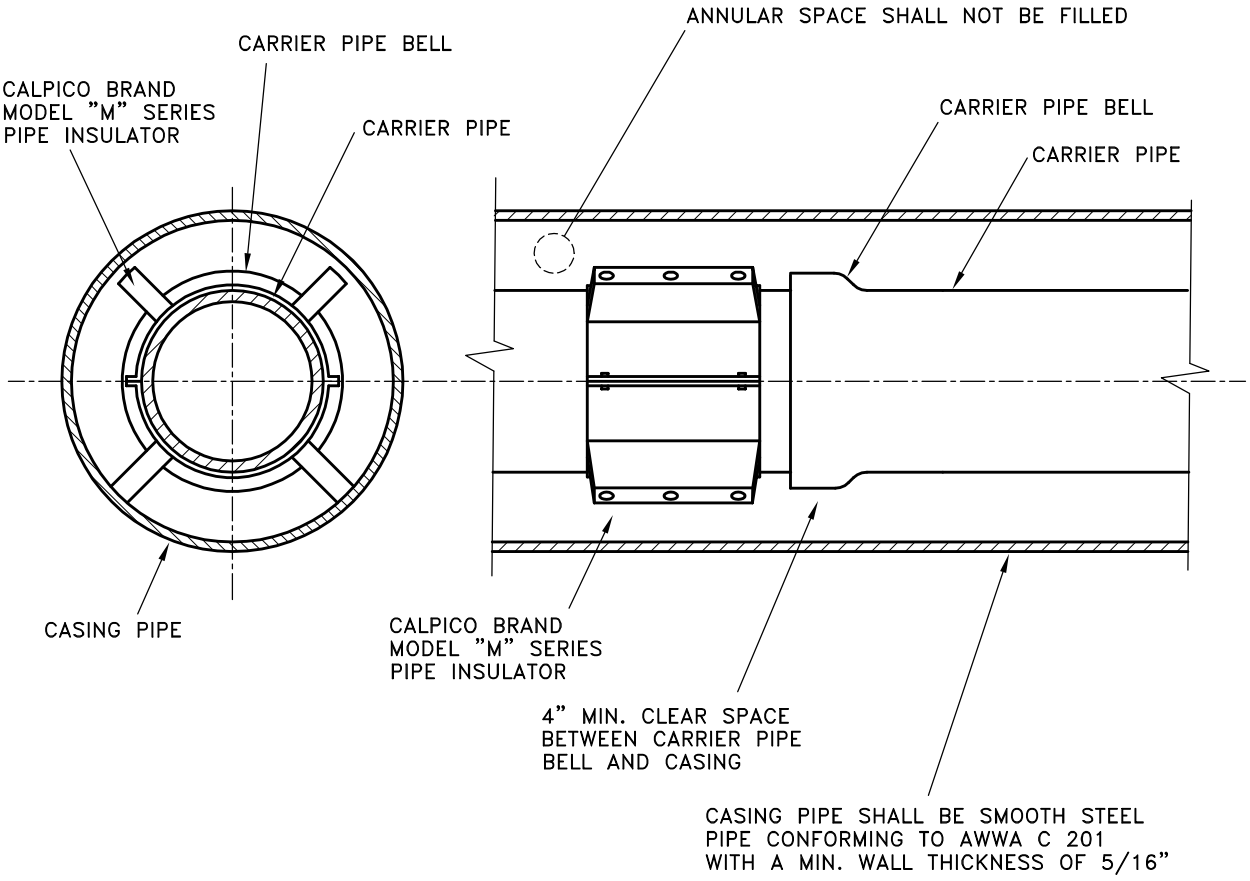
GENERAL NOTES

1. CONTACT THE UNITED STATES POSTAL SERVICE FOR LOCATION OF CLUSTER MAILBOX UNITS (CBUs). LOCATION SUBJECT TO APPROVAL BY THE CITY.
2. CBUs SHALL BE PROVIDED WITH AN UNOBSTRUCTED ACCESS PAD MEASURING NOT LESS THAN SIX FEET WIDE BY SIX FEET LONG, CENTERED ON THE FACE OF THE CBU.
3. WHERE LOCATED WITHIN A PLANTER STRIP THE ACCESS PAD SHALL BE CONTINUOUS FROM THE BACK OF CURB TO EDGE OF SIDEWALK, SEPARATED BY COLD JOINTS.
4. THE ACCESS PAD SHALL BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE AND SHALL HAVE A SLOPE OF 1.5% IN ANY DIRECTION (2.0% MAX.) AND SHALL BE FLUSH WITH ADJACENT SIDEWALK AND TOP OF CURB.
5. ADJACENT SIDEWALKS MAY BE USED IN MEASURING THE AREA OF THE ACCESS PAD.
6. CBUs SHALL BE LOCATED NO MORE THAN FIFTY FEET FROM A CURB RAMP, AS MEASURED FROM THE CENTER OF THE CURB RAMP TO THE CENTER FACE OF THE FURTHEST CBU.
7. CBUs SHALL BE CONNECTED BY A CONTINUOUS ACCESSIBLE WAY (SIDEWALK) TO THE CURB RAMP.
8. CBUs SHALL BE INSTALLED ON STREETS WITH A MAXIMUM GRADE OF 4% UNLESS APPROVED BY THE CITY ENGINEER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CLUSTER MAILBOX UNITS (CBUs)

NO SCALE	JUNE 2023	NO. 202B



NOTE:

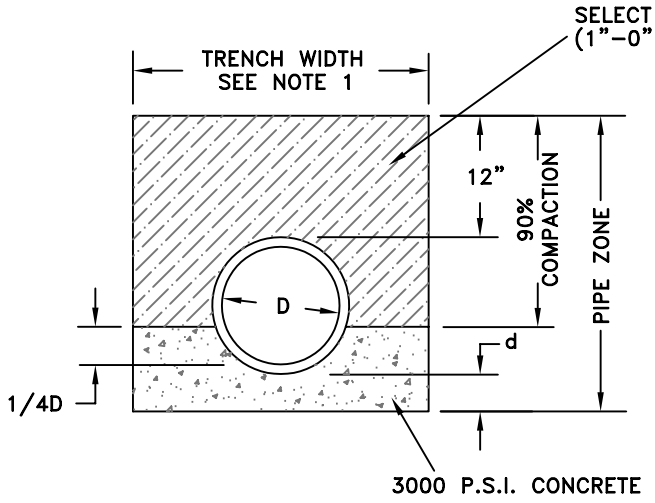
1. RAIL CROSSINGS AND SIMILAR APPLICATIONS MAY REQUIRE A CASING WALL THICKNESS GREATER THAN THE MINIMUM SHOWN. THESE REQUIREMENTS VARY BY APPLICATION AND WILL BE DETERMINED BY THE CITY OF ALBANY ENGINEERING DEPARTMENT.

2. THE LENGTH, CONFIGURATION, AND LOCATION OF THE PIPE INSULATORS ARE DEPENDENT UPON THE SIZE AND TYPE OF THE CARRIER PIPE. AT A MINIMUM, DUCTILE IRON CARRIER PIPES SHALL HAVE TWO INSULATORS PER STICK OF PIPE, SPACED TO PROVIDE AN EVEN SEPARATION OVER THE LENGTH OF CASING. PVC CARRIER PIPES SHALL HAVE THREE INSULATORS PER STICK OF PIPE, SPACED EVENLY.

3. THE METHOD OF SEALING THE CASING ENDS WILL REQUIRE APPROVAL OF THE ENGINEER. CAST-IN-PLACE CONCRETE SEALS SHALL BE CONTAINED WITHIN FORMWORK TO THE EXTENT THAT THE SEAL PENETRATES THE CASING TO A UNIFORM DEPTH OF 6 INCHES. THE SEAL SHALL BE INSTALLED AROUND THE FULL CIRCUMFERENCE OF THE CARRIER PIPE. THE CARRIER PIPE SHALL BE WRAPPED WITH ROOFING FELT OR SIMILAR MATERIAL TO PREVENT THE CONCRETE FROM BONDING TO THE PIPE WALL.

4. JOINTS ON DUCTILE IRON CARRIER PIPE USED IN PRESSURIZED SYSTEMS SHALL BE RESTRAINED BY USE OF MECHANICAL RESTRAINTS PER 501.01.01A; TR FLEX OR THRUST LOCK.

CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
TYPICAL PIPE CASING DETAIL		
NO SCALE	MAY 2009	NO. 203



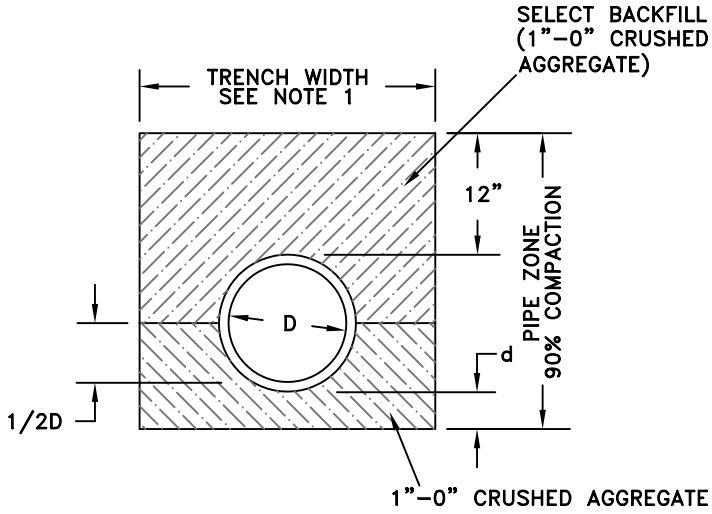
CONCRETE CRADLE

LEGEND

D = INSIDE DIAMETER

d = DEPTH OF BEDDING MATERIAL BELOW PIPE BELL.

D	d (min.)
27" & SMALLER	4"
30" TO 60"	6"
66" & LARGER	8"



GRANULAR FOUNDATION

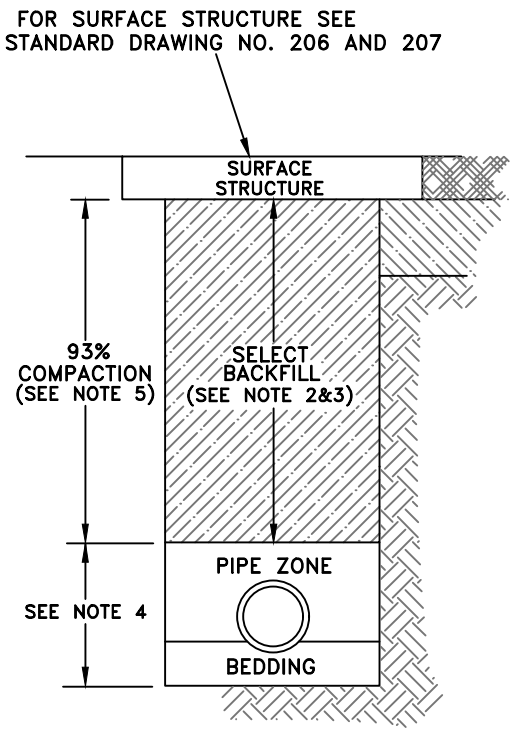
NOTES:

1. THE MAXIMUM CLEAR WIDTH OF THE TRENCH AT THE TOP OF THE PIPE SHALL NOT EXCEED THE PIPE OD + 2'. MINIMUM TRENCH WIDTH SHALL BE PIPE OD + 1'.
2. WHERE DIRECTED BY THE ENGINEER, GRANULAR TRENCH STABILIZATION SHALL BE PLACED PRIOR TO PLACEMENT OF THE BEDDING. SIZE AND DEPTH ARE DEPENDENT ON SOIL CONDITIONS.
3. FOR ROCK OR OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHALL BE OVEREXCAVATED A MINIMUM OF 6" AND REFILLED WITH GRANULAR MATERIAL AS DIRECTED BY THE ENGINEER.
4. BEDDING AND BACKFILL MATERIALS IN THE PIPE ZONE SHALL BE COMPACTED AS SPECIFIED PRIOR TO BACKFILLING THE REMAINDER OF THE TRENCH.
5. ALL COMPACTION REQUIREMENTS SHALL BE PER MODIFIED PROCTER TEST METHOD ASTM D1557.
6. SEE DETAIL DWG. NO. 205 FOR DETAILS RELATING TO TRENCH BACKFILL ABOVE THE PIPE ZONE.

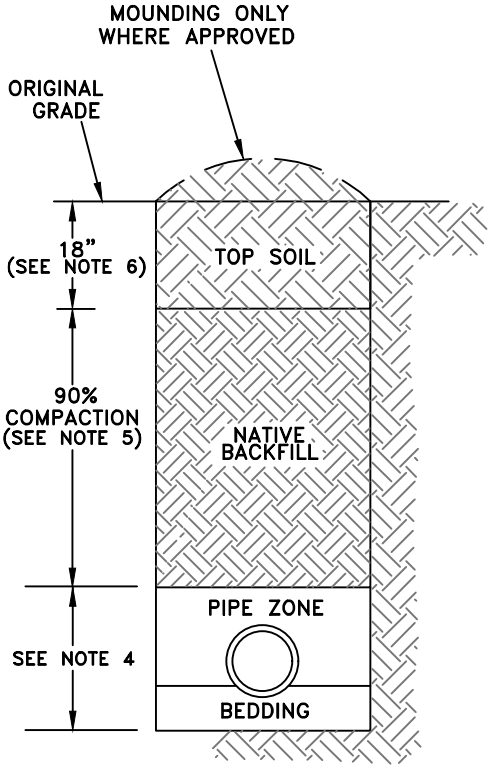
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

PIPE ZONE AND BEDDING DETAILS FOR STANDARD UTILITY TRENCH

NO SCALE	MAY 1998	NO. 204



PUBLIC R.O.W.



NATIVE BACKFILL
(WHERE APPROVED)

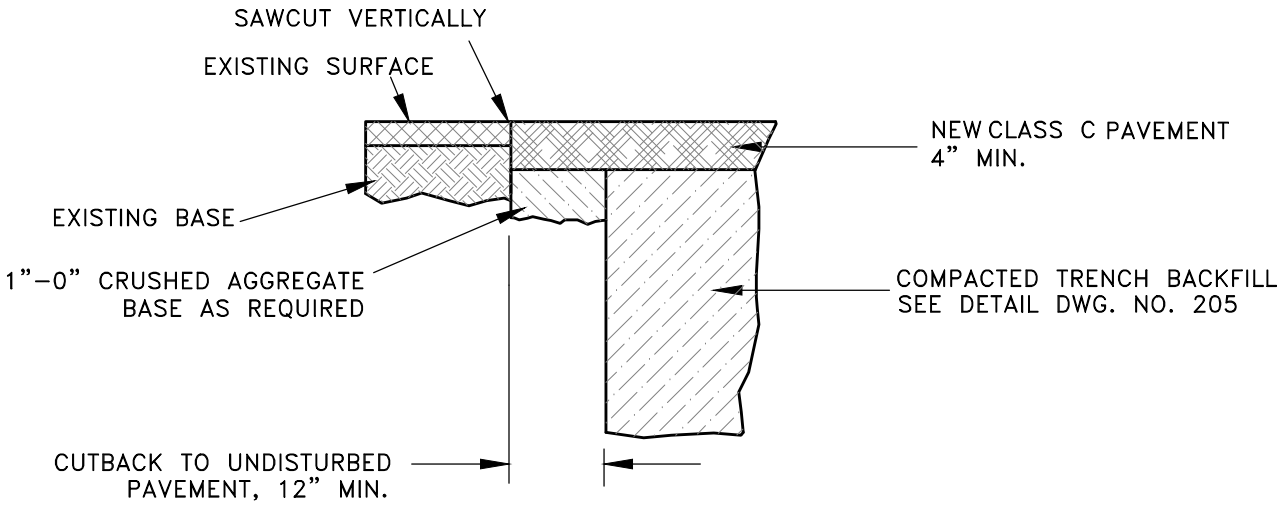
NOTES:

1. FULL PANEL REPLACEMENT IS REQUIRED ON CONCRETE SURFACES. SEE STANDARD DRAWING NO. 207.
2. SELECT BACKFILL IN THE TOP 8' OF TRENCH SHALL BE 1"–0" CRUSHED AGGREGATE.
3. BACKFILL BETWEEN THE PIPE ZONE AND 8' BELOW FINISHED GRADE MAY BE BANK–RUN GRAVEL, RIVER RUN GRAVEL, 1" MINUS OR ¾" MINUS.
4. FOR BEDDING AND PIPE ZONE REQUIREMENTS, SEE DETAIL DWG. NO. 204.
5. ALL COMPACTION REQUIREMENTS SHALL BE PER MODIFIED PROCTOR TEST METHOD ASTM D1557.
6. APPROVED TOPSOIL SHALL BE LIGHTLY COMPACTED TO RESIST SETTLEMENT. EXISTING TOPSOIL MAY BE SALVAGED WITH APPROVAL OF ENGINEER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD UTILITY TRENCH
BACKFILL DETAIL

NO SCALE	FEBRUARY 2024	NO. 205



NOTES:

1. PAVEMENT SHALL BE SAWCUT NO LESS THAN TWICE. THE FIRST SAWCUT SHALL PROVIDE FOR REMOVAL OF THE PAVEMENT AS NEEDED TO ACCOMMODATE THE WORK BEING PERFORMED. SUBSEQUENT TO THE COMPLETION OF THE WORK, AND IN PREPARATION FOR PAVEMENT REPAIR, THE PAVEMENT SHALL BE SAWCUT A SECOND TIME TO REMOVE A MINIMUM OF AN ADDITIONAL 12 INCHES OF PAVEMENT. UNDERMINED AND/OR DAMAGED PAVEMENT SHALL BE REMOVED.

2. SAWCUTTING TOOLS SHALL NOT "OVERCUT" BEYOND THE EXTENTS OF THE PAVEMENT TO BE REMOVED.

3. WHEN THE DISTANCE BETWEEN THE FINAL SAWCUT PAVEMENT EDGE AND A CURB, GUTTER, PAVEMENT EDGE, CONSTRUCTION JOINT, OR OTHER CONCRETE STRUCTURE OR IMPROVEMENT WILL BE LESS THAN 24 INCHES, THE CONTRACTOR SHALL REMOVE ALL OF THE INTERVENING PAVEMENT AND INCLUDE THAT AREA IN THE PAVEMENT RESTORATION.

4. WHEN REMOVING CUT-BACK ASPHALT, MINIMIZE DISTURBANCE TO EXISTING BASE COURSE. PROVIDE AND COMPACT ADDITIONAL 1"-0 CRUSHED AGGREGATE IN CUT-BACK AREA AS REQUIRED TO MATCH REMAINDER OF TRENCH.

5. PAVE THE TRENCH AS SHOWN AND AS SPECIFIED. FINAL ASPHALT THICKNESS SHALL BE A MINIMUM OF 4", OR AS REQUIRED TO MATCH EXISTING THICKNESS, WHICHEVER IS GREATER. PLACE ASPHALT IN A MINIMUM OF TWO LIFTS. MAXIMUM DEPTH OF EACH LIFT SHALL BE 3 INCHES FOR CLASS B MIX AND 2 INCHES FOR CLASS C MIX. THE WEARING COURSE SHALL BE CLASS C MIX.

6. IMMEDIATELY FOLLOWING PAVING, JOINTS SHALL BE SAND-SEALED WITH MATERIAL CONFORMING TO THE REQUIREMENTS OF SECTION 205.02.01C. JOINTS SHALL BE COMPLETELY FILLED AND SEALED WITH NO VOIDS OR DEFECTS.

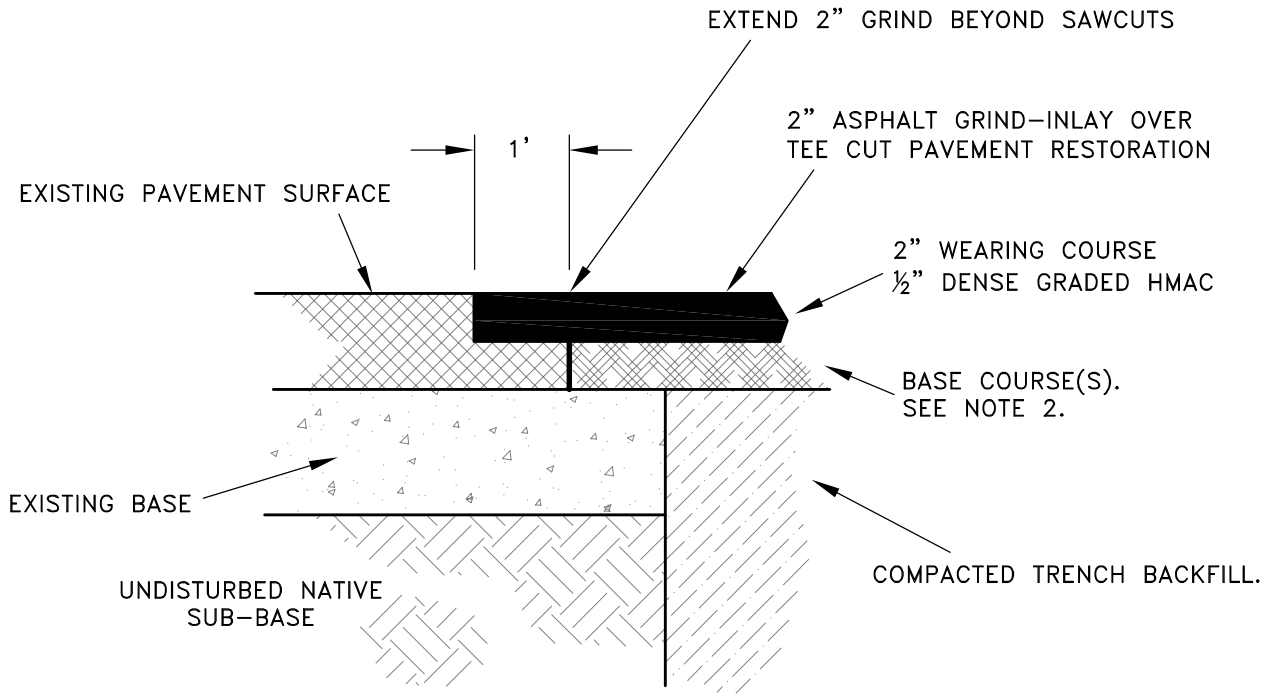
7. IF THE TRENCH IS NOT RESURFACED THE SAME DAY, PROVIDE A TEMPORARY SURFACE OF ASPHALT, EITHER HOT, WARM, OR COLD MIX.

8. A FULL WIDTH STREET OVERLAY OR GRIND/INLAY MAY BE REQUIRED DEPENDING UPON THE EXTENT OF NEW AND EXISTIN PAVEMENT CUTS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TEE CUT
PAVEMENT RESTORATION

NO SCALE	OCTOBER 2013	NO. 206A



NOTES:

1. GRIND–INLAY PAVEMENT RESTORATION SHALL BE USED WHERE THE EXISTING PAVEMENT SECTION IS 7 INCHES DEEP OR GREATER; THE EXISTING PAVEMENT IS LESS THAN 10 YEARS OLD; OR OTHERWISE AS DIRECTED BY THE CITY ENGINEER.

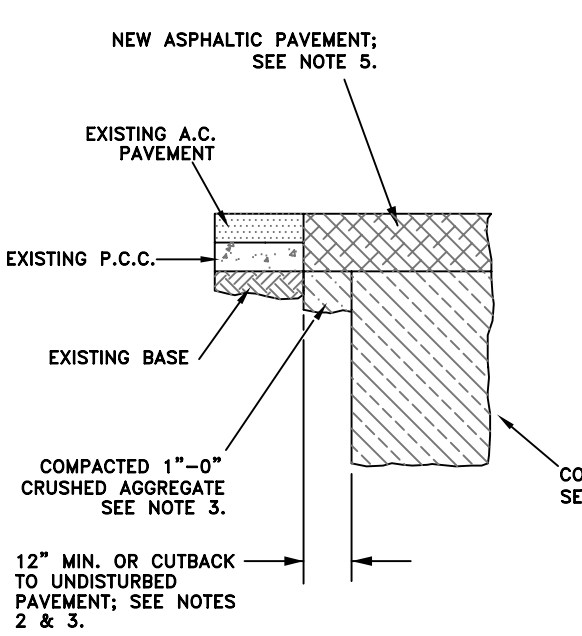
2. PRIOR TO PERFORMING THE GRIND–INLAY, CONSTRUCT TEE CUT PAVEMENT RESTORATION TO FINISHED GRADE PER STANDARD DRAWING NO. 206A.

3. AFTER TEE CUT PAVEMENT RESTORATION HAS BEEN COMPLETED THE WEARING SURFACE OF THE PAVEMENT SHALL BE GROUND OFF A MINIMUM OF 2 INCHES DEEP AND 12 INCHES BACK FROM THE SAWCUT EDGE.

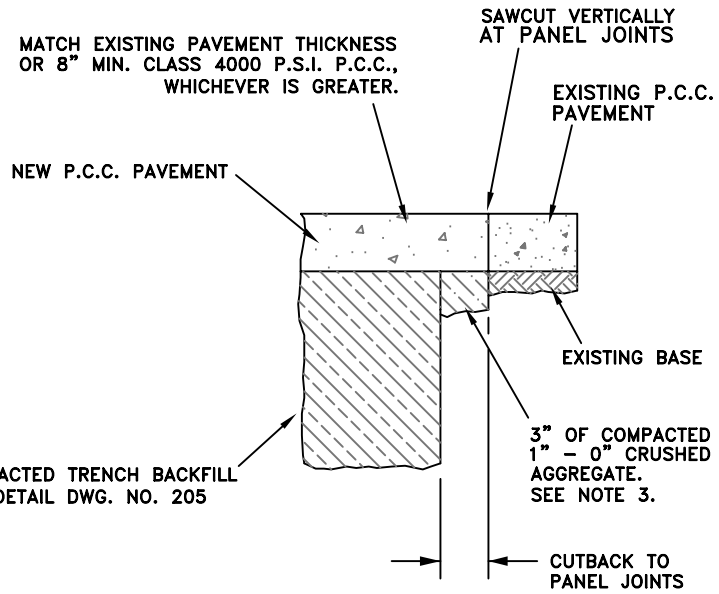
4. IMMEDIATELY FOLLOWING PAVING, JOINTS SHALL BE SAND–SEALED WITH MATERIAL CONFORMING TO THE REQUIREMENTS OF SECTION 205.02.01C. JOINTS SHALL BE COMPLETELY FILLED AND SEALED WITH NO VOIDS OR DEFECTS.

5. A FULL WIDTH STREET OVERLAY OR GRIND/INLAY MAY BE REQUIRED DEPENDING UPON THE EXTENT OF NEW AND EXISTING PAVEMENT CUTS AS DETERMINED BY THE CITY ENGINEER.

CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
GRIND–INLAY PAVEMENT RESTORATION		
NO SCALE	JANUARY 2018	NO. 206B



CASE 1



CASE 2

CASE 1 NOTES:

1. AFTER THE PIPEWORK, BACKFILL, AND COMPACTION REQUIREMENTS ARE COMPLETE, SAWCUT THE PAVEMENT A MINIMUM OF 12 INCHES FROM THE EXISTING PAVEMENT EDGE.
2. REMOVE PAVEMENT TO THE FINAL SAWCUT EDGE. MINIMIZE DISTURBANCE TO EXISTING BASE COURSE. PROVIDE AND COMPACT ADDITIONAL 1"–0" CRUSHED AGGREGATE IN CUT–BACK AREA AS REQUIRED TO MATCH REMAINDER OF TRENCH.
3. IF THE TRENCH IS NOT RESURFACED THE SAME DAY, PROVIDE TEMPORARY SURFACE PROTECTION BY INSTALLING 2" OF ASPHALT OVER THE TRENCH.
4. REPLACE COMBINED THICKNESS OF EXISTING ASPHALT AND CONCRETE PAVEMENT WITH NEW ASPHALT PAVEMENT. PLACE ASPHALT IN MAXIMUM 3" LIFTS FOR CLASS B MIX AND 2" FOR CLASS C MIX. WEARING COURSE SHALL BE CLASS C MIX.
5. IMMEDIATELY AFTER COMPLETION OF PAVING, APPLY SPECIFIED ASPHALT JOINT SEALER ALONG THE EDGE OF EXISTING ASPHALT CONCRETE PAVEMENT AND THE NEW PATCH. PLACE SAND ON TOP OF THE SEALER.

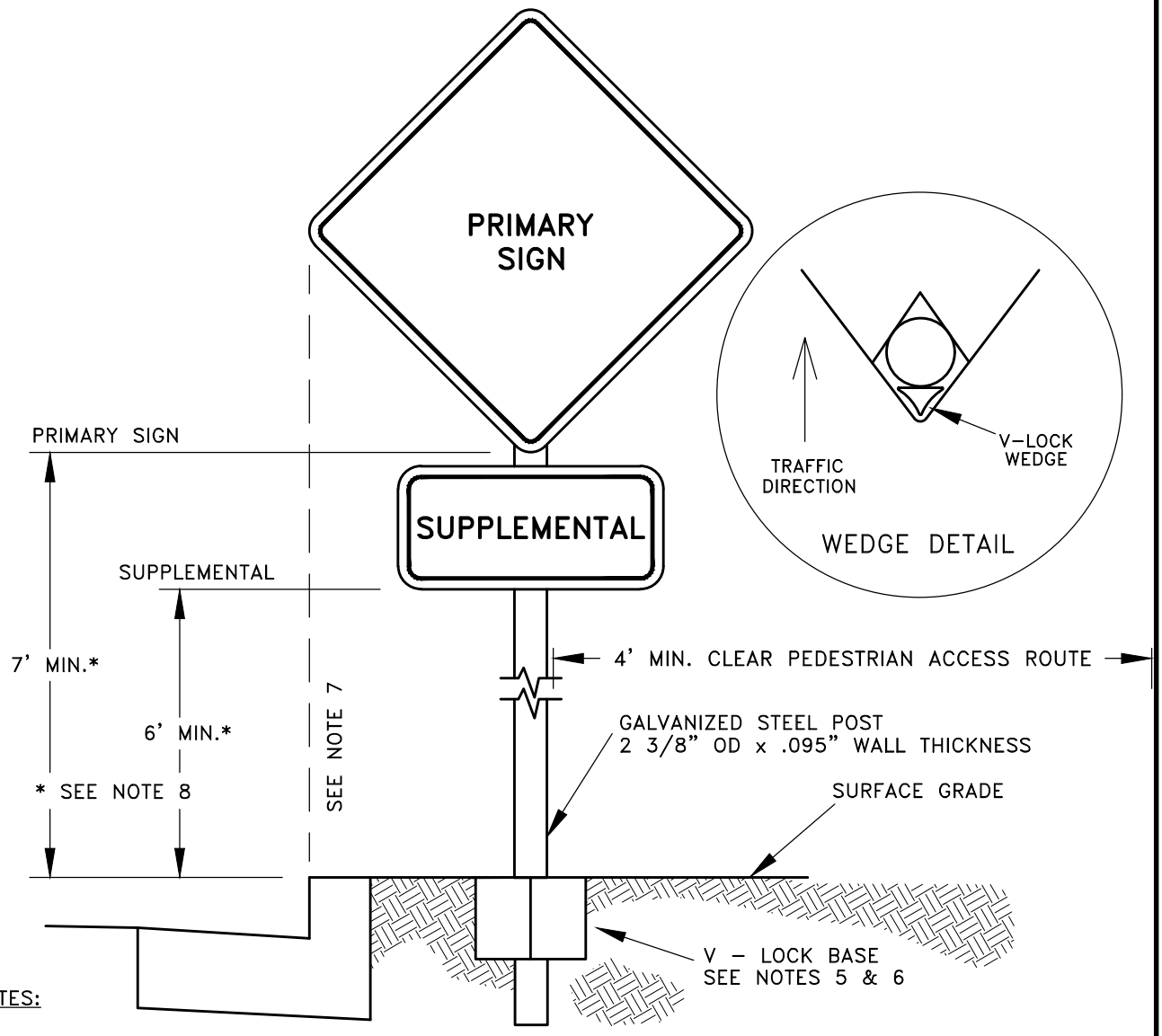
CASE 2 NOTES:

1. REMOVE AND REPLACE ENTIRE CONCRETE PANELS THAT ARE CUT OR OTHERWISE DAMAGED BY THE WORK.
2. REMOVE PAVEMENT TO THE COLD JOINT EDGE. MINIMIZE DISTURBANCE TO EXISTING BASE COURSE. PROVIDE AND COMPACT ADDITIONAL 1"–0" CRUSHED AGGREGATE IN CUT–BACK AREA AS REQUIRED TO MATCH REMAINDER OF TRENCH.
3. IF THE TRENCH IS NOT RESURFACED THE SAME DAY, PROVIDE TEMPORARY SURFACE PROTECTION BY INSTALLING 2" OF ASPHALT OVER THE TRENCH.
4. REFER TO SECTION 206 OF THE STANDARD CONSTRUCTION SPECIFICATIONS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TRENCH RESTORATION PROCEDURE AND DETAIL FOR RIGID PAVEMENT

NO SCALE	JULY 2005	NO. 207



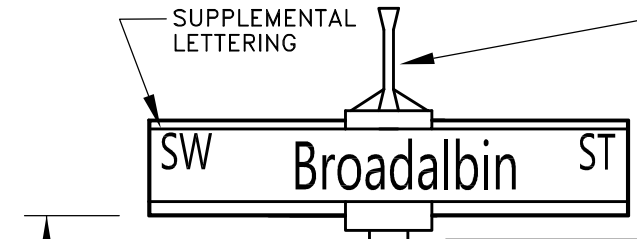
NOTES:

1. SIGNS SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF THE CURRENT VERSION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND THE OREGON SUPPLEMENT TO THE MUTCD.
2. SIGNS SHALL BE CONSTRUCTED WITH A HIGH-INTENSITY PRISMATIC OR DIAMOND GRADE SURFACE.
3. SIGNS SHALL BE CONSTRUCTED OF 0.080 INCH THICK ANODIZED ALUMINUM. REGULATORY AND WARNING SIGNS SHALL BE A MINIMUM SIZE OF 30 INCHES.
4. SIGNS SHALL BE MOUNTED ON THE POST WITH HAWKINS, SINGLE CLAMP-ON, U-BRACKETS, WITH HEX-HEAD SCREWS. GALVANIZED PRESS-ON PIPE CAPS SHALL BE INSTALLED ON THE TOP OF THE SIGN POST WHEN NO STREET SIGNS ARE PRESENT.
5. POLE BASE SHALL BE V-LOCK MODEL 23 - VR3 (SOIL APPLICATION) OR 23-VR1 (CONCRETE APPLICATION) AS MANUFACTURED BY FORESIGHT PRODUCTS, INC., OR APPROVED EQUAL. V-LOCK FRAMES SHALL BE INSTALLED FLUSH TO THE FINISHED GRADE. WHEN THE POLE IS PLACED IN CONCRETE, CONCRETE SHALL NOT COVER THE V-LOCK WEDGE.
6. WHERE V-LOCK MODEL 23-VR3 (SOIL APPLICATION) IS USED, BACKFILL MATERIAL SHALL BE AMENDED WITH A MIXTURE OF CONCRETE, AND COMPACTED TO PROVIDE RIGIDITY AND STABILITY TO THE INSTALLATION.
7. SIGN LOCATIONS SHALL BE DESIGNATED AND APPROVED BY THE CITY. SIGNS SHALL NOT EXTEND BEYOND FACE OF CURB OR EDGE OF ROAD WHERE NO CURB EXISTS.
8. MINIMUM CLEARANCE FOR ANY SIGN WITHIN OR OVERHANGING A PEDESTRIAN CIRCULATION AREA SHALL BE 7 FEET.
9. MINIMUM DISTANCE FROM EDGE OF POST TO BACK OF WALK SHALL BE 4' FOR CURBSIDE SIDEWALK.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TYPICAL SIGN INSTALLATION

NO SCALE	FEBRUARY 2024	NO. 208



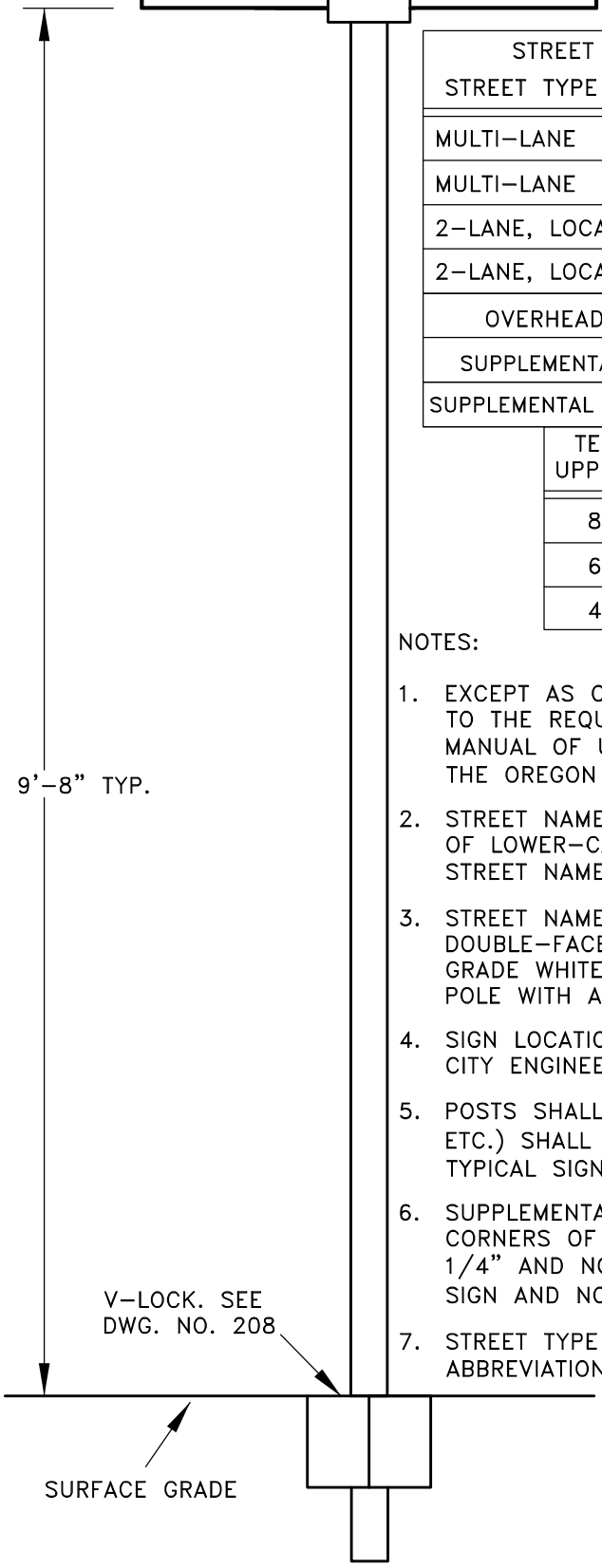
LETTERING REQUIRMENTS

STREET CHARACTERISTICS		TEXT SIZE	
STREET TYPE	SPEED LIMIT	UPPER-CASE	LOWER-CASE
MULTI-LANE	MORE THAN 40 MPH	8-INCH	6-INCH
MULTI-LANE	40 MPH OR LESS	6-INCH	4.5-INCH
2-LANE, LOCAL	25 MPH OR LESS	4-INCH	3-INCH
2-LANE, LOCAL	25 MPH OR MORE	6-INCH	4.5-INCH
OVERHEAD MOUNTED SIGNS		12-INCH	9-INCH
SUPPLEMENTAL LETTERS, 6" SIGNS		3-INCH	-
SUPPLEMENTAL LETTERS, SIGNS OVER 6"		4-INCH	-

TEXT SIZE UPPER-CASE	SIZE OF STREET NAME SIGN
8-INCH	10" X 48"
6-INCH	9" X 42"
4-INCH	6" X 30", 6" X 36" OR 6" X 42"

NOTES:

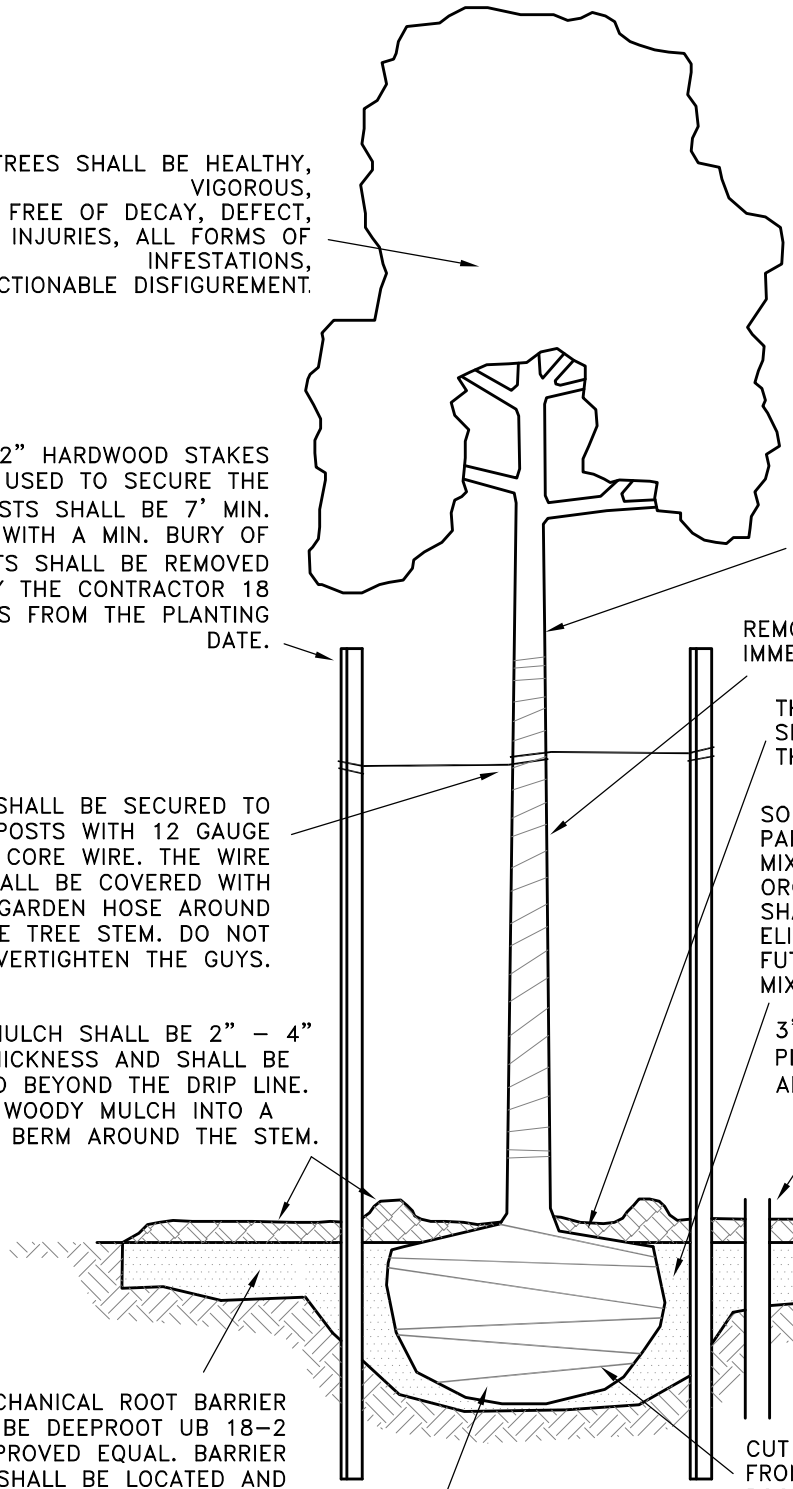
1. EXCEPT AS OTHERWISE INDICATED HERE, SIGNS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT VERSION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND THE OREGON SUPPLEMENT TO THE MUTCD.
2. STREET NAME LETTERS SHALL BE COMPOSED OF A COMBINATION OF LOWER-CASE LETTERS WITH INITIAL UPPER-CASE LETTERS. STREET NAME SIGN LETTERS SHALL BE HIGHWAY 'C' FONT.
3. STREET NAME SIGNS SHALL BE EXTRUDED ALUMINUM, DOUBLE-FACED WITH HIGH INTENSITY PRISMATIC OR DIAMOND GRADE WHITE ON GREEN REFLECTIVE SHEETING. PROVIDE EACH POLE WITH A SECOND SIGN FOR A CROSSING STREET.
4. SIGN LOCATIONS SHALL BE DESIGNATED AND APPROVED BY THE CITY ENGINEER.
5. POSTS SHALL BE INSTALLED AND ADDITIONAL SIGNS (STOP, YIELD, ETC.) SHALL BE MOUNTED PER STANDARD DRAWING NO. 208, TYPICAL SIGN INSTALLATION.
6. SUPPLEMENTAL LETTERING SHALL BE LOCATED ON THE UPPER CORNERS OF THE SIGN. LETTERS SHALL BE NO CLOSER THAN 1/4" AND NOT FURTHER THAN 1" FROM TOP AND SIDE EDGES OF SIGN AND NO CLOSURE THAN 1" FROM STREET NAME.
7. STREET TYPE APPREVIATIONS SHALL CONFORM TO MUTCD ABBREVIATIONS EXCEPT AVENUE SHALL BE "AVE".



CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TYPICAL STREET NAME SIGN

NO SCALE	JULY 2019	NO. 209



TREES SHALL BE HEALTHY, VIGOROUS, AND FREE OF DECAY, DEFECT, INJURIES, ALL FORMS OF INFESTATIONS, OR OBJECTIONABLE DISFIGUREMENT.

TREES SHALL HAVE A SINGLE STRAIGHT MAIN TRUNK. HEIGHT AND CALIPER SHALL BE CONSISTENT WITH SECTION 210.04.00.

2" X 2" HARDWOOD STAKES SHALL BE USED TO SECURE THE TREE. POSTS SHALL BE 7' MIN. LENGTH WITH A MIN. BURY OF 2'. POSTS SHALL BE REMOVED BY THE CONTRACTOR 18 MONTHS FROM THE PLANTING DATE.

REMOVE TRANSIT TRUNK GUARDS IMMEDIATELY AFTER PLANTING.

THE TOP OF THE ROOT BALL SHALL BE SLIGHTLY HIGHER THAN THE SURROUNDING FINISH GRADE.

TREES SHALL BE SECURED TO THE POSTS WITH 12 GAUGE SOLID CORE WIRE. THE WIRE SHALL BE COVERED WITH RUBBER GARDEN HOSE AROUND THE TREE STEM. DO NOT OVERTIGHTEN THE GUYS.

SOIL MIXTURE SHALL BE FOUR PARTS BY VOLUME OF TOPSOIL MIXED WITH ONE PART DECOMPOSED ORGANIC MATERIALS. THE TREE SHALL BE WATERED THOROUGHLY TO ELIMINATE AIR POCKETS AND FUTURE SETTLING OF THE PLANTING MIXTURE.

WOODY MULCH SHALL BE 2" – 4" MIN. THICKNESS AND SHALL BE EXTENDED BEYOND THE DRIP LINE. FORM WOODY MULCH INTO A WATERING BERM AROUND THE STEM.

3" PVC PERFORATED PIPE. EXTEND PIPE FROM 3" ABOVE GRADE TO APPROX. 18" – 24" BELOW GRADE. INSTALL PIPE AT EDGE OF ROOT BALL EXCAVATION AS DIRECTED BY THE ENGINEER.

MECHANICAL ROOT BARRIER SHALL BE DEEPROOT UB 18–2 OR APPROVED EQUAL. BARRIER SHALL BE LOCATED AND INSTALLED AS DIRECTED BY THE ENGINEER. GENERALLY, THE BARRIER SHALL CONSIST OF A 12' LENGTH OF APPROVED BARRIER CENTERED ON THE TREE AND LOCATED BETWEEN THE TREE AND THE CURB. (ROOT BARRIER NOT SHOWN)

ROOTS SHALL BE LOOSENED PRIOR TO PLANTING TO AVOID GIRDLING OF THE ROOTS. ROOT BALL SHALL BE PLACED ON AN UNDISTURBED SOIL BASE TO REDUCE SETTLEMENT.

CUT AND REMOVE BURLAP AND TIES FROM THE UPPER THIRD OF THE ROOT BALL. WIRE BASKETS SHALL BE CUT AND FOLDED DOWN A MIN. OF 6" BELOW THE SURFACE. PLANTING POSTS SHALL BE COMPLETELY REMOVED PRIOR TO PLANTING.

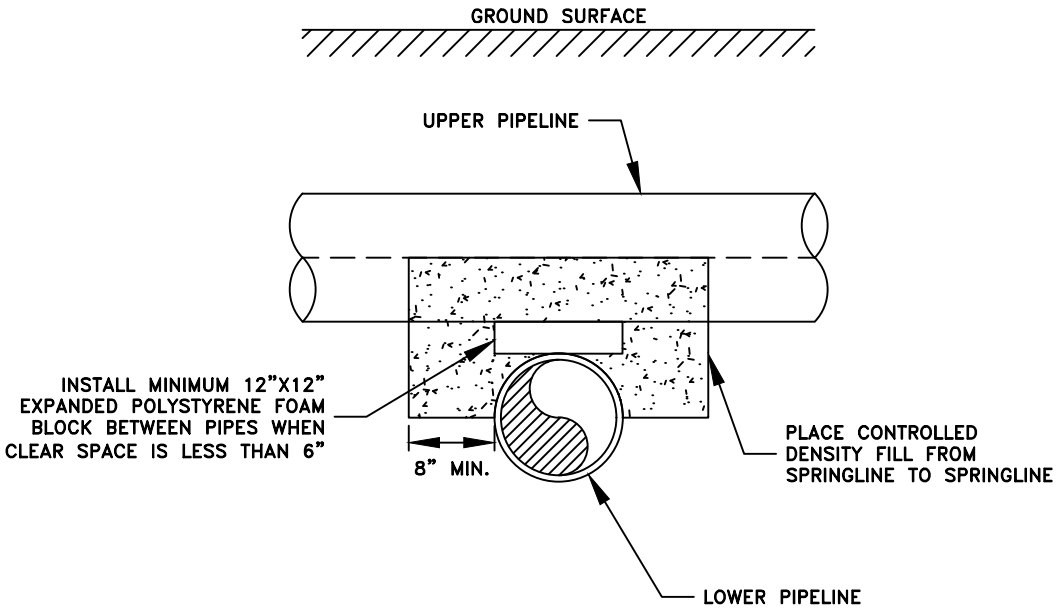
NOTES:

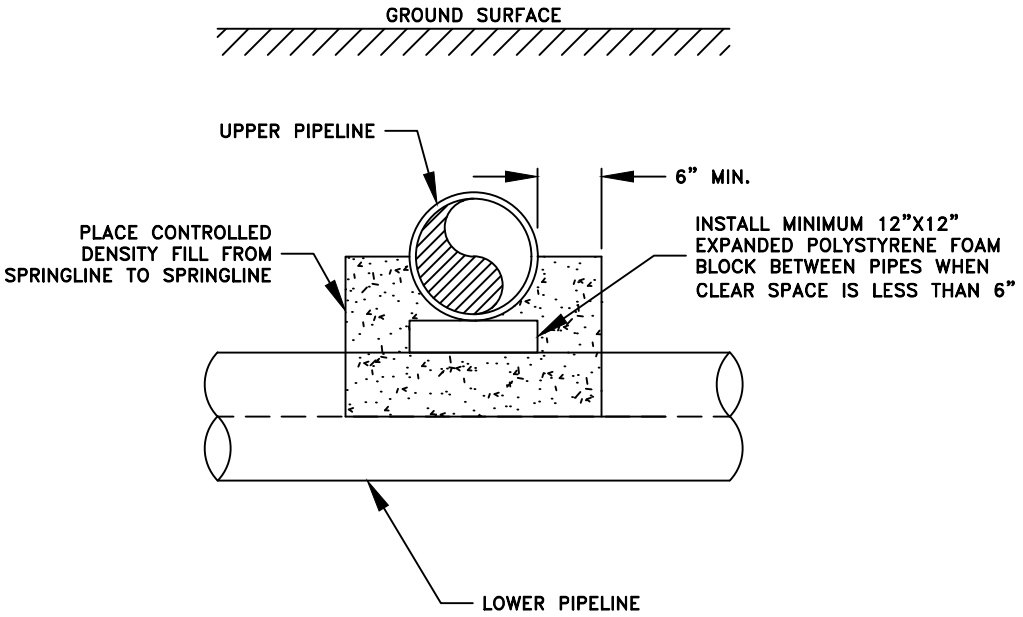
1. TREE PLANTING PROJECTS SHALL BE IN CONFORMANCE WITH THE CITY OF ALBANY URBAN FOREST MASTER PLAN.
2. ALL TREETS SHALL BE AN APPROVED SPECIES AND VARIETY FOUND IN THE URBAN FOREST MASTER PLAN.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREET TREE PLANTING DETAIL

NO SCALE	JANUARY 2018	NO. 210





NOTES:

1. MINIMUM CLEARANCE BETWEEN PIPES SHALL BE 12" UNLESS APPROVED BY THE CITY ENGINEER.

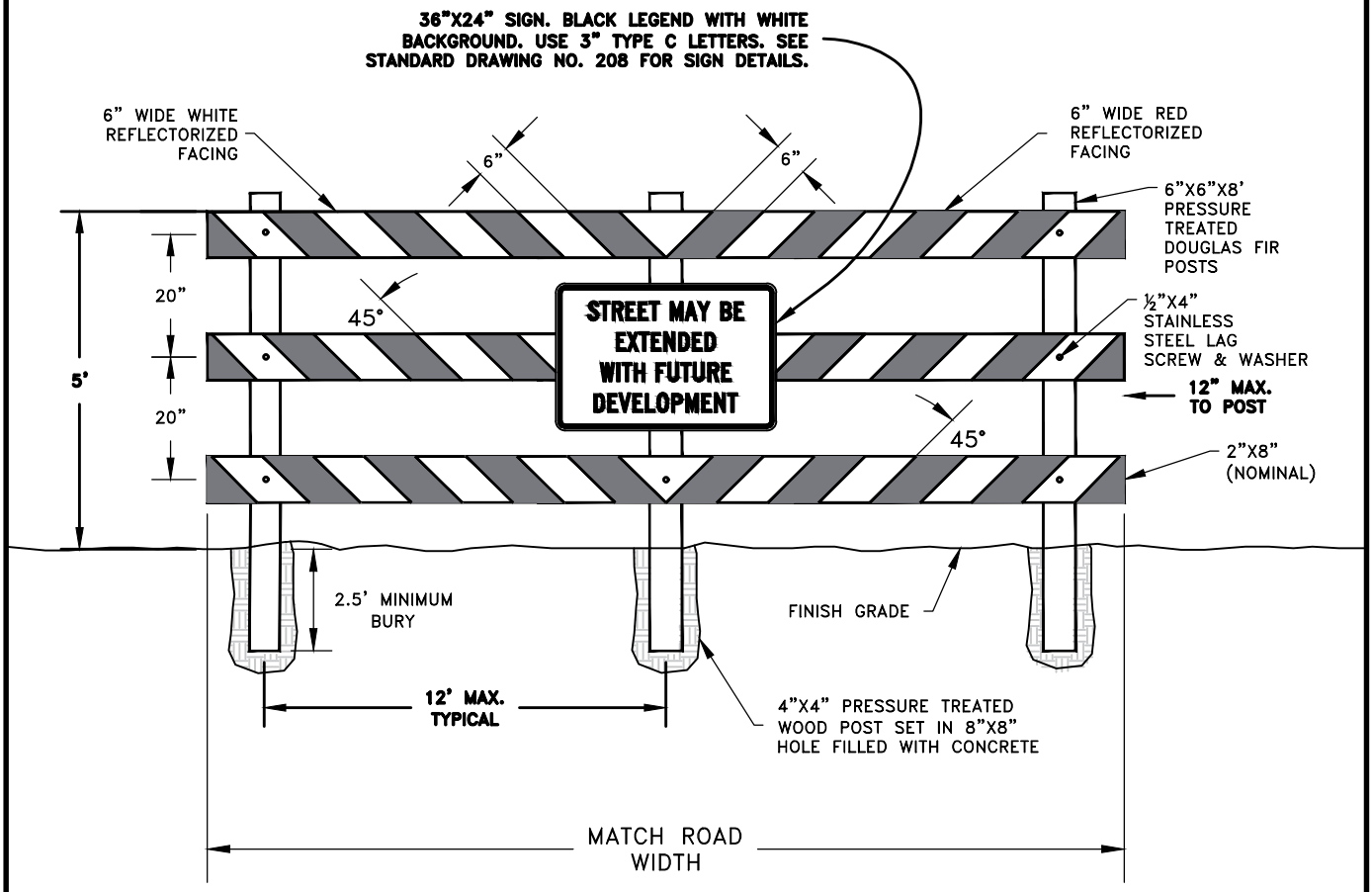
2. INSTALL UNDERGROUND UTILITY SUPPORT WHEN CLEARANCE BETWEEN PIPES IS LESS THAN 12".

3. CONTROLLED DENSITY FILL SHALL HAVE AN ULTIMATE COMPRESSIVE STRENGTH OF 50 PSI MINIMUM TO 200 PSI MAXIMUM. SEE SPECIAL PROVISIONS.

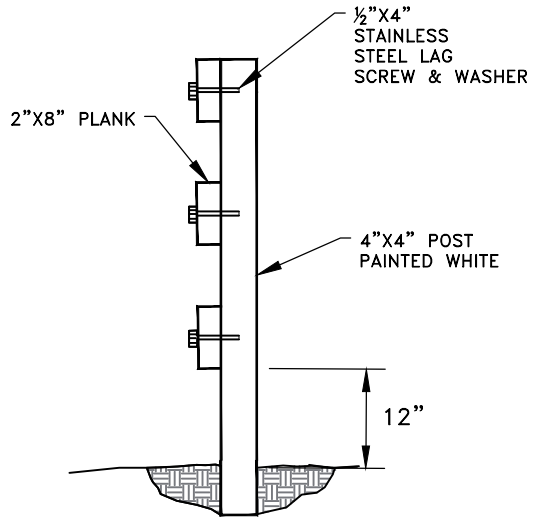
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

UNDERGROUND UTILITY SUPPORT

NO SCALE	FEBRUARY 2024	NO. 211



TYPE III BARRICADE



BARRICADE SECTION VIEW

NOTES:

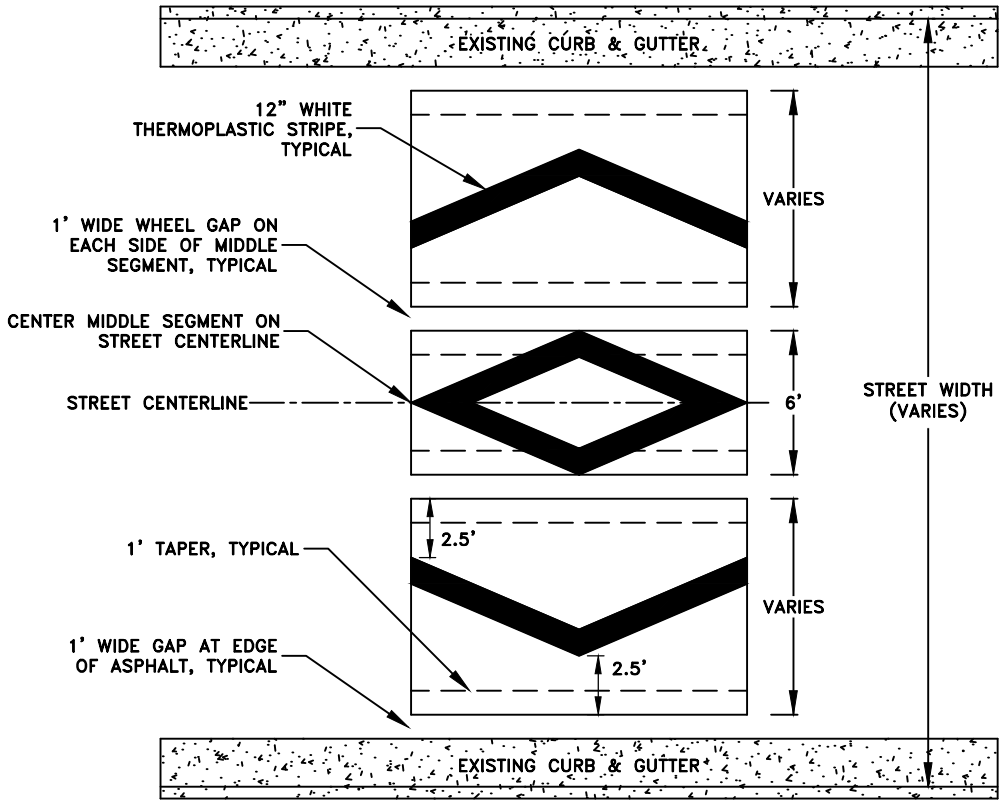
1. MARKINGS FOR BARRICADE RAILS SHALL BE ALTERNATE WHITE AND RED STRIPES SLOPING DOWNWARD AT AN ANGLE OF 45°.
2. BARRICADE SECTION SHALL EXTEND ACROSS THE ENTIRE STREET AREA. USE DOUBLE BARRICADES AS NECESSARY SEPARATED BY 4".
3. OPTIONS TO USE ALTERNATIVE POST AND PLANK MATERIALS SUBJECT TO APPROVAL OF CITY ENGINEER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

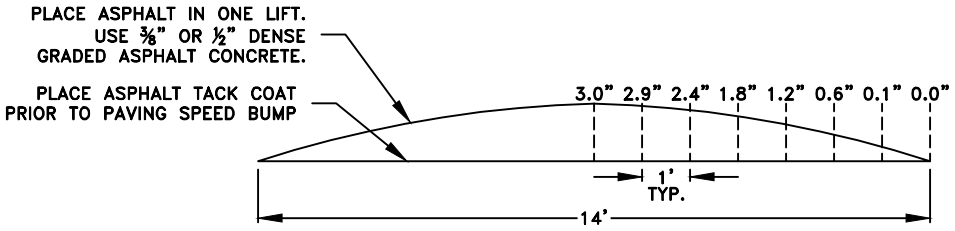
END OF STREET BARRICADE

NO SCALE	FEBRUARY 2024	NO. 212

PLAN VIEW



PROFILE VIEW



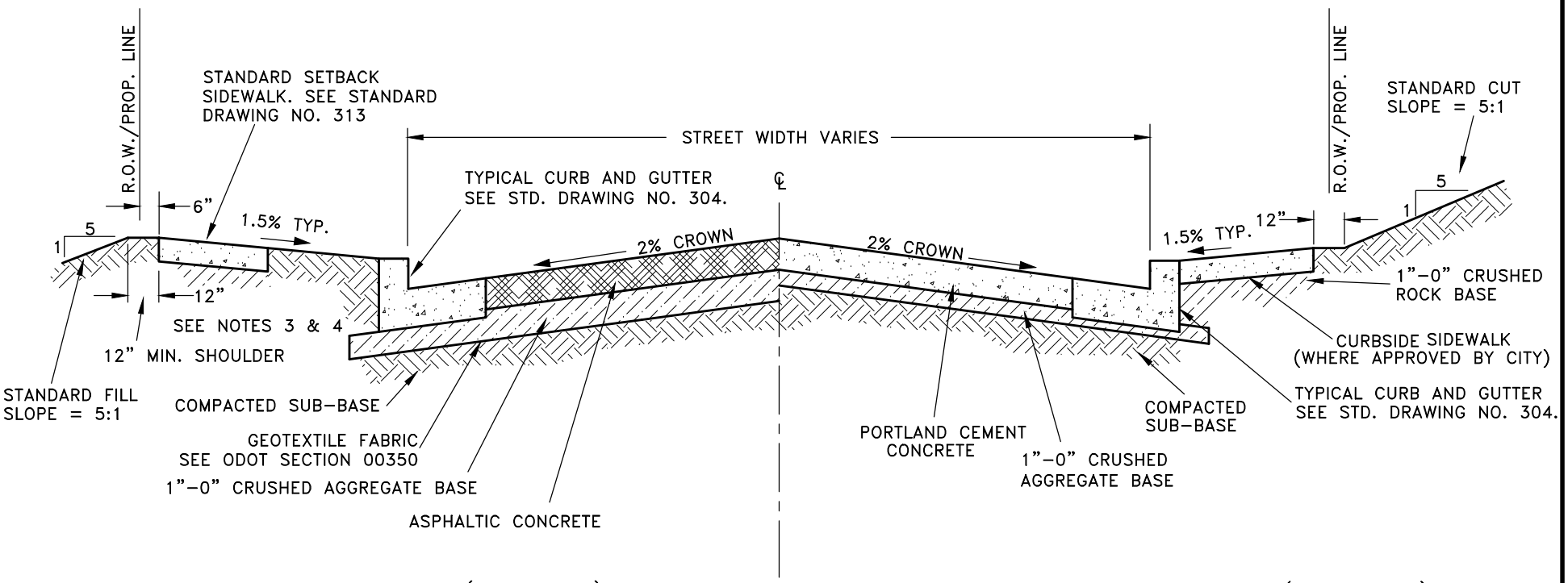
NOTE:

LOCATION AND SPACING OF SPEED BUMPS REQUIRE APPROVAL OF THE CITY ENGINEER

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

SPEED BUMP

NO SCALE	FEBRUARY 2024	NO. 213



ASPHALT CONCRETE (STANDARD)

PORTLAND CEMENT CONCRETE (ALTERNATE)

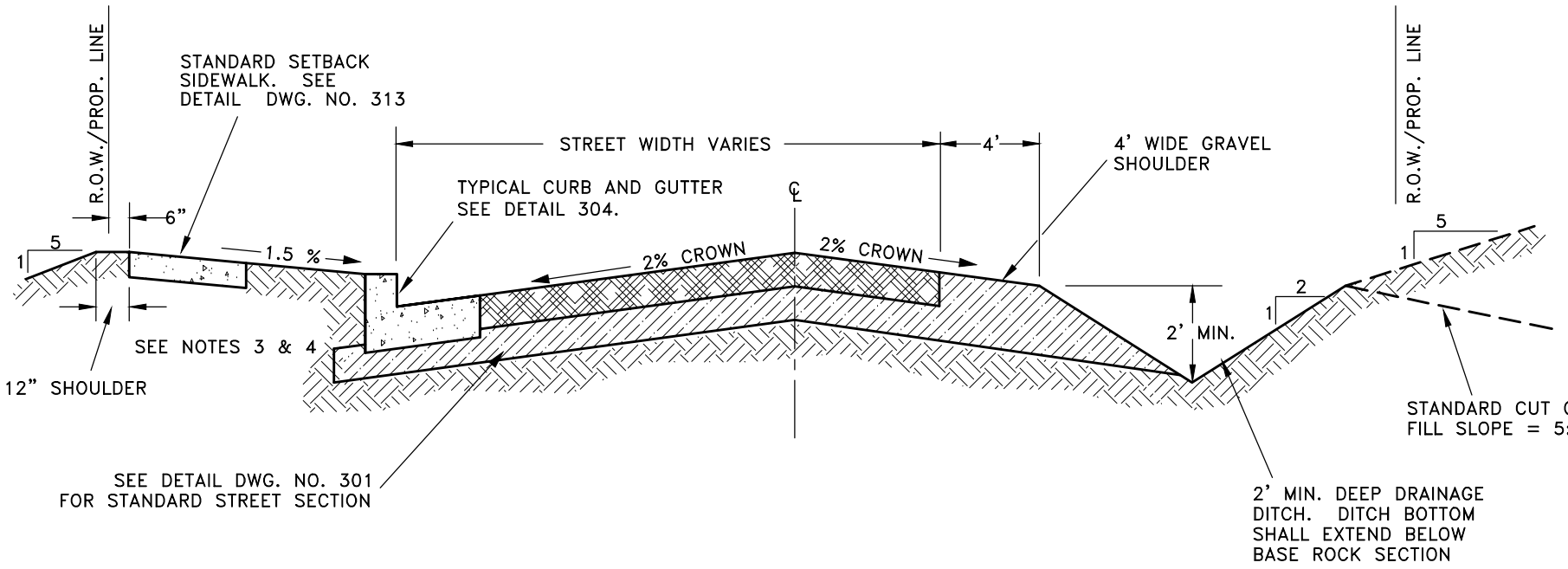
NOTES

1. THE TYPICAL SECTION FOR LOCAL RESIDENTIAL STREETS SHALL BE AS FOLLOWS:
   a. ASPHALT CONCRETE: 5" OF ASHPALT CONCRETE AND 12" OF COMPACTED 1"–0 CRUSHED AGGREGATE BASE OVER GEOTEXTILE FABRIC.
   b. PORTLAND CEMENT CONCRETE: 8" OF PORTLAND CEMENT CONCRETE OVER 2" OF COMPACTED 1"–0 CRUSHED AGGREGATE.
2. THE STRUCTURAL SECTION FOR ALL OTHER STREETS SHALL BE DESIGNED AS SPECIFIED IN THE CITY OF ALBANY ENGINEERING STANDARDS.
3. AGGREGATE BASE MATERIAL SHALL EXTEND TO ONE FOOT BEYOND THE FACE OF CURB, MINIMUM.
4. PLANTER STRIPS SHALL, AT A MINIMUM, BE COMPOSED OF SILTY CLAY LOAMS NATIVE TO THE AREA. IN LOCATIONS THAT ARE COMPOSED OF GRANULAR, AGGREGATE, OR OTHER IMPORTED MATERIALS, THE CONTRACTOR SHALL REMOVE AND REPLACE THE PLANTER STRIP NO LESS THAN 4' DEEP BY 4' WIDE USING NATIVE SOILS MORE CONDUCIVE TO TREE SURVIVABILITY THROUGH THE LENGTH OF THE PLANTER STRIP.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TYPICAL STREET SECTION

NO SCALE	FEBRUARY 2024	NO. 301



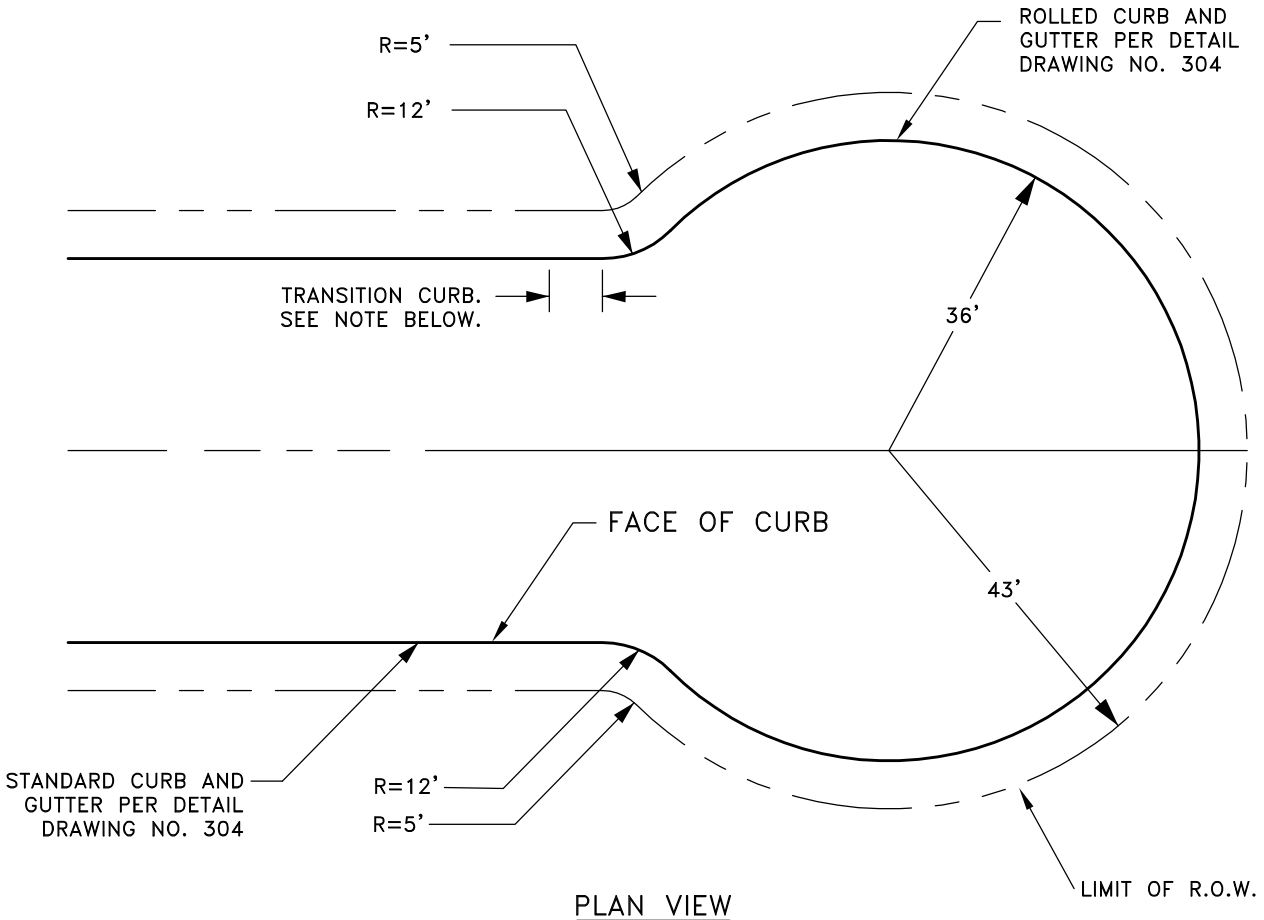
NOTES

1. THE STORM WATER COLLECTION SYSTEM, INCLUDING CURB INLETS, SHALL BE CONSTRUCTED WITH PARTIAL STREET IMPROVEMENTS..
2. UTILITIES TO BE LOCATED AS SHOWN IN DETAIL DWG. NO. 201.
3. AGGREGATE BASE MATERIAL SHALL EXTEND TO ONE FOOT BEYOND THE FACE OF CURB, MINIMUM.
4. PLANTER STRIPS SHALL, AT A MINIMUM, BE COMPOSED OF SILTY CLAY LOAMS NATIVE TO THE AREA. IN LOCATIONS THAT ARE COMPOSED OF GRANULAR, AGGREGATE, OR OTHER IMPORTED MATERIALS, THE CONTRACTOR SHALL REMOVE AND REPLACE THE PLANTER STRIP NO LESS THAN 4' DEEP BY 4' WIDE USING NATIVE SOILS MORE CONDUCIVE TO TREE SURVIVABILITY THROUGH THE LENGTH OF THE PLANTER STRIP.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

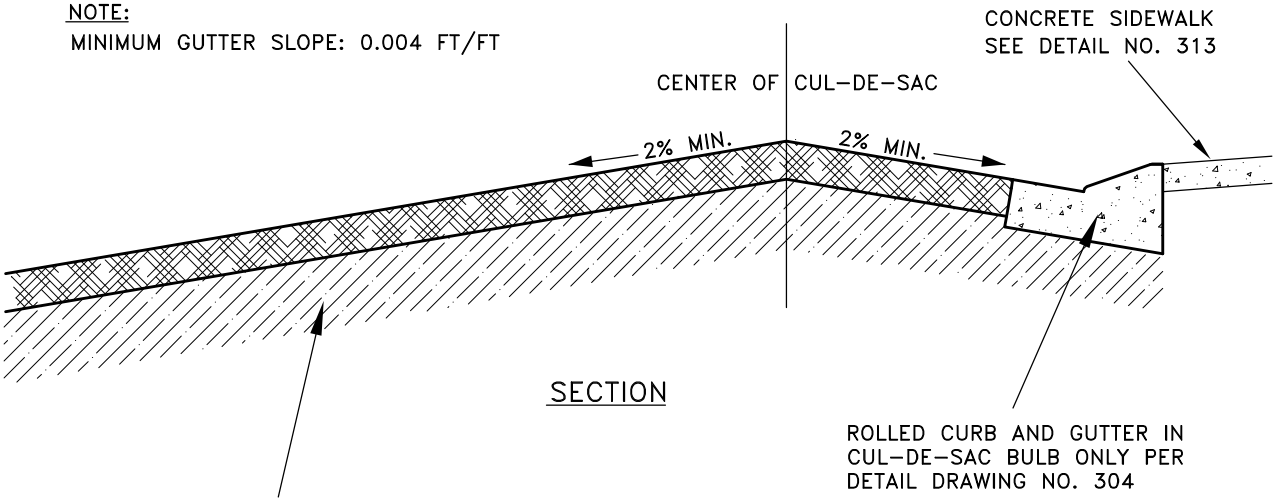
TYPICAL PARTIAL STREET SECTION

NO SCALE	OCTOBER 2013	NO. 302



PLAN VIEW

NOTE:
MINIMUM GUTTER SLOPE: 0.004 FT/FT



SECTION

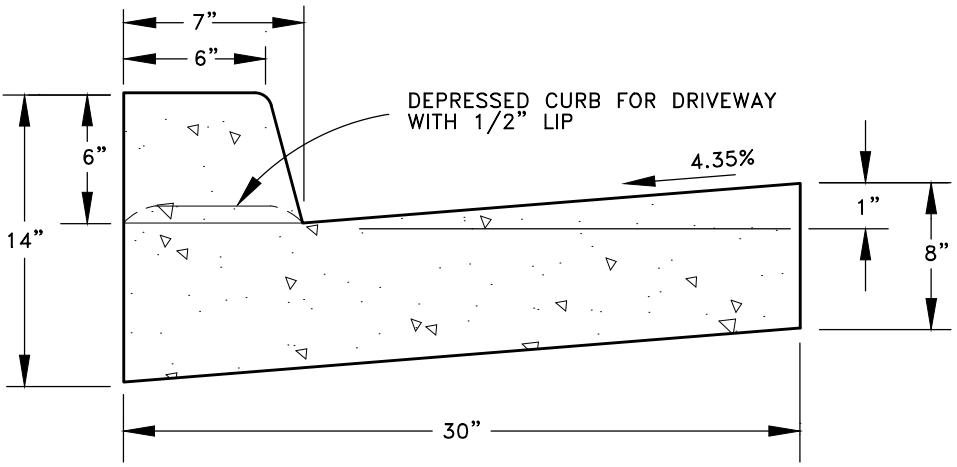
NOTE:

THE TRANSITION FROM STANDARD CURB AND GUTTER TO ROLLED CURB AND GUTTER SHALL BE 12 – 36 INCHES LINEAR DISTANCE TANGENT FROM THE POINT OF CURVATURE OF THE CUL-DE-SAC BULB.

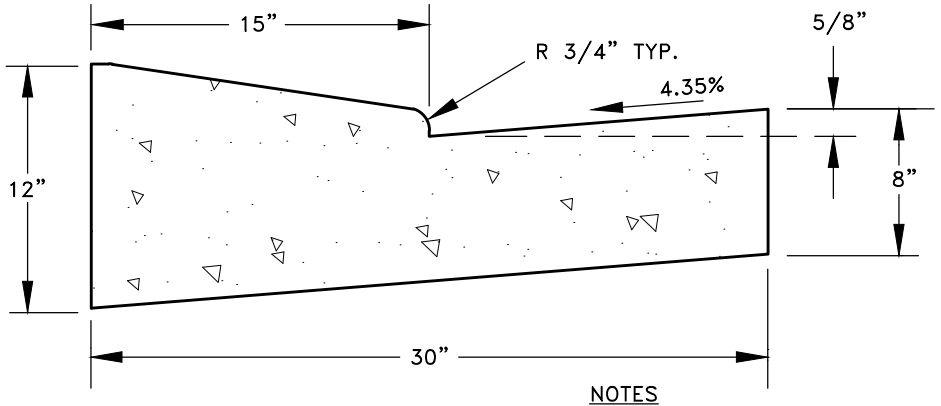
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

36' CUL-DE-SAC STANDARD DETAIL

NO SCALE	MAY 2009	NO. 303



TYPICAL CURB AND GUTTER

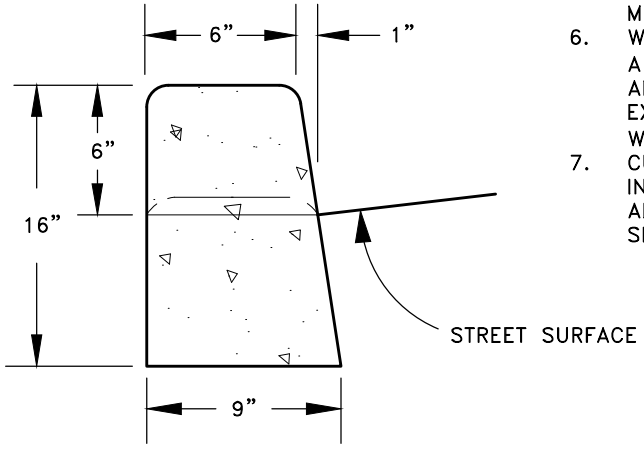


THE TRANSITION ZONE FROM TYPICAL CURB AND GUTTER TO ROLLED CURB AND GUTTER SHALL BE 4' TO 5' LONG

ROLLED CURB AND GUTTER
(REQUIRES APPROVAL BY THE CITY ENGINEER)

NOTES

1. STRAIGHT CURB AND ROLLED CURB SHALL NOT BE CONSTRUCTED WITHOUT THE APPROVAL OF THE CITY ENGINEER, EXCEPT FOR ROLLED CURB ON CUL-DE-SACS. SEE STANDARD DRAWING NO. 303.
2. CONTRACTION JOINTS SHALL BE PLACED AT 10' INTERVALS AND SHALL EXTEND AT LEAST 50% THROUGH THE CURB AND GUTTER. JOINTS SHALL MATCH SIDEWALK JOINTS FOR CURBSIDE SIDEWALK.
3. CONCRETE SHALL HAVE A MINIMUM 4,000 PSI 28-DAY COMPRESSIVE STRENGTH.
4. ALL RADII SHALL BE 3/4" UNLESS OTHERWISE NOTED.
5. THE STREET STRUCTURAL SECTION SHALL EXTEND TO A MINIMUM 6" BEHIND CURB.
6. WHEN CONSTRUCTING CURB ON EXISTING ASPHALT STREETS, A MINIMUM 24" WIDTH OF PAVEMENT SHALL BE SAWCUT AND REMOVED ALONG THE ENTIRE LENGTH OF NEW CURB. EXISTING ASPHALT SHALL BE REPLACED IN ACCORDANCE WITH DETAIL DWG. NO. 206 (A OR B AS APPLICABLE).
7. CURB AND GUTTER SHALL BE CONSTRUCTED INDEPENDENTLY, AND SEPARATED BY A COLD JOINT FROM ALL ADJACENT CONCRETE CONSTRUCTION; INCLUDING SIDEWALKS, DRIVEWAY RAMPS, CURB RAMPS, AND ETC.

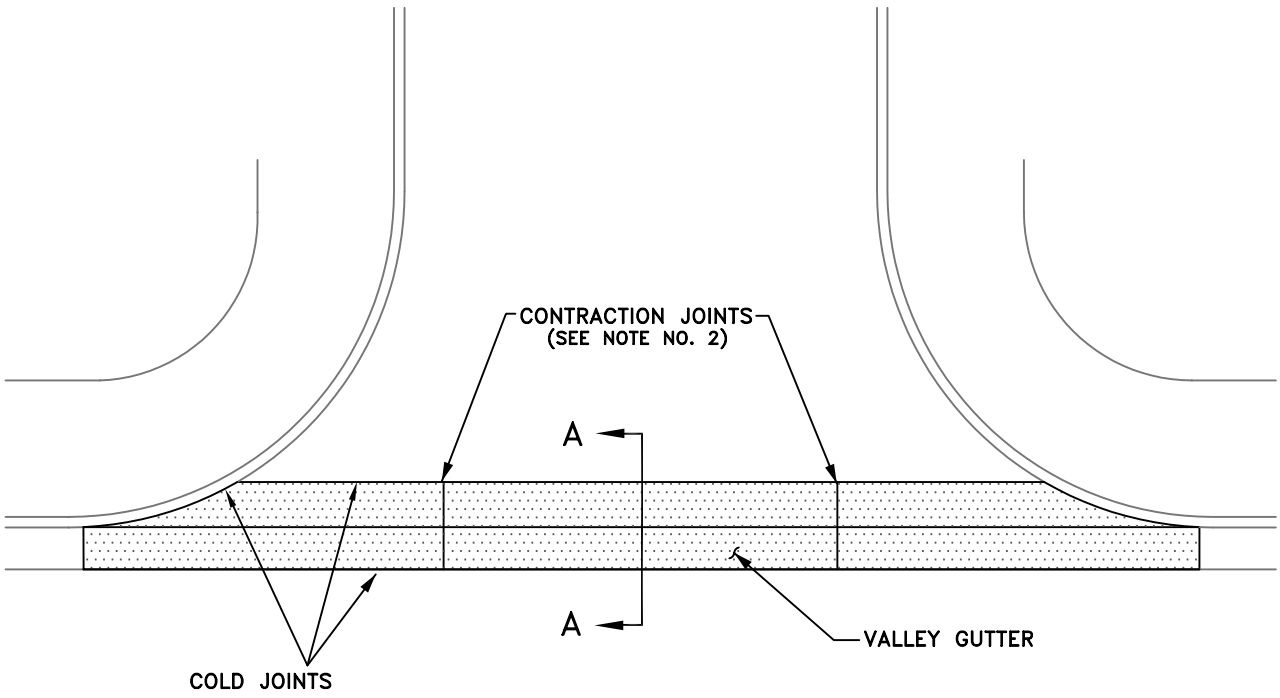


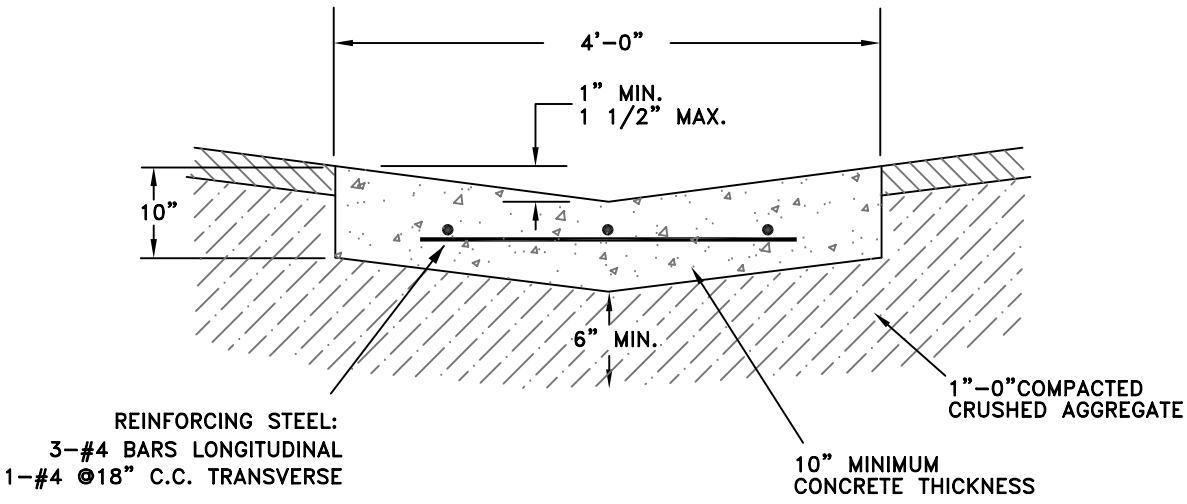
STRAIGHT CURB
(REQUIRES APPROVAL BY THE CITY ENGINEER)

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

DETAILS FOR
TYPICAL CURB AND GUTTER
CONFIGURATIONS

NO SCALE	FEBRUARY 2024	NO. 304





SECTION A-A

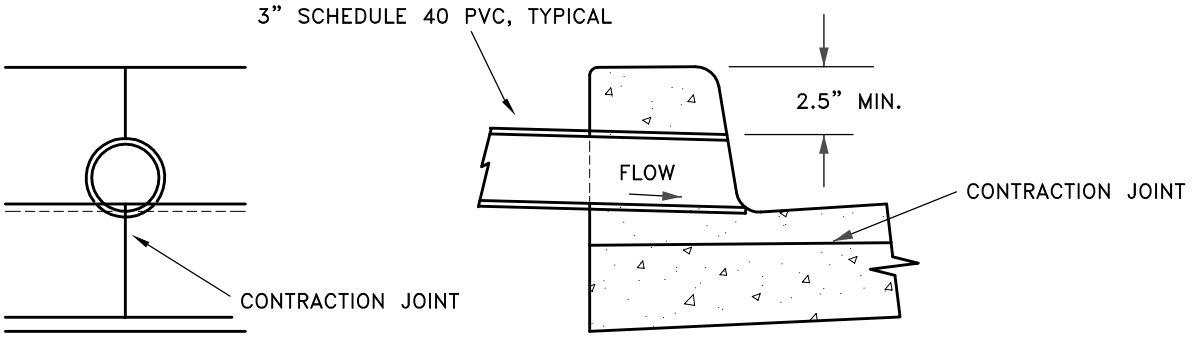
NOTES:

1. VALLEY GUTTER SHALL NOT BE USED WITHOUT APPROVAL OF THE CITY ENGINEER.
2. ALL CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI.
3. PROVIDE GUTTER CONTRACTION JOINTS AT 15' O.C. MAX.

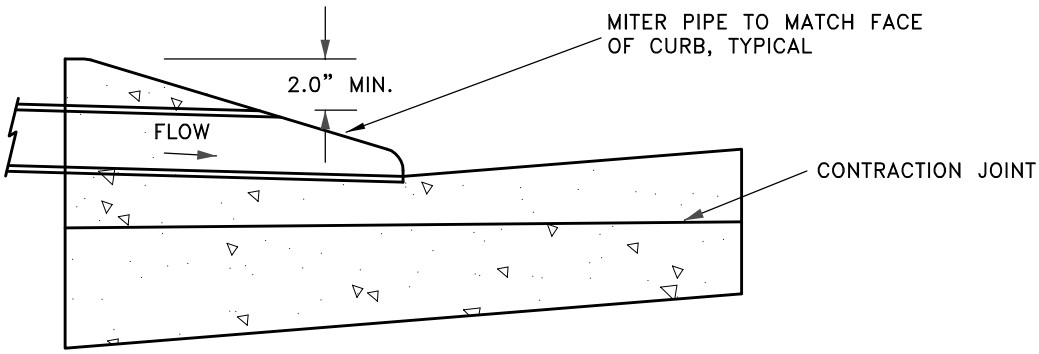
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

VALLEY GUTTER DETAIL

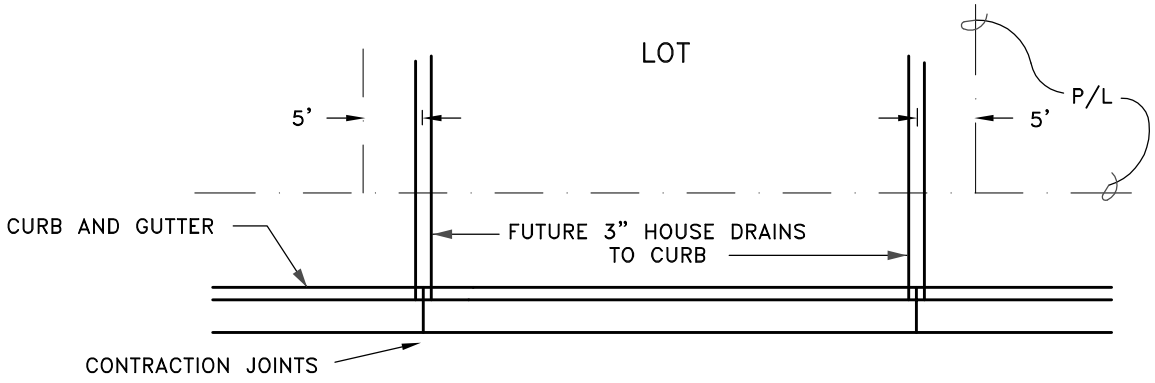
NO SCALE	MAY 1998	NO. 305



STANDARD CURB



ROLLED CURB



PLAN VIEW

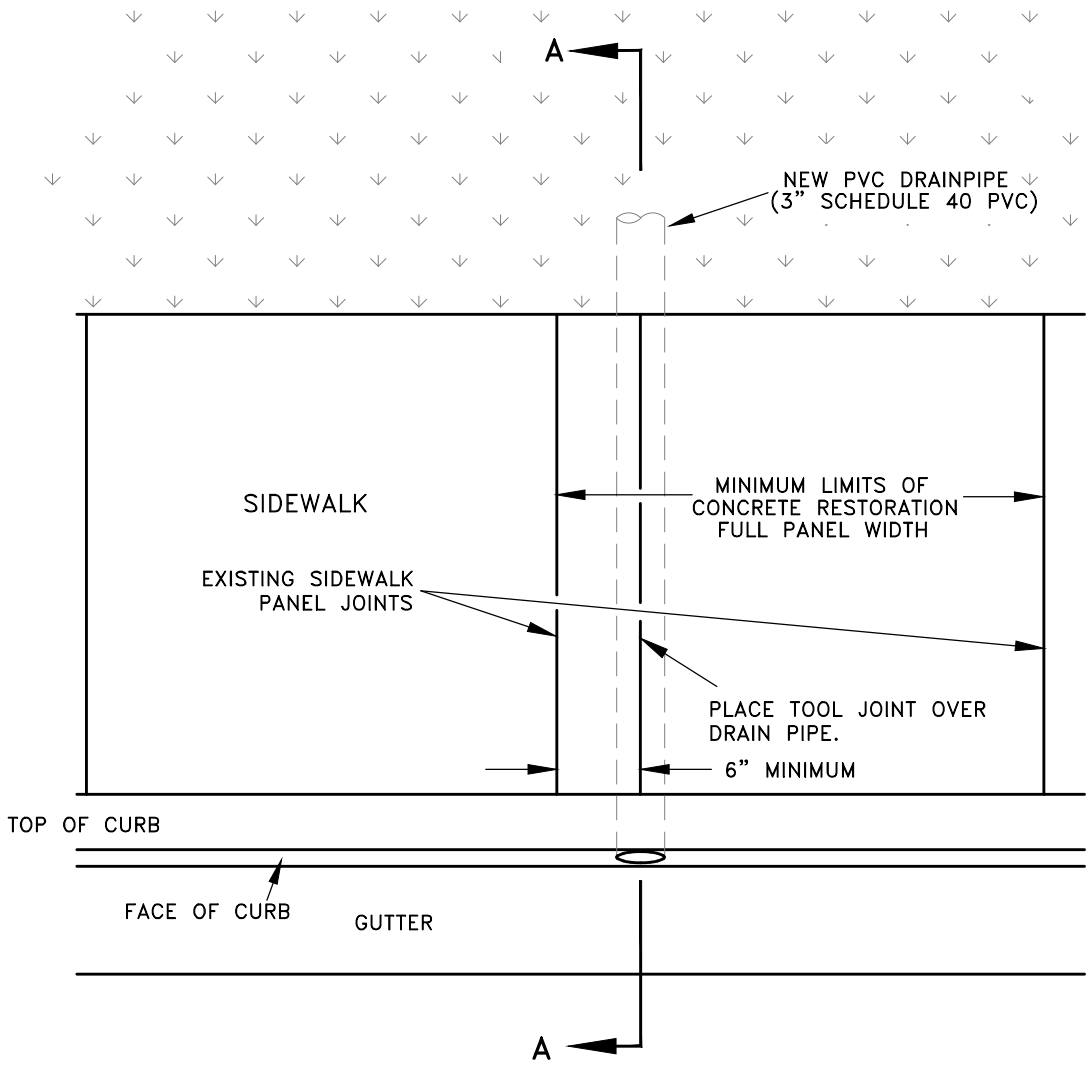
NOTES:

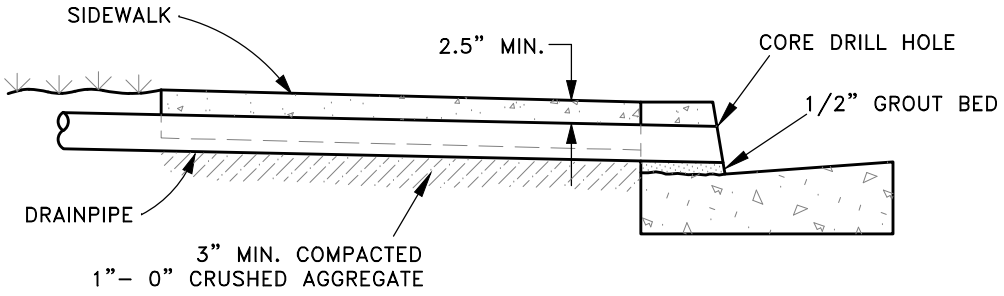
1. INSTALL A MINIMUM OF TWO, 3" PVC SCHEDULE 40 PIPE CURB DRAINS TO SERVE FOR EACH LOT.
2. FOR UNDEVELOPED PROPERTY, THE CURB DRAINS SHALL BE INSTALLED 5' FROM EACH PROPERTY CORNER OR AT LOCATIONS DETERMINED BY THE ENGINEER.
3. FOR DEVELOPED PROPERTY, CURB DRAINS SHALL BE INSTALLED OPPOSITE ALL EXISTING DRAINAGE OUTLETS SERVING THE PROPERTY, OR AS DIRECTED BY THE ENGINEER.
4. WHEREVER POSSIBLE, CURB DRAIN LOCATIONS SHALL BE ADJUSTED TO COINCIDE WITH CONTRACTION JOINTS IN THE CURB AND/OR SIDEWALK. IF NOT A SCORE MARK SHALL BE PLACED OVER PIPE.
5. CURB DRAINS SHALL BE INSTALLED TRANSVERSE TO THE LENGTH OF THE CURB WITHOUT THE USE OF INTERMEDIATE ANGLE FITTINGS BETWEEN THE FACE OF THE CURB AND THE PROPERTY LINE.
6. THE 3" PVC PIPE SHALL BE INSTALLED TO THE PROPERTY LINE. THE PIPE SHALL HAVE POSITIVE FLOW FROM THE PROPERTY LINE TO THE GUTTER.
7. REMOVABLE CAPS SHALL BE INSTALLED IN CURB DRAIN OPENINGS AT THE CURB FACE UPON INITIAL CONSTRUCTION. CAPS SHALL BE REMOVED BY OTHERS AT TIME OF CONNECTION TO DRAINAGE PIPE. USE OATEY BRAND "MULIT-SIZE END-CAPS, OR APPROVED EQUAL.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TYPICAL CURB DRAIN

NO SCALE	JANUARY 2018	NO. 306





SECTION A–A

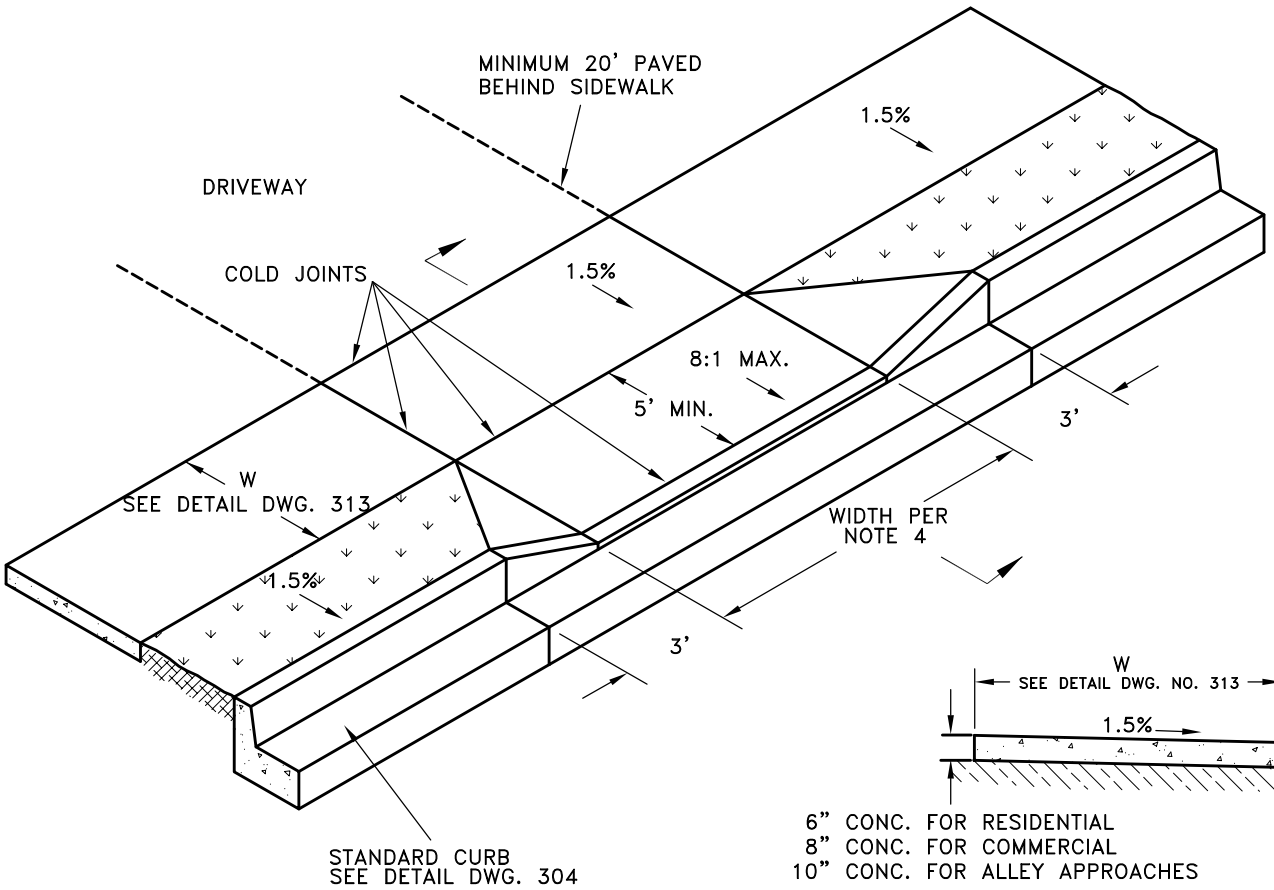
NOTES

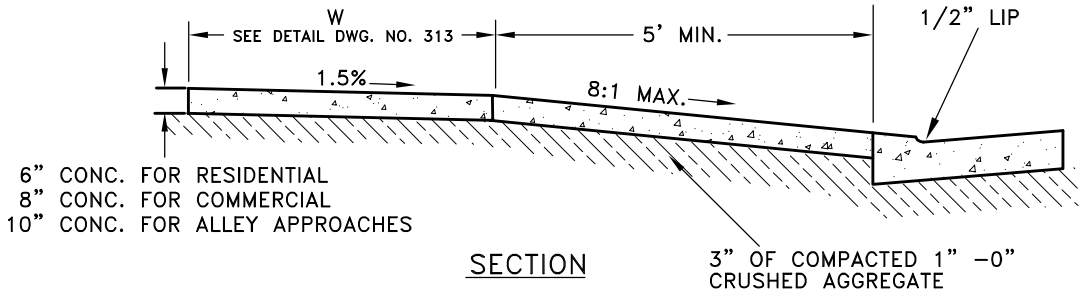
1. SAWCUT SIDEWALK TO FULL DEPTH. MINIMUM LIMIT OF CONCRETE REMOVAL AND REPLACEMENT IS ENTIRE AREA BETWEEN PANEL DIVISION MARKS.
2. CURB SHALL BE CORE DRILLED.
3. MATCH THICKNESS OF EXISTING CURB AND SIDEWALK.
4. FINISH SIDEWALK AND CURB (TOP AND FACE) FLUSH WITH EXISTING ADJACENT LINE AND GRADE.
5. THE MINIMUM 28–DAY COMPRESSIVE STRENGTH OF ALL CONCRETE SHALL BE 4000 P.S.I.
6. INSTALL DRAIN PIPE PERPENDICULAR TO THE CURB THROUTH THE RIGHT OF WAY.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

INSTALLATION OF CURB DRAINS UNDER EXISTING SIDEWALKS

NO SCALE	OCTOBER 2013	NO. 307





SECTION

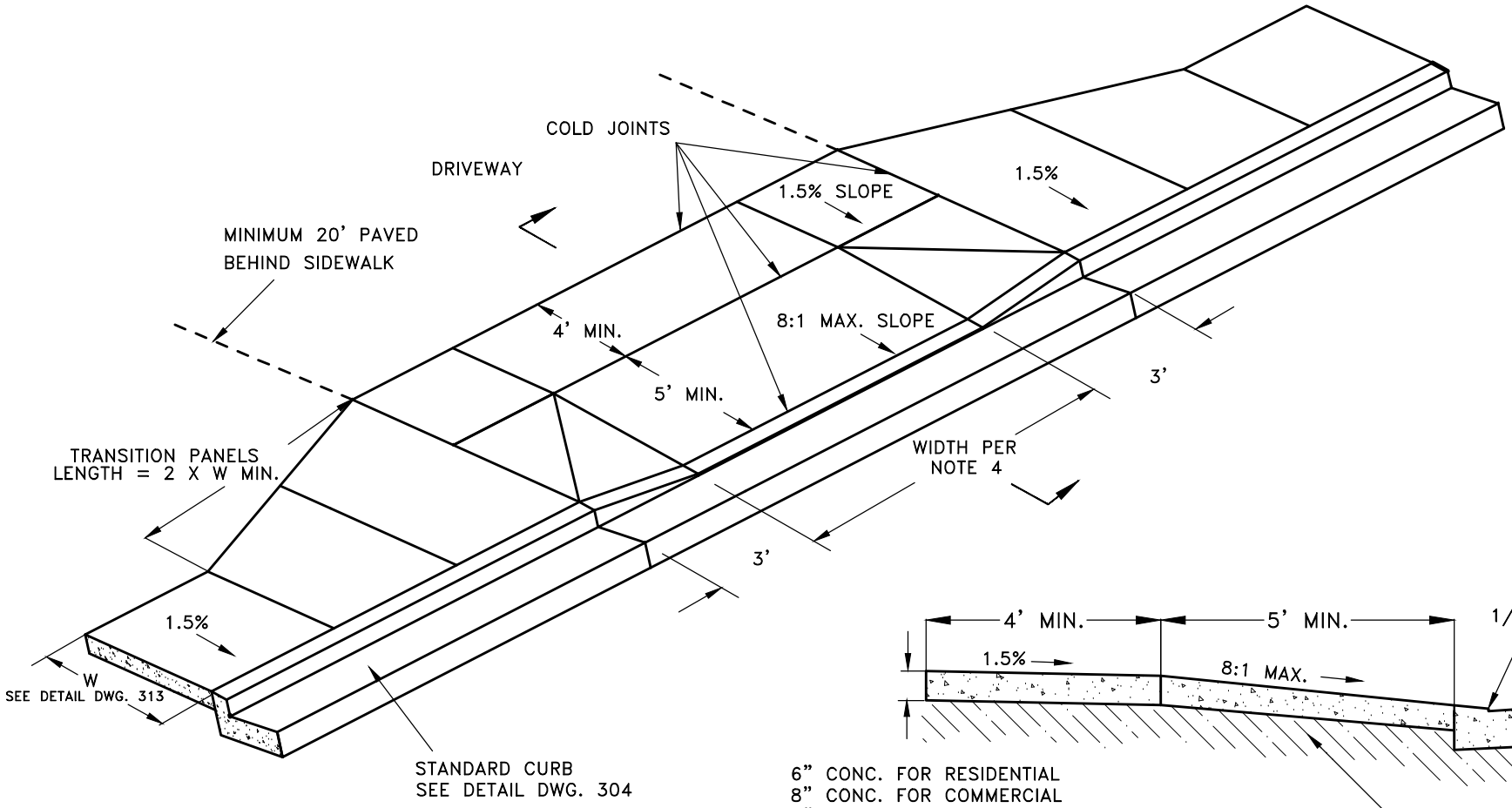
NOTES:

1. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI.
2. CURB AND GUTTER SHALL BE CONSTRUCTED INDEPENDENTLY, AND SEPARATED BY A COLD JOINT, FROM ALL ADJACENT CONCRETE CONSTRUCTION; INCLUDING SIDEWALKS AND DRIVEWAY RAMPS.
3. PROVIDE CONTRACTION JOINT AT MIDPOINT OF DRIVEWAY IF DRIVEWAY IS 16' WIDE OR GREATER.
4. RESIDENTIAL DRIVEWAY WIDTH 10' – 24'. COMMERCIAL DRIVEWAY WIDTH PER DEVELOPMENT CODE, ARTICLE 12, CHAPTER 12.100
5. NEW DRIVEWAY ACCESS CONSTRUCTION IN AN EXISTING CURB SHALL BE CONSTRUCTED WITH THE USE OF HORIZONTAL CONCRETE SAWCUTTING EQUIPMENT. SEE 306.02.07B.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

RESIDENTIAL AND COMMERCIAL DRIVEWAYS WITH SETBACK SIDEWALK

NO SCALE	JANUARY 2011	NO. 308



SECTION

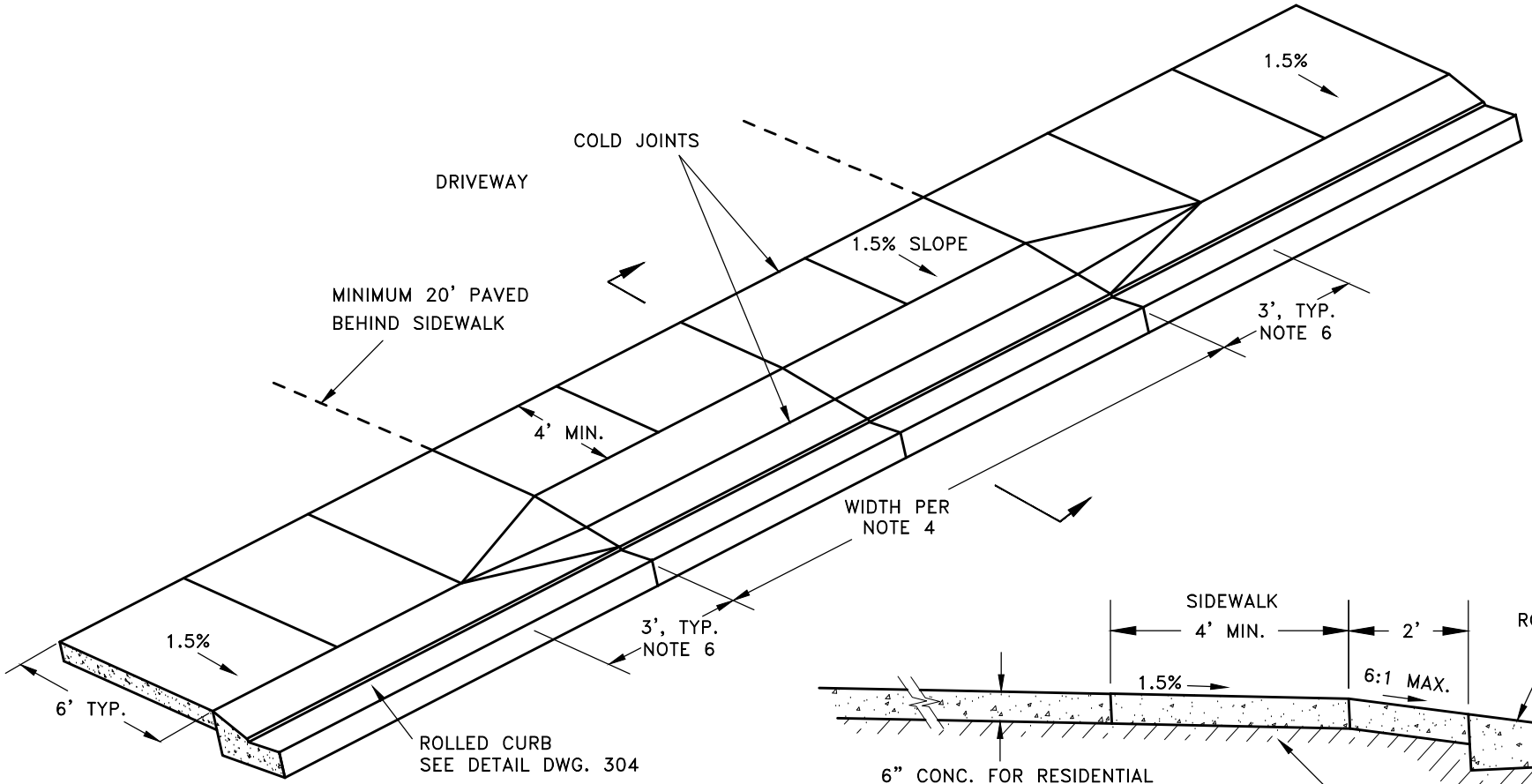
NOTES:

1. CONCRETE SHALL HAVE A MINIMUM 28–DAY COMPRESSIVE STRENGTH OF 4000 PSI.
2. CURB AND GUTTER SHALL BE CONSTRUCTED INDEPENDENTLY, AND SEPARATED BY A COLD JOINT, FROM ALL ADJACENT CONCRETE CONSTRUCTION; INCLUDING SIDEWALKS AND DRIVEWAY RAMPS.
3. PROVIDE CONTRACTION JOINT AT MIDPOINT OF DRIVEWAY IF DRIVEWAY WIDTH IS 16' OR GREATER.
4. RESIDENTIAL DRIVEWAY WIDTH 10' – 24'. COMMERCIAL DRIVEWAY WIDTH PER DEVELOPMENT CODE, ARTICLE 12, CHAPTER 12.100.
5. NEW DRIVEWAY ACCESS CONSTRUCTION IN AN EXISTING CURB SHALL BE CONSTRUCTED WITH THE USE OF HORIZONTAL CONCRETE SAWCUTTING EQUIPMENT. SEE 306.02.07B.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

RESIDENTIAL AND COMMERCIAL DRIVEWAYS WITH CURB SIDE SIDEWALK

NO SCALE	OCTOBER 2013	NO. 309A



SECTION

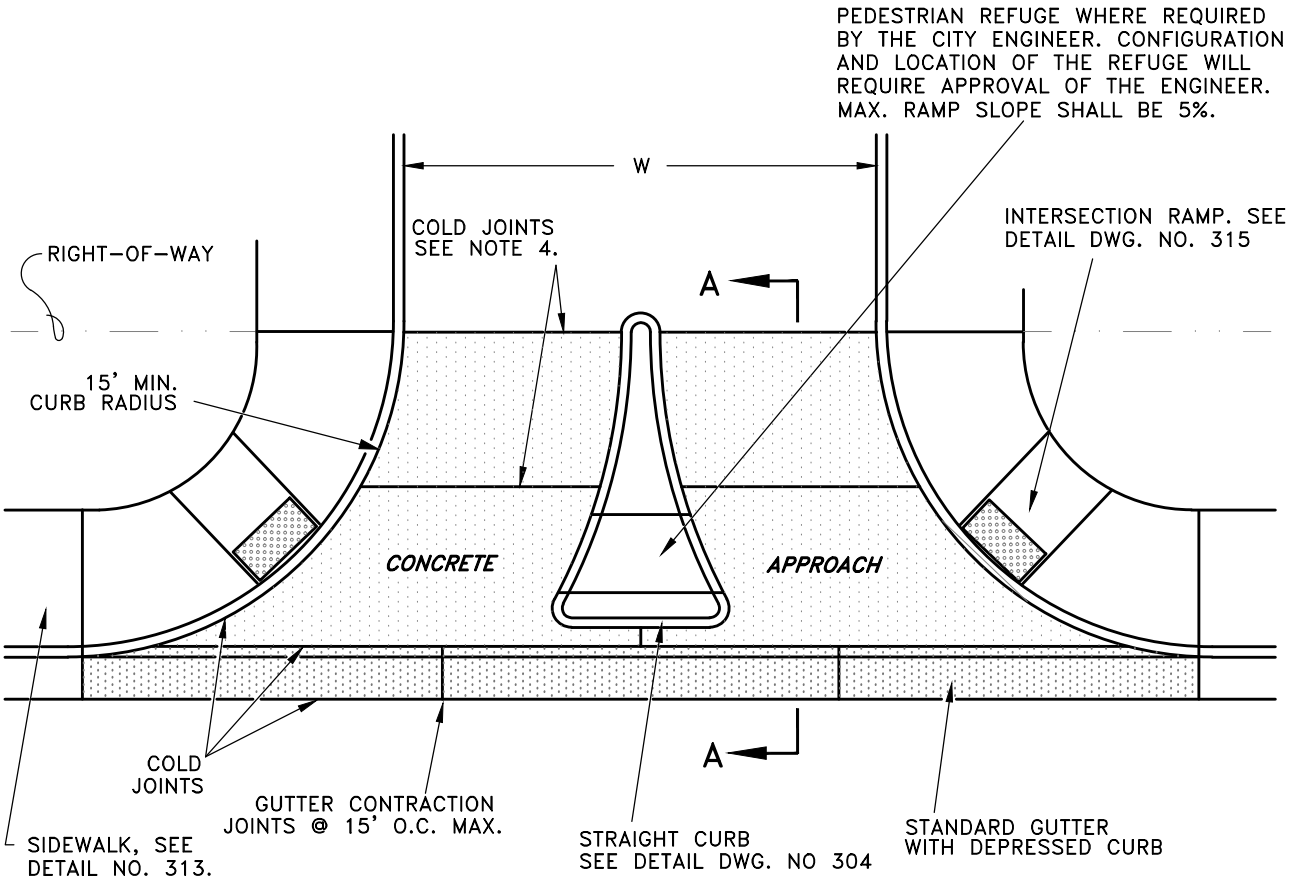
NOTES:

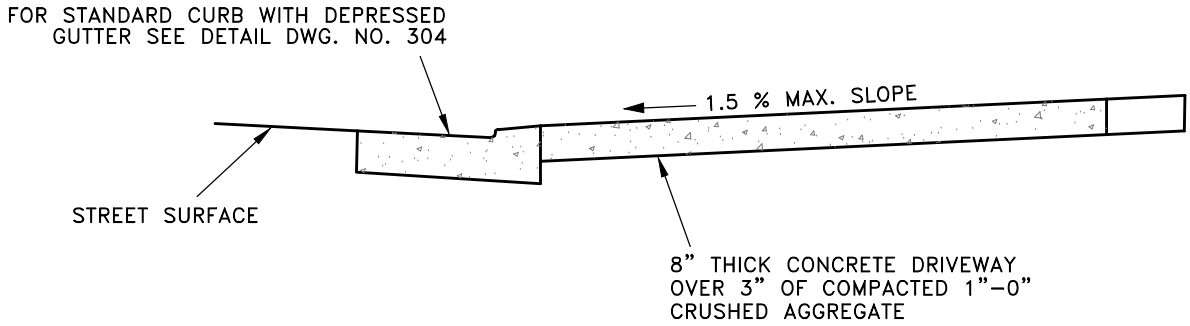
1. A CURB CUT SHOULD NOT TYPICALLY BE REQUIRED FOR DRIVEWAYS ON ROLLED CURB. USE OF THIS DETAIL IS OPTIONAL WITH APPROVAL OF THE CITY ENGINEER.
2. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
3. CURB AND GUTTER SHALL BE CONSTRUCTED INDEPENDENTLY AND SEPARATED BY A COLD JOINT FROM ALL ADJACENT CONCRETE CONSTRUCTION; INCLUDING SIDEWALKS AND DRIVEWAY APRONS.
4. PROVIDE CONTRACTION JOINT AT MIDPOINT OF DRIVEWAY IF DRIVEWAY WIDTH IS 16' OR GREATER.
5. RESIDENTIAL DRIVEWAY WIDTH 10' TO 24'. COMMERCIAL DRIVEWAY WIDTH PER DEVELOPMENT CODE.
6. NEW DRIVEWAY ACCESS CONSTRUCTION ON AN EXISTING CURB SHALL BE CONSTRUCTED WITH THE USE OF HORIZONTAL CONCRETE SAWING EQUIPMENT. SEE STANDARD CONSTRUCTION SPECIFICATIONS SECTION 306.02.07B.
7. WHERE MINIMUM 5' SEPARATION BETWEEN DRIVEWAY IS PROVIDED FOR SINGLE-FAMILY DETACHED DWELLINGS AND MIDDLE HOUSING, WING MAY BE REDUCED TO 2.5' LONG.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

DRIVEWAYS ON ROLLED CURB WITH CURBSIDE SIDEWALK (OPTIONAL)

NO SCALE	FEBRUARY 2024	NO. 309B





SECTION A-A
(NOT TO SCALE)

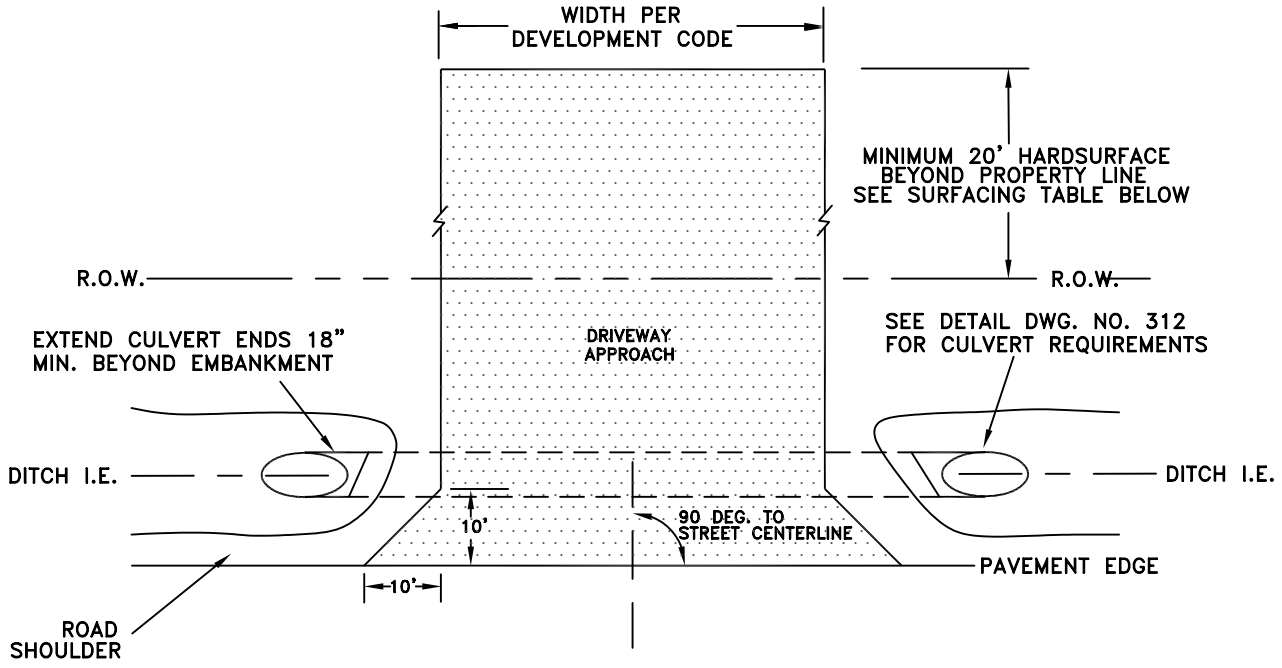
NOTES:

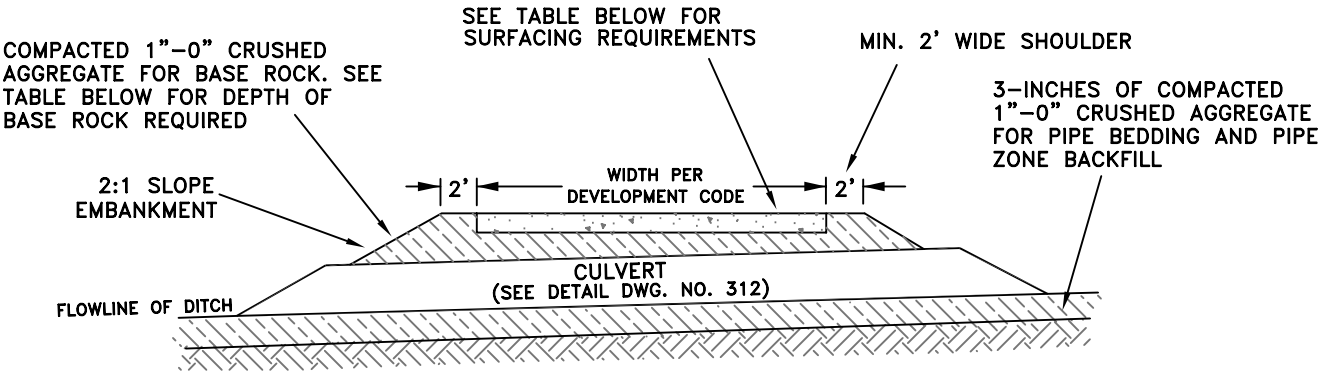
1. THIS TYPE OF APPROACH SHALL NOT BE USED WITHOUT APPROVAL OF THE CITY ENGINEER.
2. W = WIDTH REQUIREMENTS AS SPECIFIED IN THE DEVELOPMENT CODE, OR AS INDICATED ON CITY APPROVED CONTRACT DRAWINGS.
3. ALL CONCRETE TO HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 P.S.I.
4. PROVIDE COLD JOINTS AS SPECIFIED @ 15' O.C. MAX.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

COMMERCIAL DRIVEWAY WITH STANDARD CURB RETURN

NO SCALE	OCTOBER 2013	NO. 310





SURFACING MATERIAL	SURFACING REQUIREMENTS	BASE ROCK REQUIREMENTS
CONCRETE	6" OF 4000 PSI PORTLAND CEMENT CONCRETE	3" OF 1"-0" CRUSHED AGGREGATE
ASPHALT	4" OF ASPHALTIC CONCRETE PAVEMENT	6" OF 1"-0" CRUSHED AGGREGATE

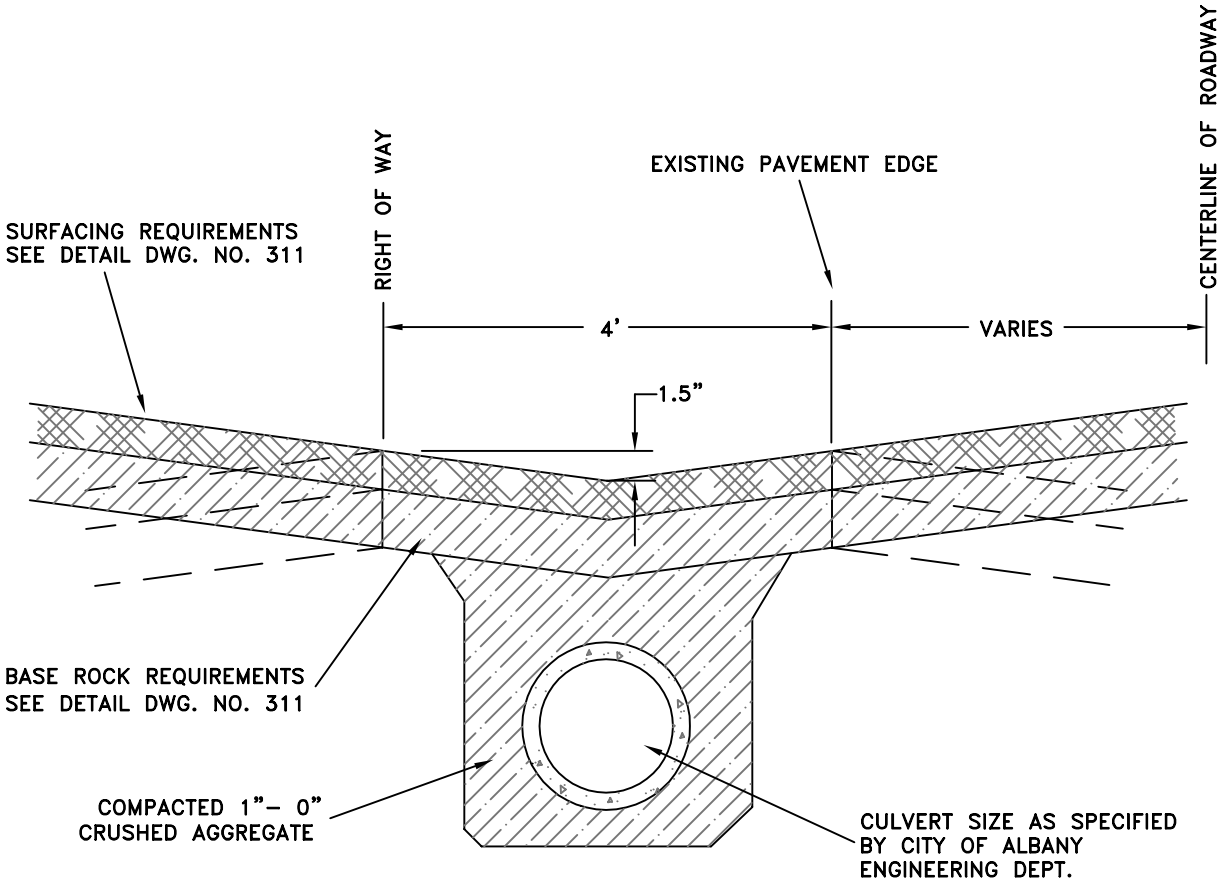
NOTES:

1. SEE DETAIL DWG. NO. 312 FOR CULVERT REQUIREMENTS.
2. ALL SURFACE MATERIALS, BASE ROCK, AND TRENCH BACKFILL SHALL BE COMPACTED TO CITY STANDARDS.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI.
4. ROADSIDE DITCHES SHALL NOT BE FILLED IN EXCEPT AT DRIVEWAY LOCATIONS WITH CULVERT.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD DRIVEWAY APPROACH FOR UNIMPROVED STREETS

NO SCALE	JULY 2005	NO. 311



NOTES:

1. CULVERT PIPE SHALL BE TYPE 3 REINFORCED CONCRETE OR CORRUGATED HIGH–DENSITY POLYETHYLENE WITH SMOOTH INTERIOR, ADS N–12 OR APPROVED EQUAL.
2. CULVERT PIPE SHALL BE MIN. DIA. OF 12" OR AS SPECIFIED BY THE CITY OF ALBANY ENGINEERING DEPT.
3. CULVERT ENDS SHALL BE MITERED 2:1 ON PIPE LARGER THAN 15" DIA.
4. ROADSIDE DITCHES SHALL NOT BE FILLED IN EXCEPT AT DRIVEWAY LOCATIONS WITH CULVERT.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CULVERT DETAIL FOR STANDARD DRIVEWAY APPROACH

UNIMPROVED STREETS

NO SCALE	JANUARY 2018	NO. 312

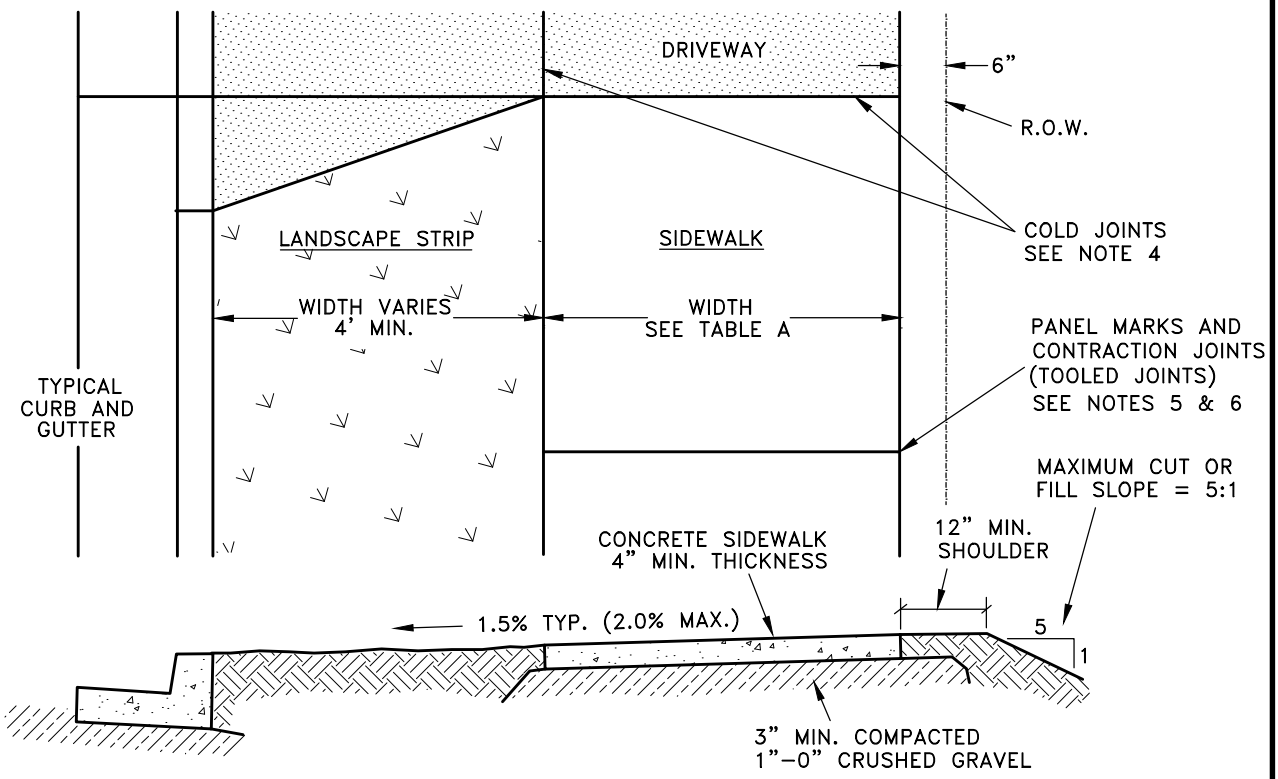
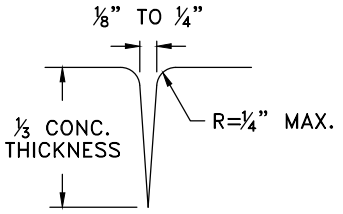


TABLE A STANDARD SIDEWALK WIDTH		
STREET TYPE	SETBACK SIDEWALK (STANDARD LOCATION)	CURBSIDE SIDEWALK (APPROVAL REQUIRED)
ARTERIALS AND COLLECTORS	6 FT.	7 FT.
LOCAL	5 FT.	6 FT.

CONTRACTION JOINT



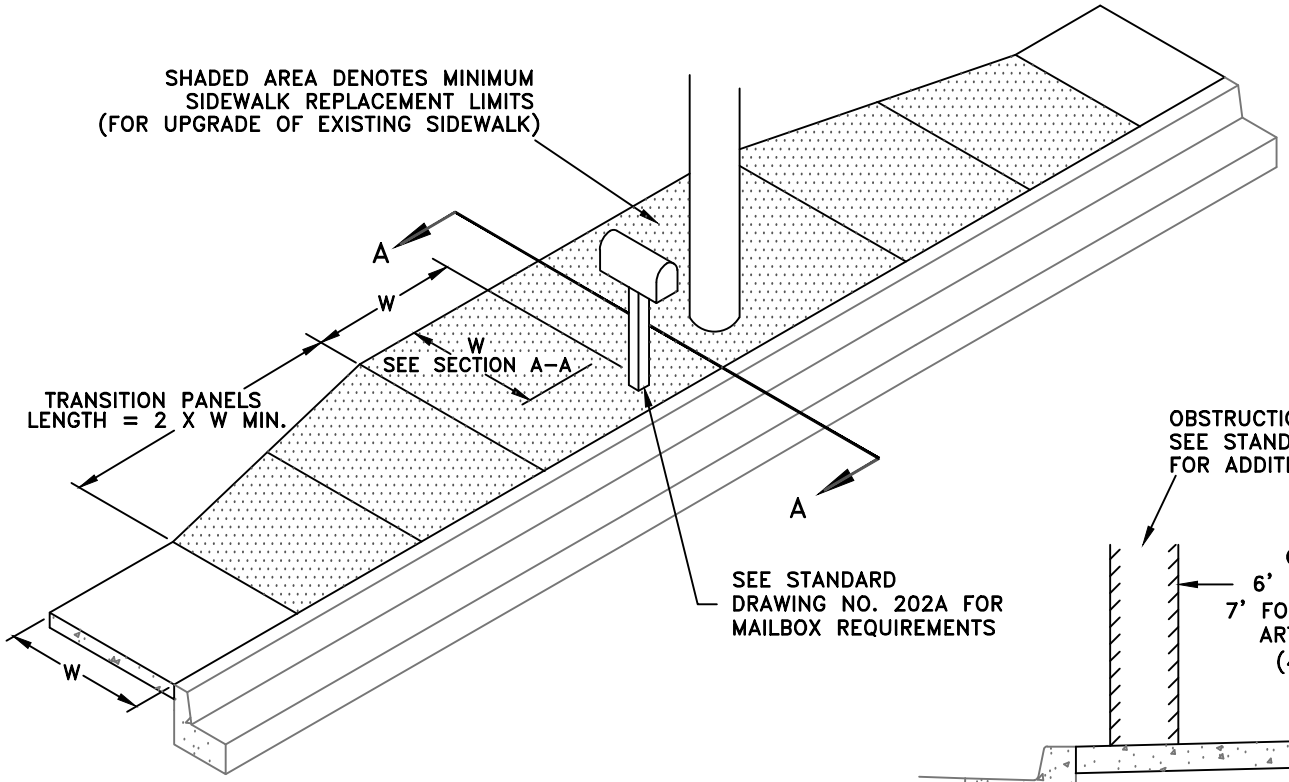
STANDARD SIDEWALK SPECIFICATIONS

1. STANDARD SIDEWALK SHALL BE CONSTRUCTED A MINIMUM OF 4' BEHIND THE CURB. SIDEWALK CONSTRUCTED ADJACENT TO THE CURB IS NOT PERMITTED WITHOUT APPROVAL OF THE ENGINEER.
2. CONCRETE FOR SIDEWALK SHALL HAVE A COMPRESSIVE STRENGTH OF 4000 PSI AND A 2" TO 4" SLUMP.
3. THE SIDEWALK AND LANDSCAPE STRIP SHALL SLOPE TOWARD THE CURB AT 1.5% GRADE. HORIZONTAL AND VERTICAL ALIGNMENT SHALL NOT VARY MORE THAN 1/4" FROM ESTABLISHED LINE AND GRADE AS MEASURED WITH A STRAIGHT EDGE.
4. COLD JOINTS SHALL BE LOCATED IN SIDEWALKS AT DRIVEWAY SECTIONS AND CHANGES OF DIRECTION. SIDEWALK SHALL NOT BE CONSTRUCTED MONOLITHICALLY WITH CURBING OR OTHER ADJACENT NON-PEDESTRIAN SURFACES. FULL DEPTH JOINT MATERIAL (3 WRAPS MIN. OF NO. 15 ROOFING FELT) SHALL BE PLACED AROUND UTILITY POLES AND FIRE HYDRANTS LOCATED WITHIN THE SIDEWALK AREA.
5. THE SIDEWALK SHALL BE DIVIDED INTO EVENLY SPACED PANELS USING A V-GROOVED JOINTING TOOL. PANEL LENGTH SHALL EQUAL SIDEWALK WIDTH.
6. CONTRACTION JOINTS SHALL BE CONSTRUCTED AT EVERY OTHER PANEL MARK. DEPTH OF THE JOINTS SHALL BE 1/3 OF CONCRETE THICKNESS.
7. INSTALL 1/2" MAXIMUM WIDTH FULL-DEPTH EXPANSION JOINT ADJACENT TO EXISTING SIDEWALK, TYPICAL
8. ALL SIDEWALKS SHALL BE FINISHED WITH A "LIGHT BROOM" FINISH. THE DIRECTION OF BROOMING SHALL BE PERPENDICULAR TO THE LENGTH OF THE SIDEWALK. OUTSIDE EDGES OF THE SIDEWALK AND PANEL MARKS SHALL BE FINISHED WITH A V-GROOVED EDGING TOOL.
9. SEE DETAIL DWG. NO. 314 FOR SIDEWALK SPECIFICATIONS RELATIVE TO CONSTRUCTION AROUND OBSTACLES (MAILBOXES, POLES, ETC.).
10. CONCRETE SIDEWALK ADJACENT TO ROLLED CURB SHALL HAVE A 6" MIN. THICKNESS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD (SETBACK) SIDEWALK

NO SCALE	JUNE 2023	NO. 313



SECTION A–A

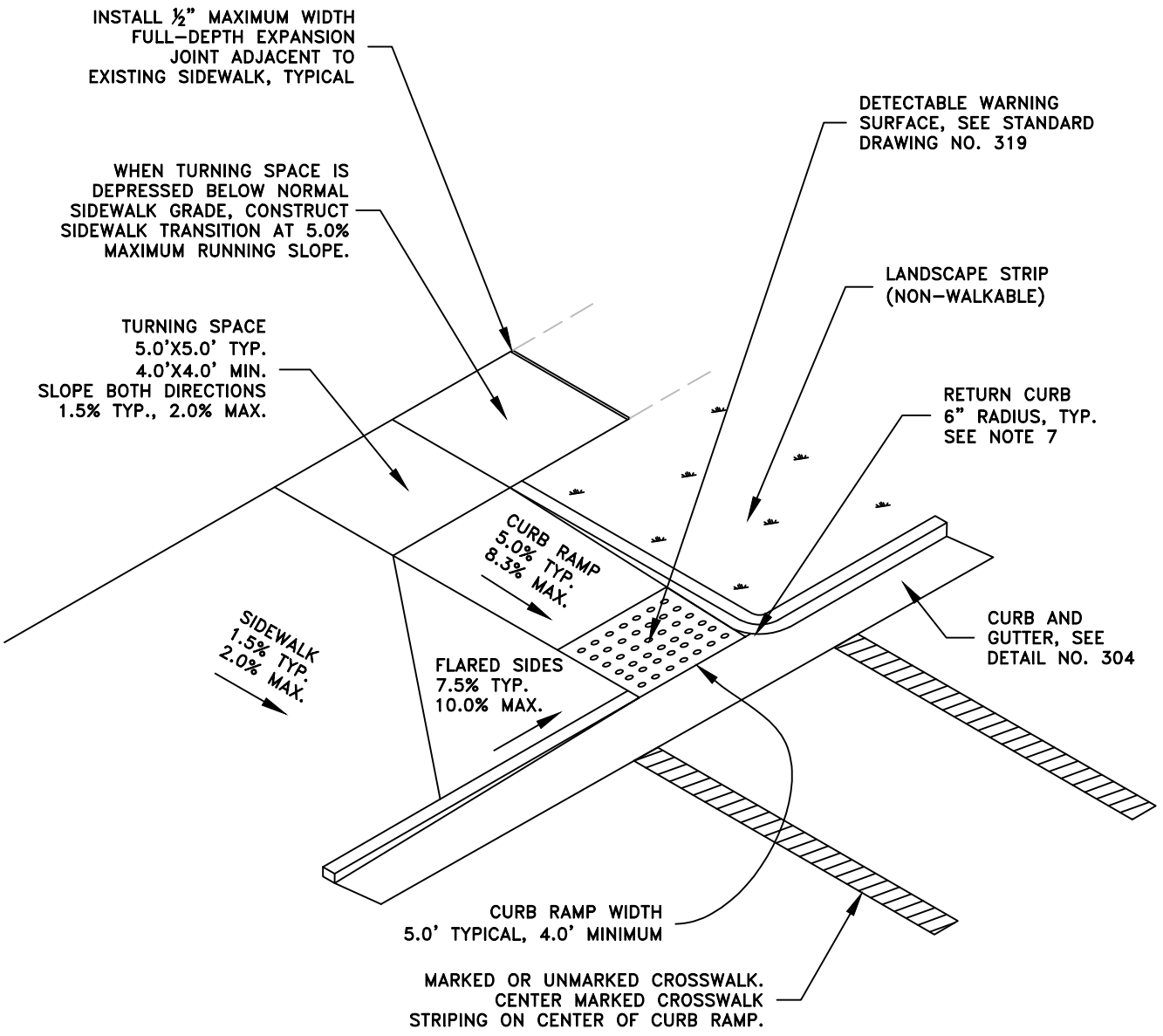
NOTES:

1. THIS DRAWING SHOWS REQUIREMENTS FOR PROVIDING MINIMUM CLEAR SPACE AROUND EXISTING OBSTRUCTIONS IN NEW AND EXISTING, NON–STANDARD CURBSIDE SIDEWALK. COMMON OBSTRUCTIONS INCLUDE FIRE HYDRANTS, MAIL BOXES, UTILITY POLES, AND OTHER OBJECTS THAT MAY IMPEDE PEDESTRIAN TRAFFIC.
2. W = MINIMUM SIDEWALK WIDTH. SEE STANDARD DRAWING NO. 313 FOR MINIMUM SIDEWALK WIDTHS AND CONSTRUCTION SPECIFICATIONS. THE ACTUAL AMOUNT OF CLEAR SPACE BETWEEN THE OBSTRUCTION AND BACK OF THE SIDEWALK SHALL EQUAL THE MINIMUM SIDEWALK WIDTH (4.0' MIN. WITH APPROVAL OF THE CITY ENGINEER).
3. FOR UPGRADING EXISTING CURBSIDE SIDEWALK, MIN. LIMITS OF SIDEWALK REPLACEMENT ARE AS SHOWN. CONSTRUCTION OF ADDITIONAL SIDEWALK AGAINST THE BACK OF EXISTING SIDEWALK TO MEET MIN. CLEAR SPACE REQUIREMENTS IS NOT PERMITTED.
4. ADDITIONAL PUBLIC R.O.W. MAY BE REQUIRED TO MEET MINIMUM SIDEWALK WIDTH REQUIREMENTS.
5. THE ENCROACHMENT PERMIT ISSUED FOR A SPECIFIC SITE WILL DETERMINE CONFIGURATION OF SIDEWALK INVOLVING NON–STANDARD DIMENSIONS AND R.O.W. LIMITATIONS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CONSTRUCTION OF SIDEWALK AROUND EXISTING OBSTRUCTIONS ON CURBSIDE SIDEWALK

NO SCALE	JUNE 2023	NO. 314



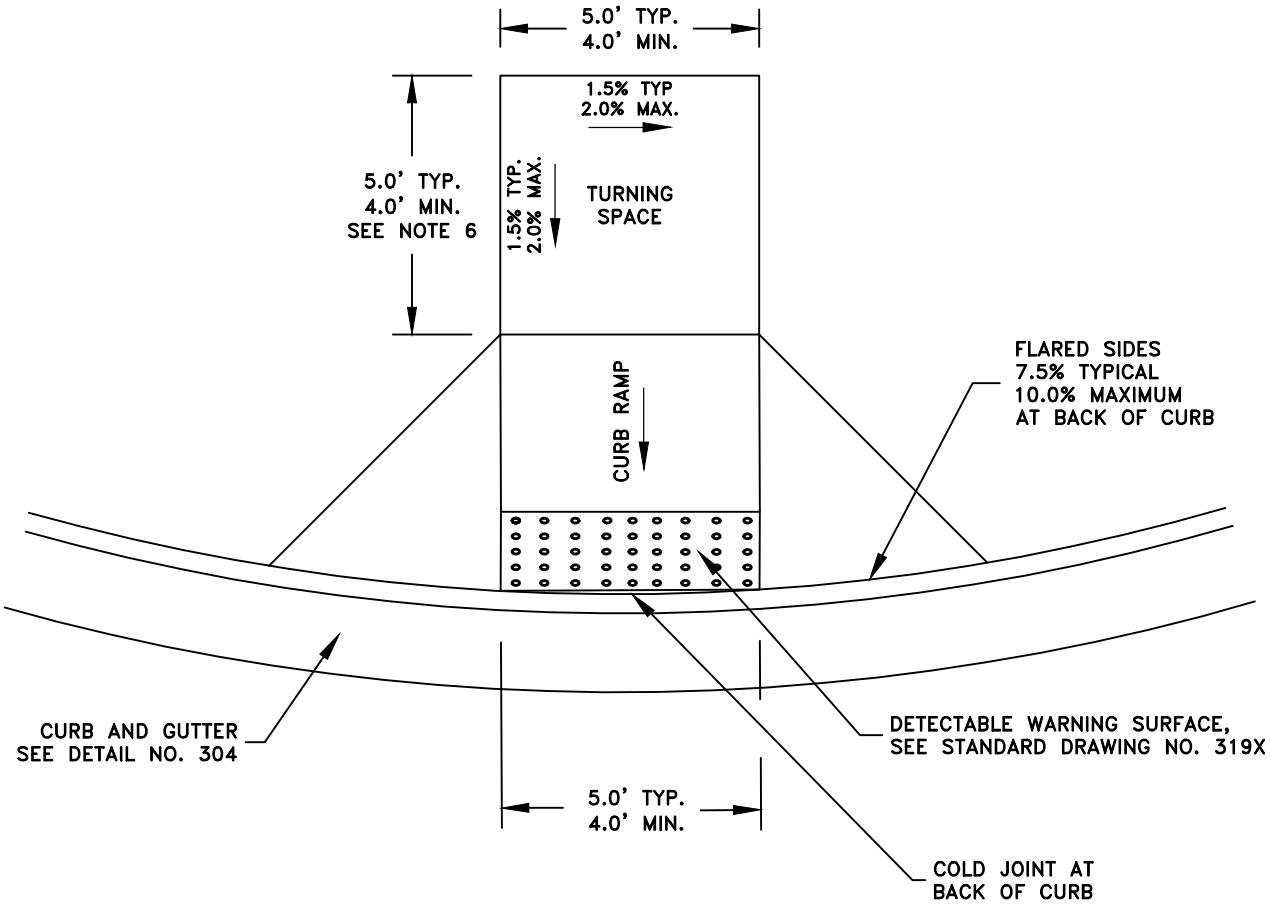
NOTES:

1. THE LOCATION AND GEOMETRY OF CURB RAMPS SHALL BE DESIGNED BY THE PROJECT ENGINEER IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT, THE ALBANY DEVELOPMENT CODE, AND THE ALBANY ENGINEERING STANDARDS.
2. ALL CURB RAMPS SHALL COMPLY WITH THE CURRENT ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT–OF–WAY (PROWAG) PUBLISHED BY THE U.S. ACCESS BOARD.
3. EACH CURB RAMP SHALL SERVE ONE END OF ONE CROSSWALK. TWO CROSSWALKS SHALL NOT SHARE ONE CURB RAMP.
4. RAMPS SHALL CONFIRM TO THE REQUIREMENTS OF STANDARD DRAWING NO. 313 FOR PCC AND BASE.
5. THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE FOOT OF CURB RAMP RUN SHALL BE 5% MAX.
6. NO LIP ALLOWED AT BOTTOM OF RAMP
7. RETURN CURB MAY BE PROVIDED IN LIEU OF FLARED SLOPE ONLY IF PROTECTED FROM TRAVERSE TRAVEL BY LANDSCAPING, HANDRAIL OR OTHER OBSTRUCTION. RETURN CURB SHALL NOT REDUCE WIDTH OF APPROACHING SIDEWALK.
8. MAXIMUM REQUIRED CURB RAMP LENGTH SHALL BE 15.0' REGARDLESS OF CURB RAMP SLOPE.
9. THE CITY ENGINEER MAY AUTHORIZE DESIGN EXCEPTIONS FOR ALTERATIONS OF EXISTING FACILITIES WHEN EXISTING PHYSICAL CONSTRAINTS PREVENT FULL COMPLIANCE.

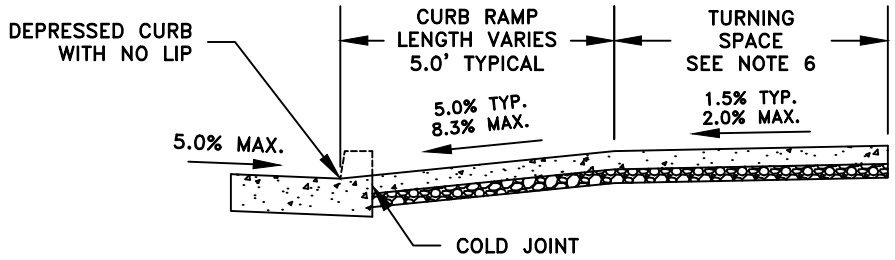
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

GENERAL CURB RAMP DETAILS

NO SCALE	JUNE 2023	NO. 315



CURB RAMP CROSS SECTION



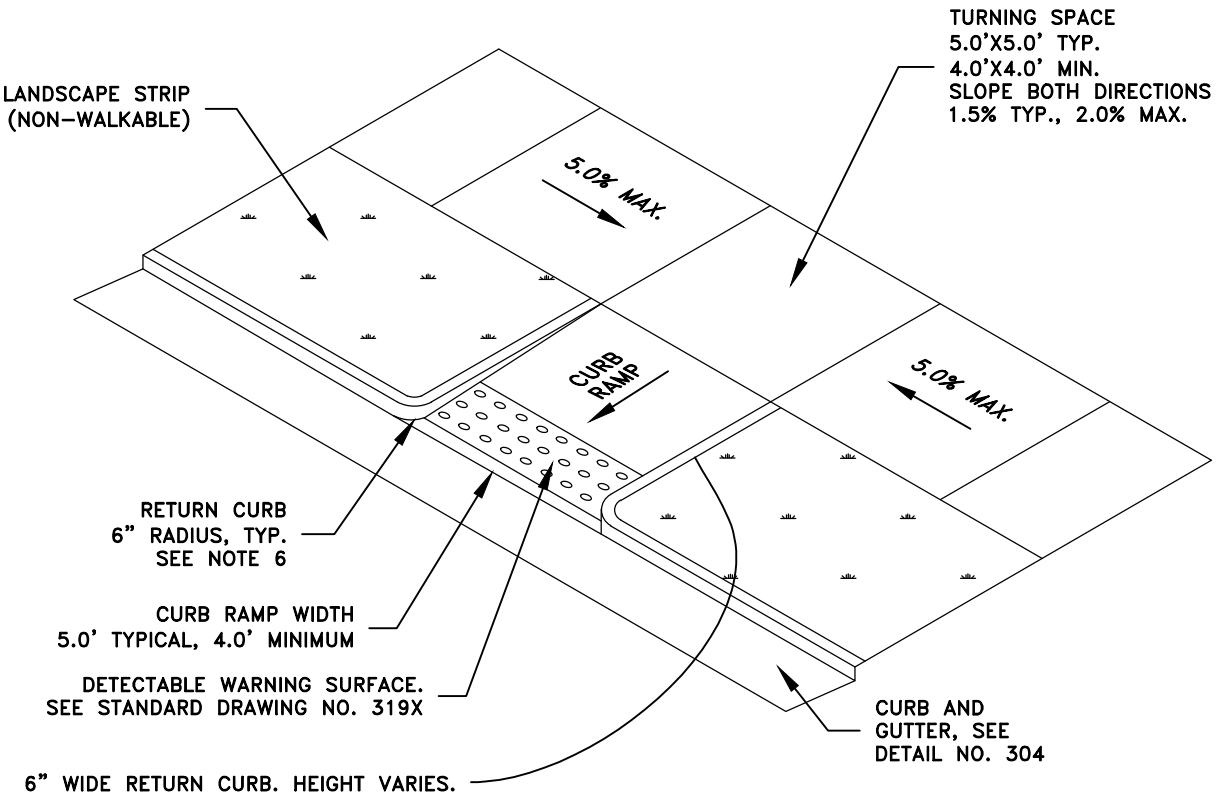
NOTES:

1. THE LOCATION AND GEOMETRY OF CURB RAMPS SHALL BE DESIGNED BY THE PROJECT ENGINEER IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT, THE ALBANY DEVELOPMENT CODE, AND THE ALBANY ENGINEERS STANDARDS.
2. ALL CURB RAMPS SHALL COMPLY WITH THE CURRENT ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY (PROWAG) PUBLISHED BY THE US ACCESS BOARD.
3. RAMPS SHALL CONFIRM TO THE REQUIREMENTS OF STANDARD DRAWING NO. 313 FOR PCC AND BASE.
4. THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE FOOT OF CURB RAMP RUN SHALL BE 5% MAX.
5. CONSTRUCT FLARED SIDES WITH SLOPE OF 10% MAX, MEASURED PARALLEL TO THE CURB LINE,
6. WHERE THE TURNING SPACE IS CONSTRAINED AT THE BACK OF SIDEWALK, THE TURNING SPACE SHALL BE A MINIMUM OF 5.0' IN THE DIRECTION OF THE CURB RAMP.

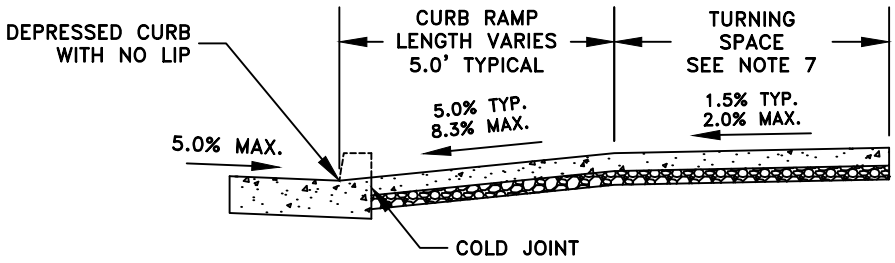
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

PERPENDICULAR CURB RAMP

NO SCALE	JUNE 2023	NO. 316



CURB RAMP CROSS SECTION



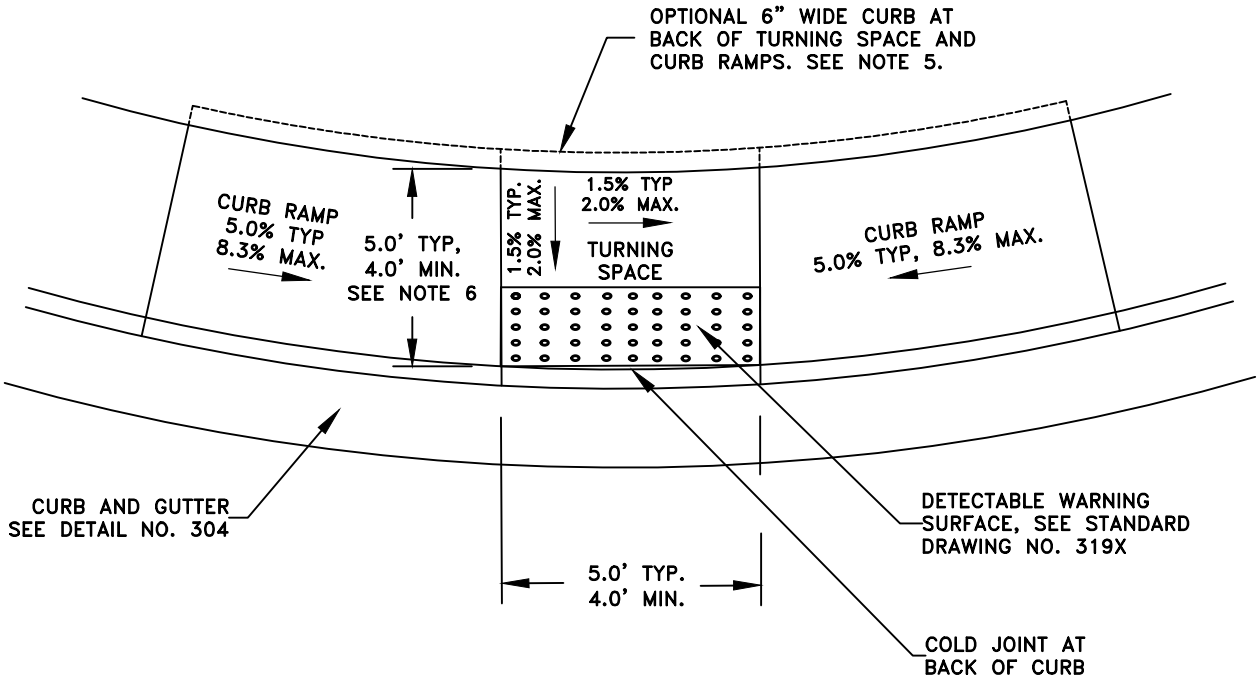
NOTES:

1. ONLY ONE RAMP SHOWN FOR CLARITY. TYPICAL CURB RETURN WILL HAVE TWO RAMPS.
2. THE LOCATION AND GEOMETRY OF CURB RAMPS SHALL BE DESIGNED BY THE PROJECT ENGINEER IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT, THE ALBANY DEVELOPMENT CODE, AND THE ALBANY ENGINEERS STANDARDS.
3. ALL CURB RAMPS SHALL COMPLY WITH THE CURRENT ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY (PROWAG) PUBLISHED BY THE US ACCESS BOARD.
4. RAMPS SHALL CONFIRM TO THE REQUIREMENTS OF STANDARD DRAWING NO. 313 FOR PCC AND BASE.
5. THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE FOOT OF CURB RAMP RUN SHALL BE 5% MAX.
6. RETURN CURBS MAY BE PROVIDED IN LIEU OF FLARED SIDES ONLY IF PROTECTED FROM TRAVERSE TRAVEL BY LANDSCAPING, HANDRAIL OR OTHER OBSTRUCTION. RETURN CURB SHALL NOT REDUCE WIDTH OF APPROACHING SIDEWALK.
7. WHERE THE TURNING SPACE IS CONSTRAINED AT THE BACK OF SIDEWALK, THE TURNING SPACE SHALL BE A MINIMUM OF 5.0' IN THE DIRECTION OF THE CURB RAMP.

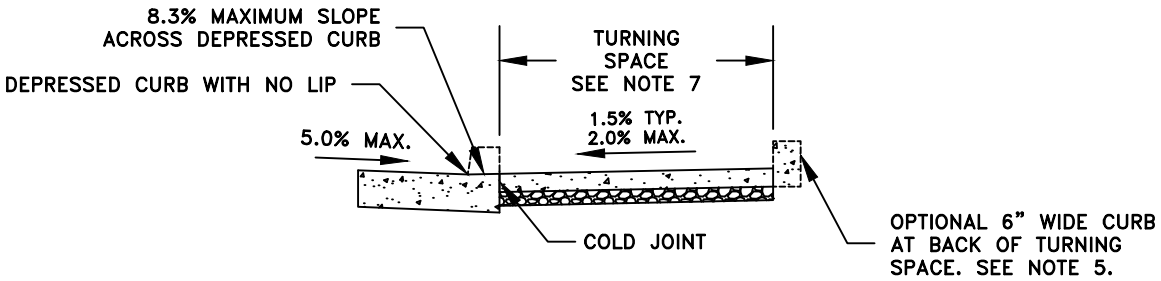
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

PERPENDICULAR CURB RAMP WITH RETURN CURBS

NO SCALE	JUNE 2023	NO. 317



TURNING SPACE CROSS SECTION



NOTES:

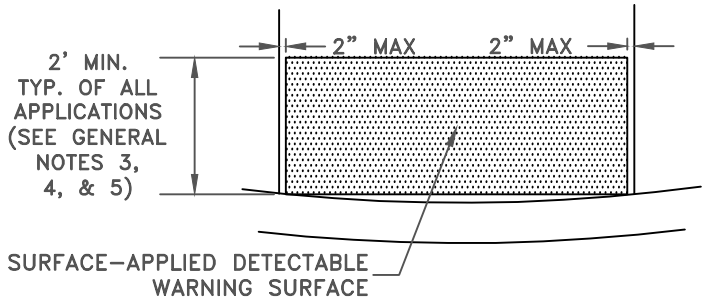
1. THE LOCATION AND GEOMETRY OF CURB RAMPS SHALL BE DESIGNED BY THE PROJECT ENGINEER IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT, THE ALBANY DEVELOPMENT CODE, AND THE ALBANY ENGINEERS STANDARDS.
2. ALL CURB RAMPS SHALL COMPLY WITH THE CURRENT ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY (PROWAG) PUBLISHED BY THE US ACCESS BOARD.
3. RAMPS SHALL CONFIRM TO THE REQUIREMENTS OF STANDARD DRAWING NO. 313 FOR PCC AND BASE.
4. THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE FOOT OF CURB RAMP RUN SHALL BE 5% MAX.
5. WHERE THE TURNING SPACE IS CONSTRAINED ON TWO OR MORE SIDES, THE TURNING SPACE SHALL BE A MINIMUM OF 5.0' IN THE DIRECTION OF THE PEDESTRIAN STREET CROSSING.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

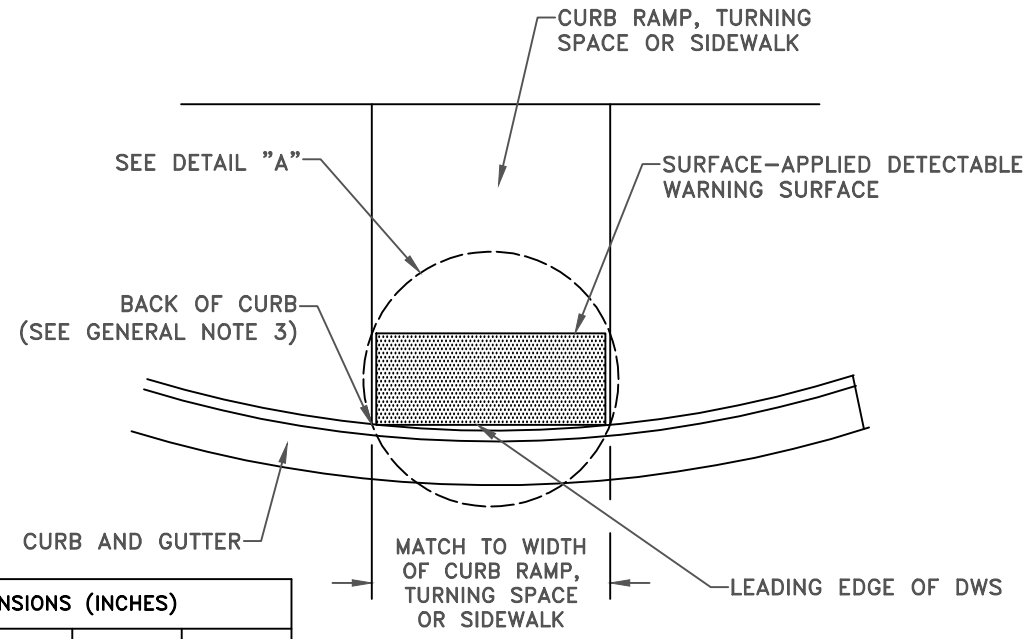
PARALLEL CURB RAMP

NO SCALE	JUNE 2023	NO. 318

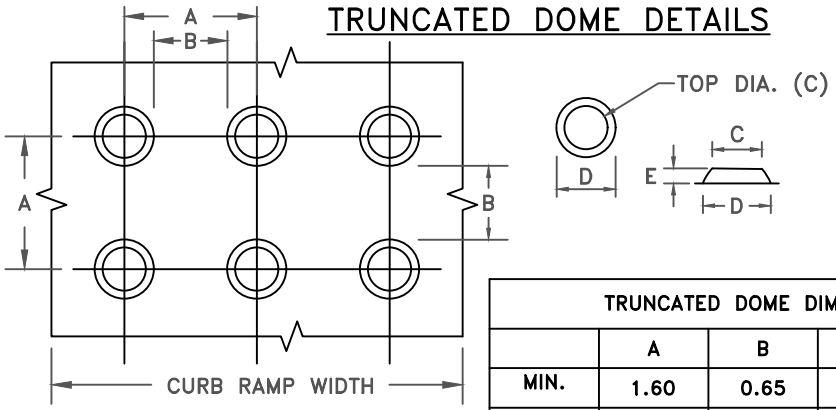
DETAIL "A"



DETECTABLE WARNING SURFACE DETAIL



TRUNCATED DOME DETAILS



TRUNCATED DOME DIMENSIONS (INCHES)					
	A	B	C	D	E
MIN.	1.60	0.65	50% D	0.90	0.20
MAX.	2.40	–	65% D	1.40	0.20

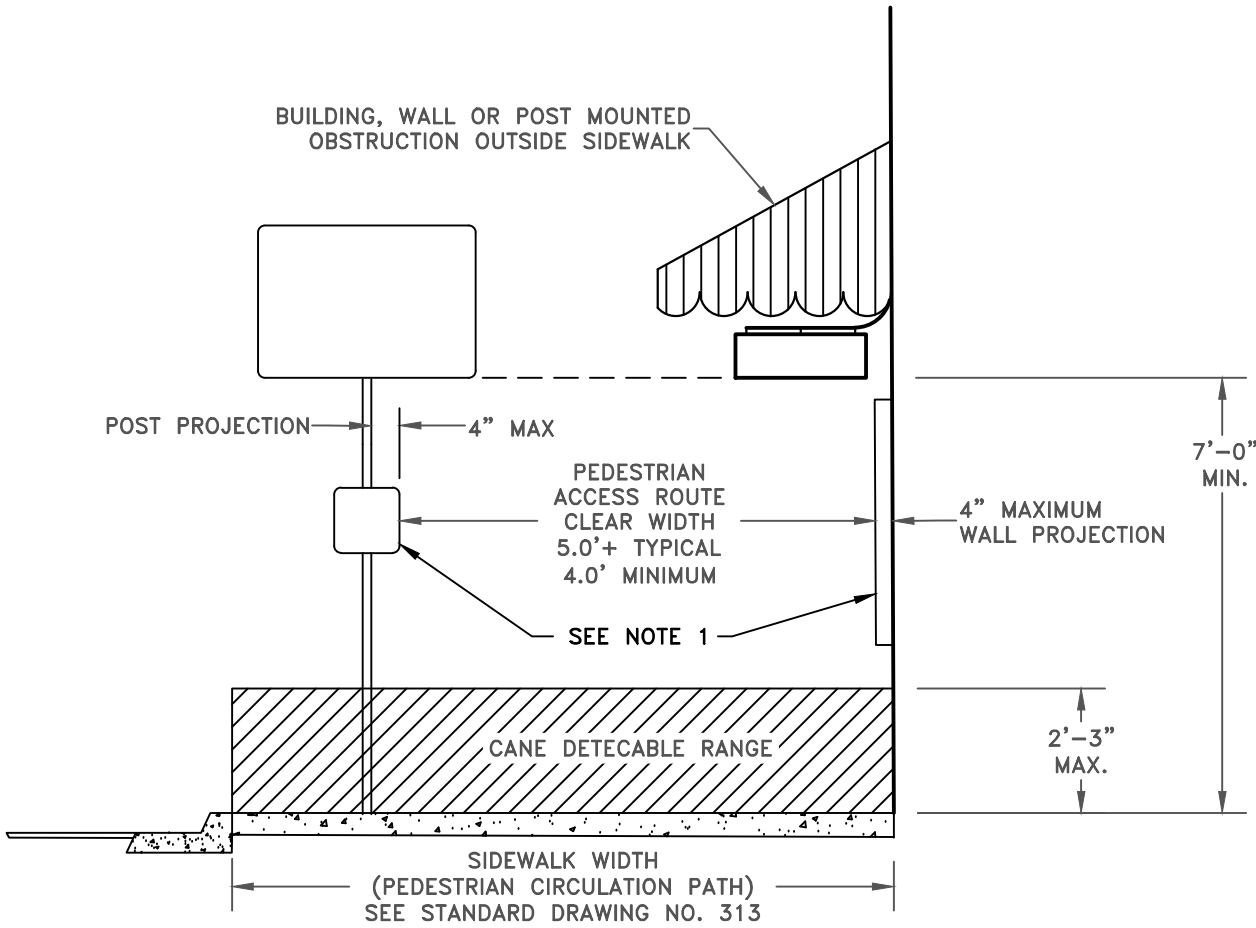
NOTES:

1. THE DETECTABLE WARNING SURFACE SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP OPENING, SHARED PATH, BLENDED TRANSITION, TURNING SPACE, OR OTHER ROADWAY ENTRANCE AS APPLICABLE. A GAP OF UP TO 2 INCHES ON EACH SIDE OF THE DETECTABLE WARNING SURFACE IS PERMITTED
2. DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE BACK OF CURB FOR A MINIMUM DEPTH OF 2 FT. IN THE DIRECTION OF PEDESTRIAN TRAVEL AT CURB RAMPS THAT ARE ADJACENT TO TRAFFIC. DETECTABLE WARNING SURFACE MAY BE RADIAL OR RECTANGULAR, BUT MUST COMPLY WITH THE TRUNCATED DOME SIZE AND SPACING STANDARDS. DETECTABLE WARNING SURFACE MAY BE CUT TO MEET NECESSARY SHAPE AS SHOWN ON THE CONSTRUCTION DRAWINGS. THE DETECTABLE WARNING SURFACE SHALL NOT BE PLACED ACROSS A GRADE BREAK.
3. DETECTABLE WARNING SURFACE SHALL BE USED IN THE FOLLOWING LOCATIONS:
   A). CURB RAMPS AT STREET CROSSINGS
   B). PEDESTRIAN ISLANDS (ACCESSIBLE ROUTE ISLANDS)
   C). RAILROAD CROSSINGS
4. WHERE NO CURB IS PRESENT, THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE EDGE OF PAVEMENT.
5. DETECTABLE WARNING COLOR SHALL BE SAFETY YELLOW, EXCEPT IN DOWNTOWN ALBANY WHERE IT SHALL BE BLACK IN COLOR. ALTERNATIVE COLORS REQUIRE PRIOR APPROVAL OF THE CITY ENGINEER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

DETECTABLE WARNING SURFACE DETAIL

NO SCALE	JUNE 2023	NO. 319



CLEAR CIRCULATION PATH

NOTES:

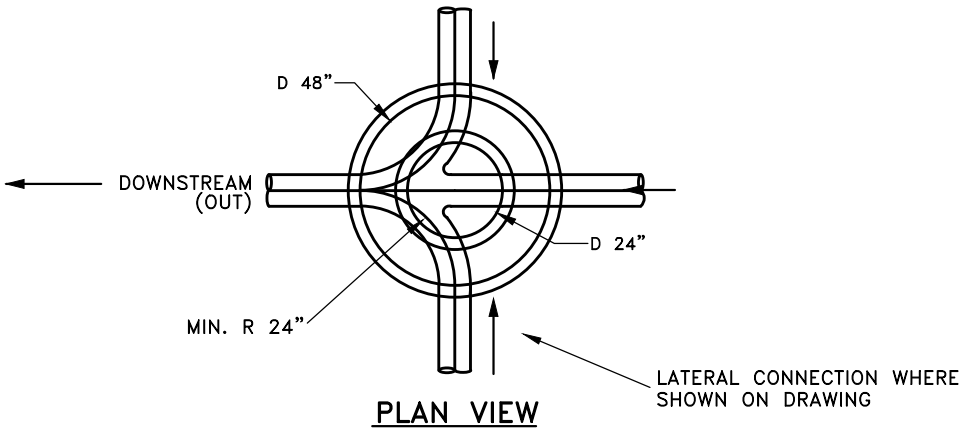
1. OBJECTS WITH BASE BELOW 2'-3" MAY PROTRUDE ANY DISTANCE AS LONG AS THE PEDESTRIAN ACCESS ROUTE CLEAR WIDTH IS MAINTAINED. WHEN AN OBJECT WITH A BASE HIGHER THAN 2'-3" PROTRUDES FURTHER THAN 4" PROVIDE A DETECTION BELOW PROTRUSION TO DELINEATE EDGE.

2. OPENINGS IN THE SIDEWALK SHALL NOT ALLOW THE PASSAGE OF A ½" DIAMETER SPHERE

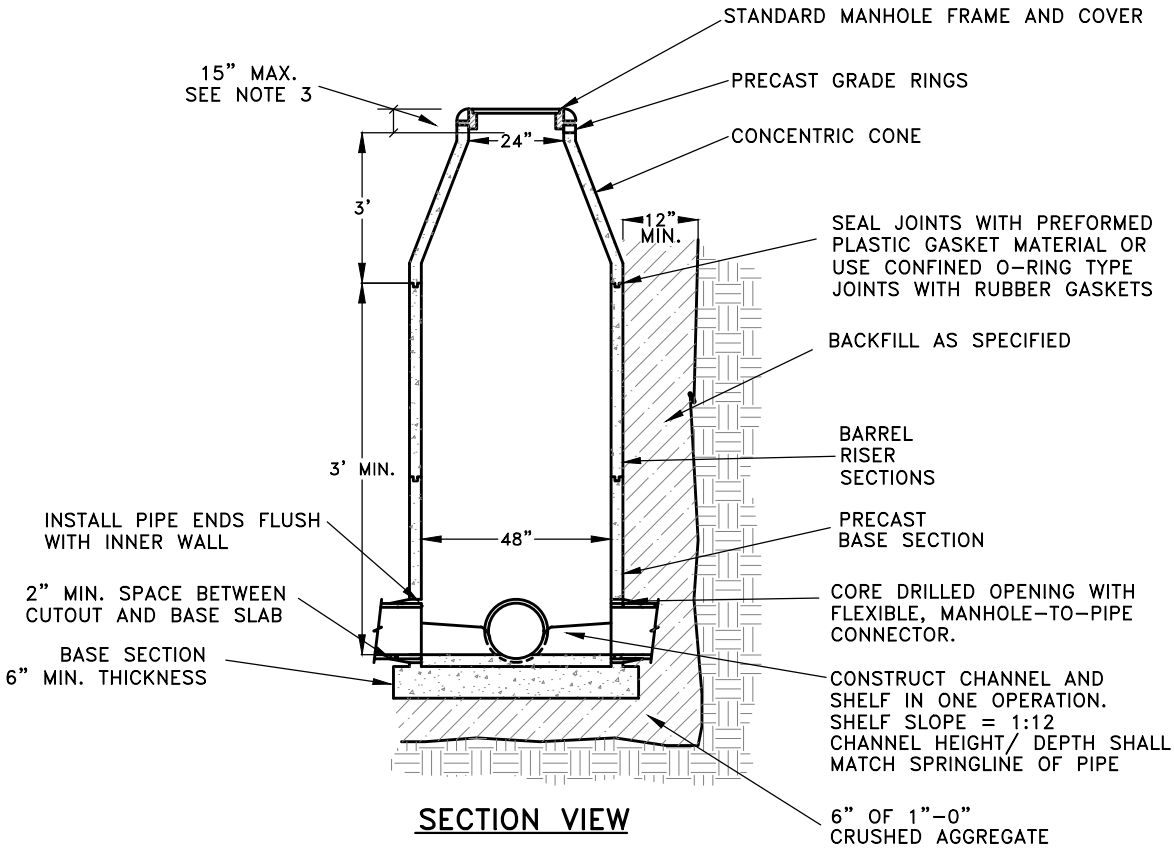
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

PEDESTRIAN ACCESS
CIRCULATION PATH

NO SCALE	JUNE 2023	NO. 320



PLAN VIEW



SECTION VIEW

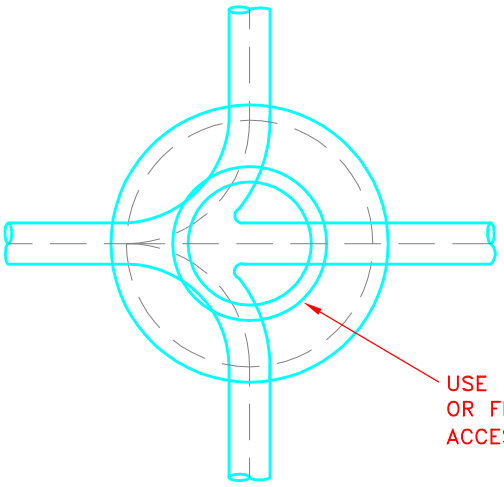
NOTES:

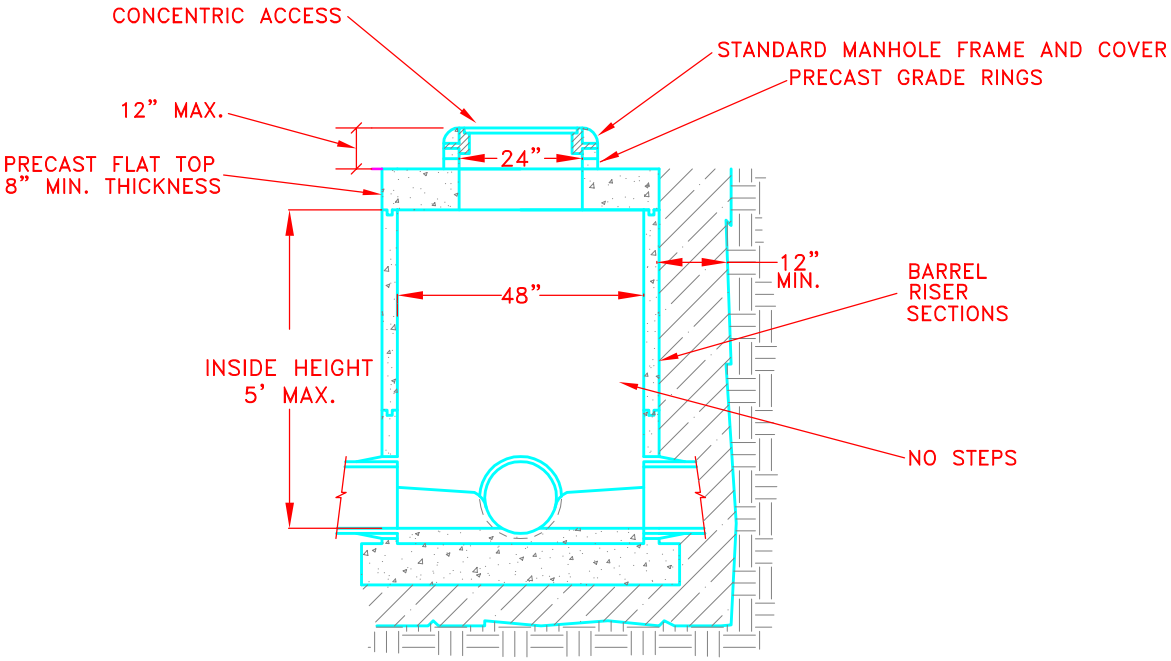
1. MANHOLE BASES, BARREL SECTIONS, CONCENTRIC CONES, AND GRADE RINGS SHALL BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE, CONFORMING TO ASTM C478.
2. 48" MANHOLE DETAILS ARE FOR PIPES 24" OR SMALLER. CONFIGURATION DETAILS FOR MANHOLES WITH LARGER PIPES WILL BE DETERMINED BY THE CITY ENGINEER.
3. MAXIMUM DISTANCE BETWEEN THE TOP OF THE CONE SECTION AND FINAL SURFACE GRADE SHALL NOT EXCEED 15".
4. PROVIDE FOR A PIPE JOINT WITHIN 24" OF THE MANHOLE WHEN INSTALLING RIGID PIPE.
5. NO INTERIOR GROUTING IS ALLOWED.
6. MINIMUM 6" CONCRETE AT INTERIOR OF MANHOLE REQUIRED BETWEEN PIPE OPENINGS AND/OR EDGES OF BARREL SECTIONS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD PRECAST MANHOLE

NO SCALE	FEBRUARY 2024	NO. 401





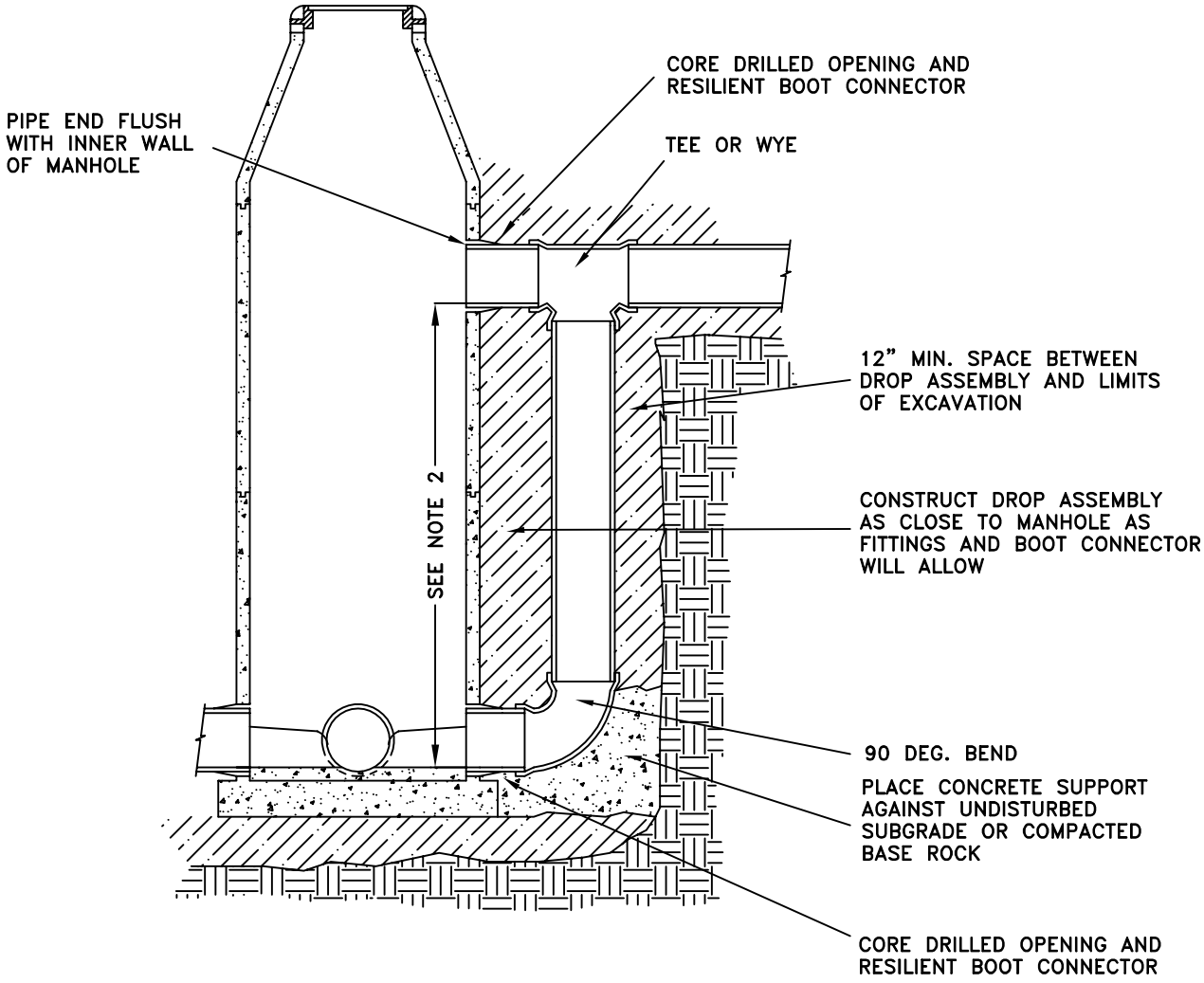
NOTES:

1. SEE DETAIL DWG. NO. 401 FOR ADDITIONAL REQUIREMENTS RELATIVE TO CONSTRUCTION OF PRECAST STANDARD AND FLAT–TOP MANHOLES.
2. FLAT–TOP MANHOLES SHALL BE CONSTRUCTED WHERE INSIDE HEIGHT IS LESS THAN 5'.
3. PRECAST CONCRETE SHORT CONES AND FLAT–TOPS SHALL BE PROVIDED WITH CONCENTRIC ACCESS WHERE INSIDE HEIGHT OF MANHOLE IS LESS THAN 5'.
4. NO INTERIOR GROUTING IS ALLOWED.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

SHALLOW PRECAST MANHOLE DETAIL

NO SCALE	JULY 2019	NO. 402



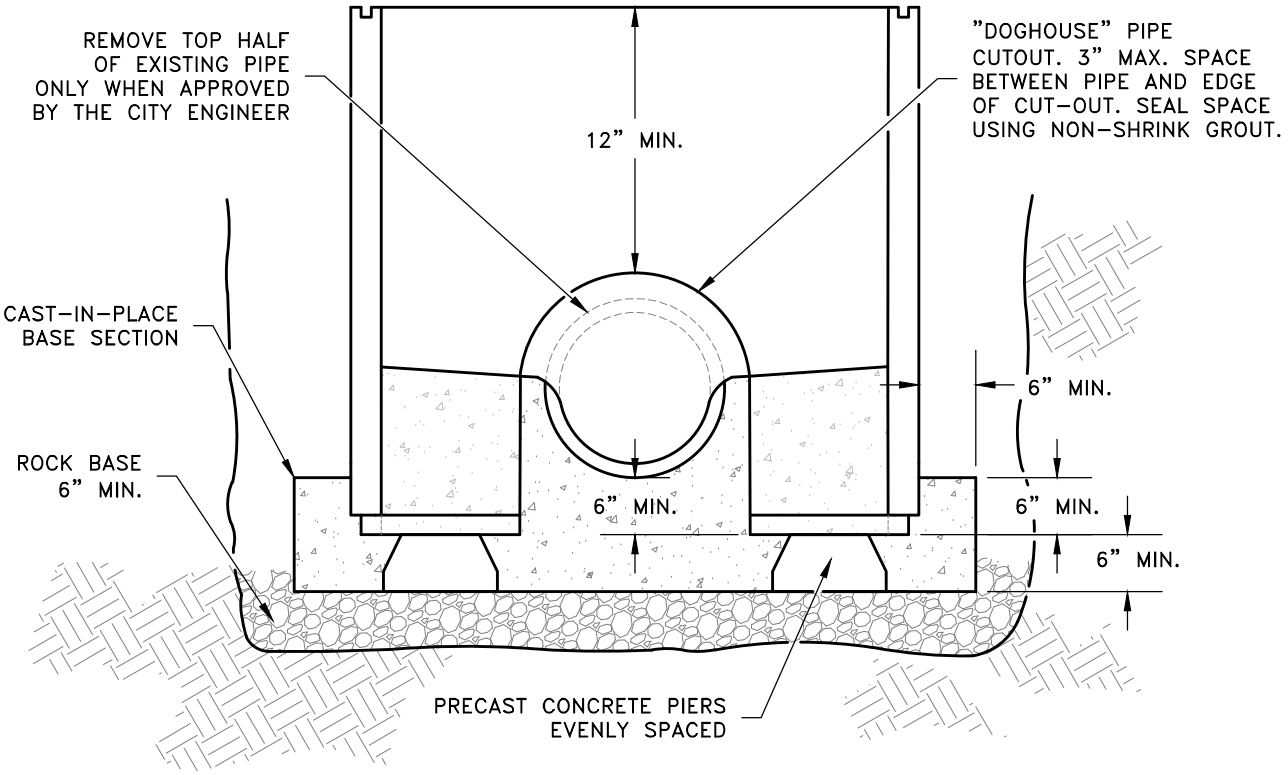
NOTES:

1. SEE DETAIL DWG. NOS. 401 AND 402 FOR ADDITIONAL REQUIREMENTS RELATIVE TO THE CONSTRUCTION OF PRECAST STANDARD AND FLAT-TOP MANHOLES.
2. DROP MANHOLES SHALL BE CONSTRUCTED WHERE THE DISTANCE BETWEEN PIPE INVERTS WILL EXCEED 24" IN SANITARY SEWER MANHOLES.
3. DROP ASSEMBLIES SHALL BE CONSTRUCTED OF MATERIALS APPROVED FOR USE IN SANITARY SEWER SYSTEMS.
4. DROP ASSEMBLIES SHALL BE CONSTRUCTED ON THE OUTSIDE OF THE MANHOLE AS SHOWN. INSIDE DROP ASSEMBLIES ARE NOT PERMITTED WITHOUT THE APPROVAL OF THE CITY ENGINEER.
5. NO INTERIOR GROUTING IS ALLOWED.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD DROP MANHOLE

NO SCALE	JULY 2019	NO. 403



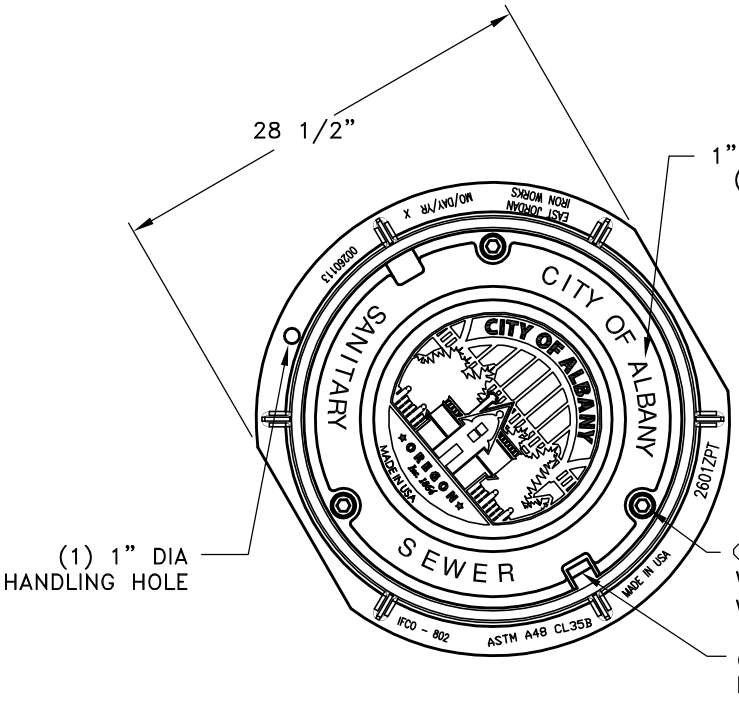
NOTES:

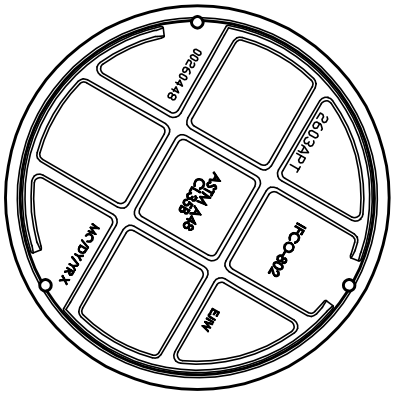
1. CONSTRUCTION OF CAST-IN-PLACE MANHOLE BASES IS NOT PERMITTED WITHOUT APPROVAL OF THE CITY ENGINEER.
2. SEE DETAIL DWG. NOS. 401, 402, & 403 FOR APPLICABLE REQUIREMENTS RELATIVE TO THE CONSTRUCTION OF STANDARD AND FLAT-TOP MANHOLES.
3. CONCRETE FOR CAST-IN-PLACE MANHOLE BASES SHALL HAVE A MIN. COMPRESSIVE STRENGTH OF 3000 PSI.
4. MANHOLE BASES SHALL NOT BE CONSTRUCTED WHERE THERE IS UNSTABLE SUBGRADE, STANDING OR FLOWING WATER IN THE EXCAVATION, OR ANY OTHER CONDITION THAT WILL ADVERSELY AFFECT THE INTEGRITY OF THE MANHOLE BASE.
5. THE PIPE AND BOTTOM BARREL SECTION SHALL BE SET AND SECURED IN FINAL POSITION PRIOR TO PLACING CONCRETE.
6. IF THE EXCAVATION EXCEEDS THE MINIMUM DIMENSIONS REQUIRED FOR CONSTRUCTION OF THE BASE, FORMS SHALL BE ERECTED SUFFICIENT TO CONFINE THE CONCRETE TO THE SPECIFIED DIMENSIONS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

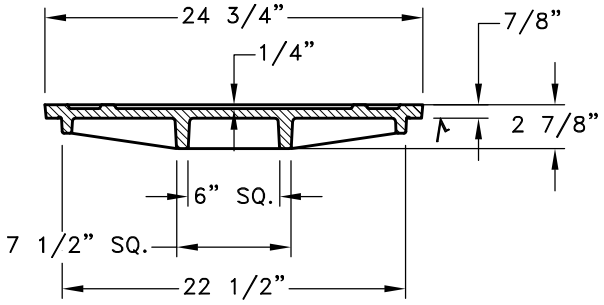
CAST-IN-PLACE MANHOLE BASE

NO SCALE	OCTOBER 2013	NO. 404



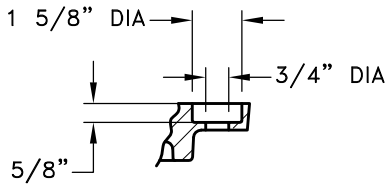


COVER BOTTOM

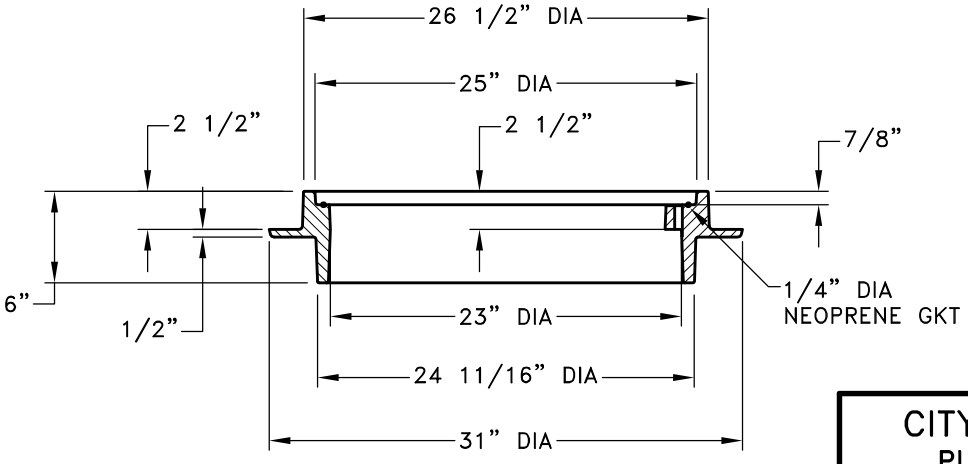


COVER SECTION

FRAME AND COVER ASSEMBLY SHALL BE MACHINED AS NECESSARY TO PREVENT MOVEMENT OF THE COVER WITHIN THE FRAME UNDER TRAFFIC LOADS.

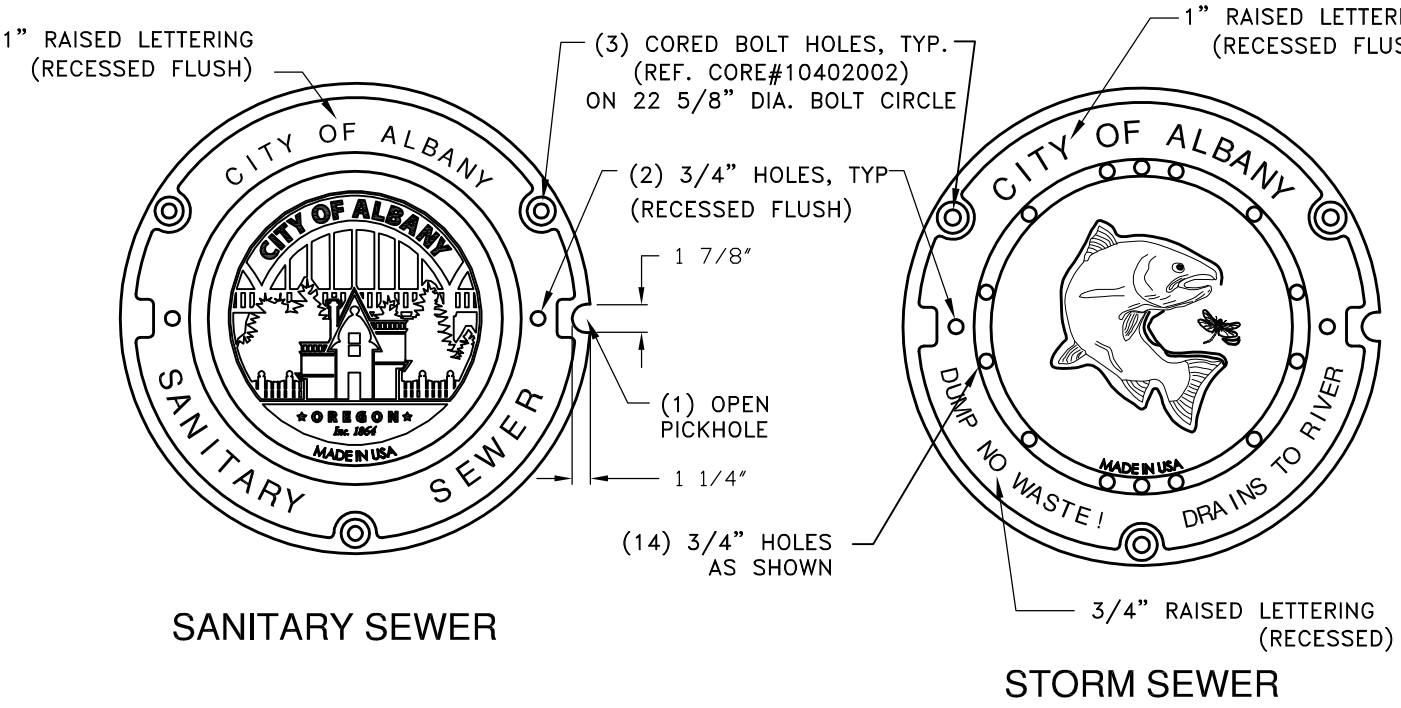


BOLT HOLE



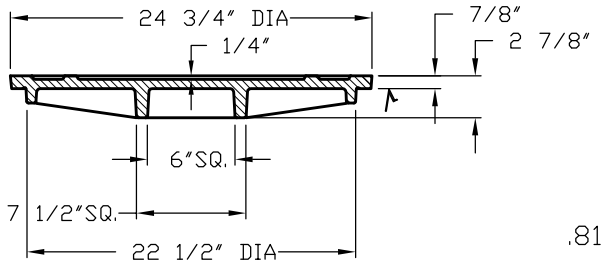
FRAME SECTION

CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
WATERTIGHT MANHOLE FRAME & COVER		
NO SCALE	JULY 2019	NO. 405

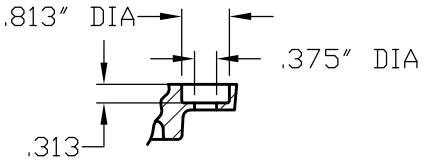


SANITARY SEWER

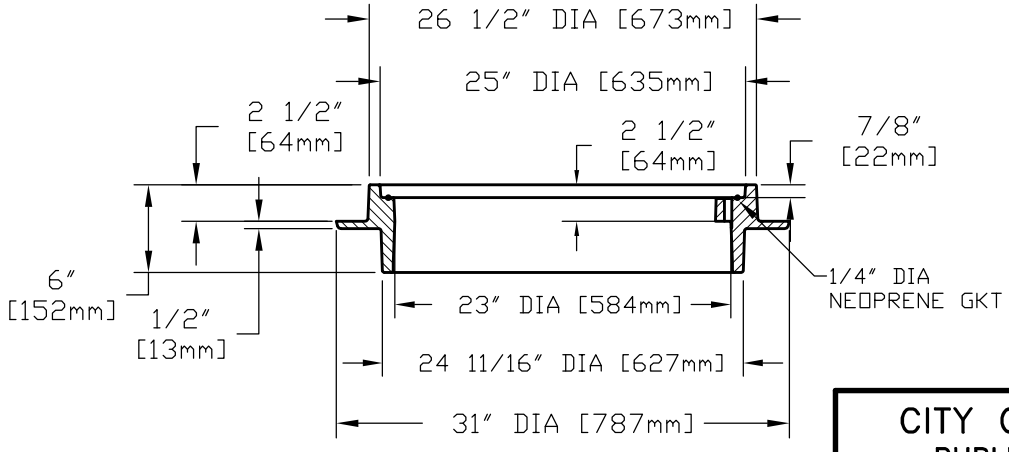
STORM SEWER



COVER SECTION



BOLT HOLE

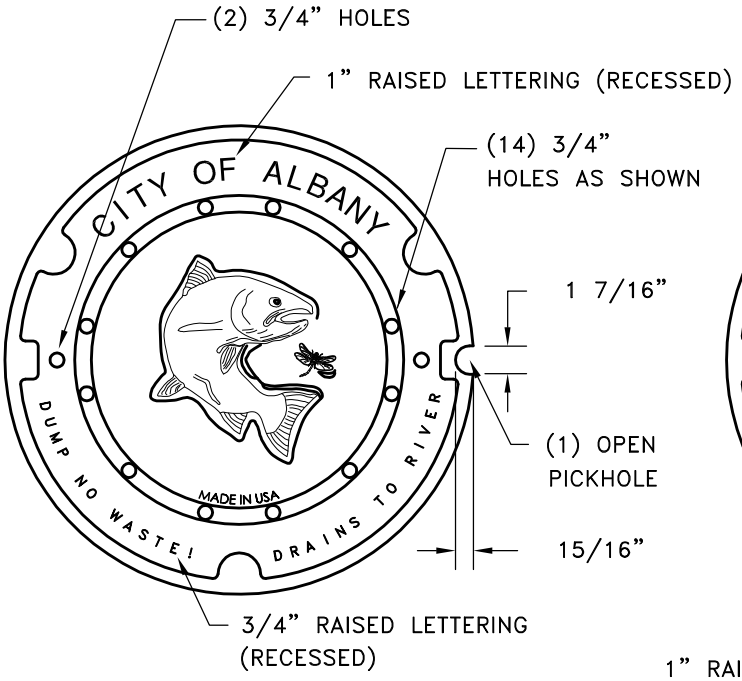


FRAME SECTION

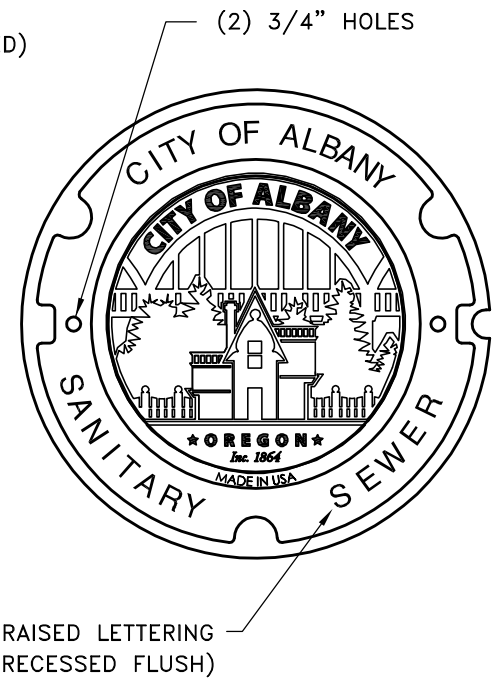
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TAMPERPROOF MANHOLE FRAME & COVER

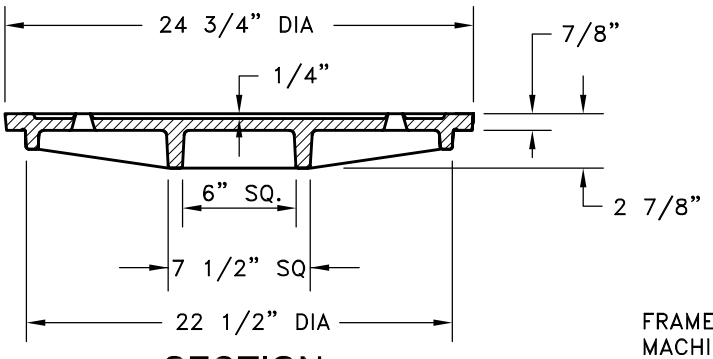
NO SCALE	JULY 2019	NO. 406



STORM SEWER

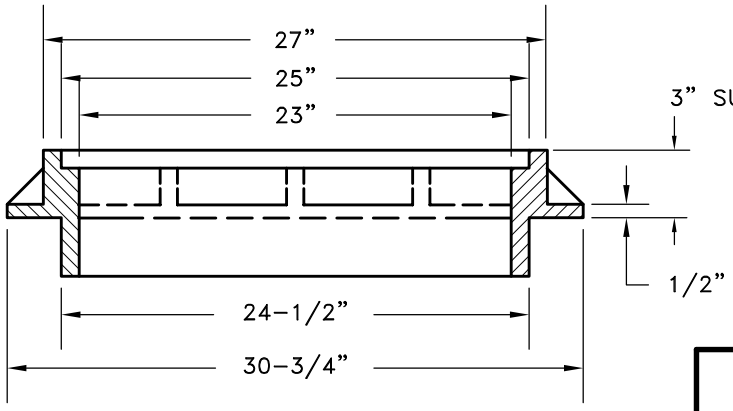


SANITARY SEWER



SECTION

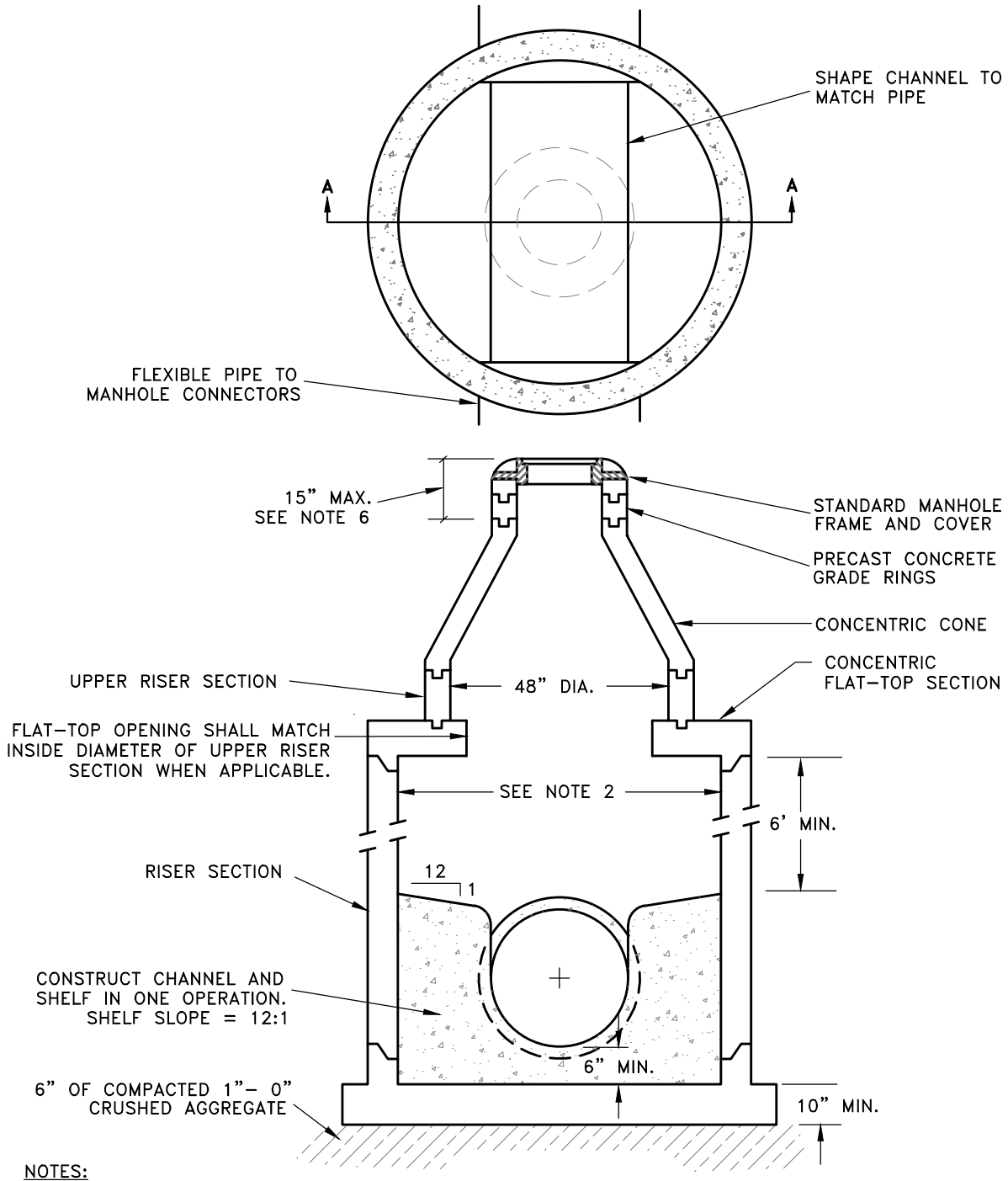
FRAME AND COVER ASSEMBLY SHALL BE MACHINED AS NECESSARY TO PREVENT MOVEMENT OF THE COVER WITHIN THE FRAME UNDER TRAFFIC LOADS.



CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD
MANHOLE FRAME & COVER

NO SCALE	JULY 2019	NO. 407



NOTES:

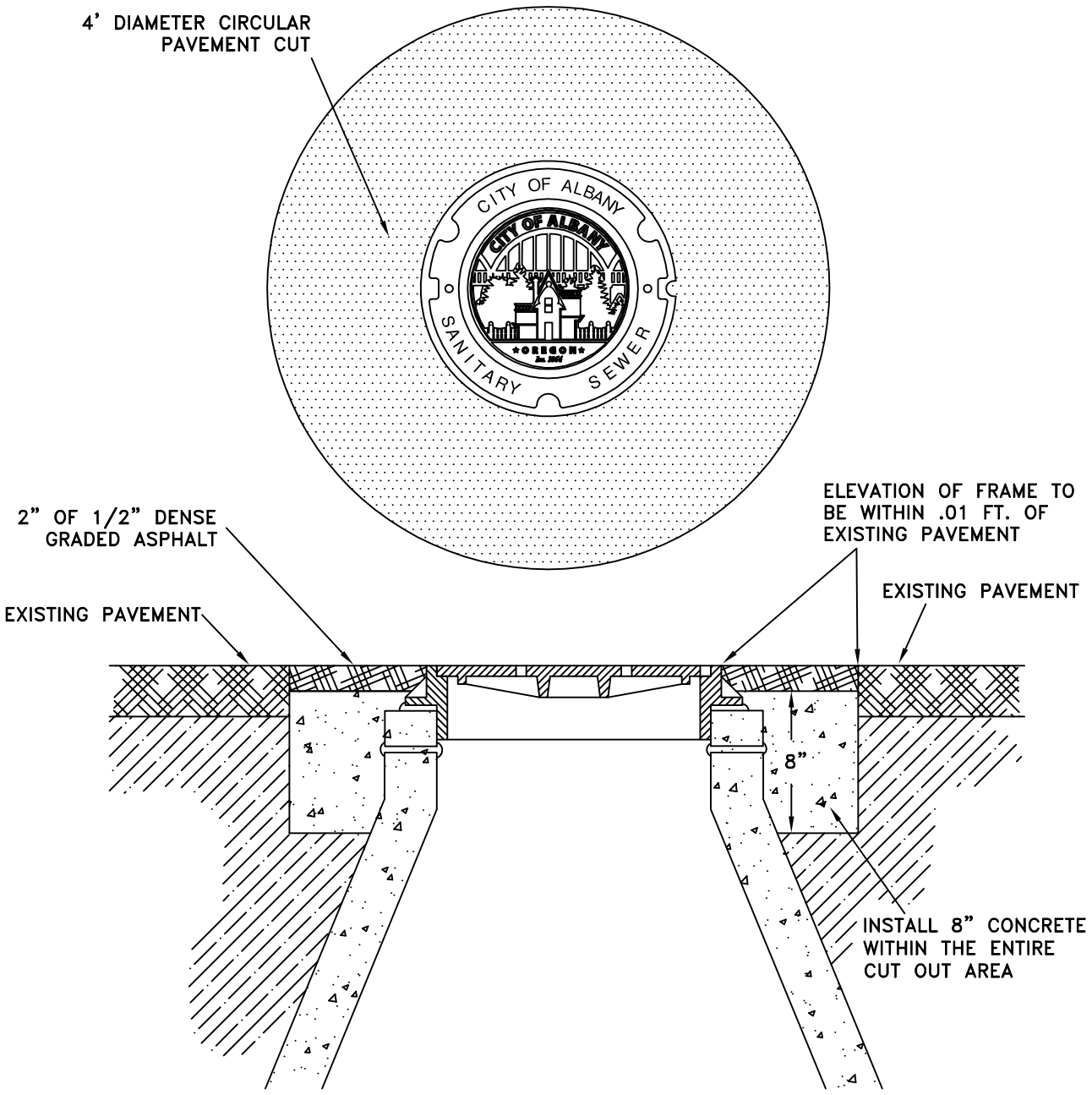
1. MANHOLE BASES, BARREL SECTIONS, CONES, AND GRADE RINGS SHALL BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE CONFORMING TO ASTM C478.
2. MINIMUM DIAMETER OF THE BASE SECTION SHALL BE 60 INCHES, OR THE LARGEST PIPE DIAMETER + 24 INCHES, WHICHEVER IS GREATER.
3. MANHOLE COMPONENTS SHALL BE SUPPLIED WITH NO LADDER ASSEMBLIES.
4. PIPE OPENINGS SHALL BE CORE DRILLED OR BLOCKED OUT (CIRCULAR OPENINGS ONLY) AT THE TIME OF MANUFACTURE.
5. PIPE CONNECTIONS SHALL BE MADE WITH MANUFACTURED, FLEXIBLE, WATERTIGHT CONNECTORS.
6. MAXIMUM DISTANCE BETWEEN THE TOP OF THE CONE SECTION AND FINAL SURFACE GRADE SHALL NOT EXCEED 15".

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

LARGE DIAMETER PRECAST MANHOLE

FOR PIPE LARGER THAN 24" DIAMETER

NO SCALE	FEBRUARY 2024	NO. 408



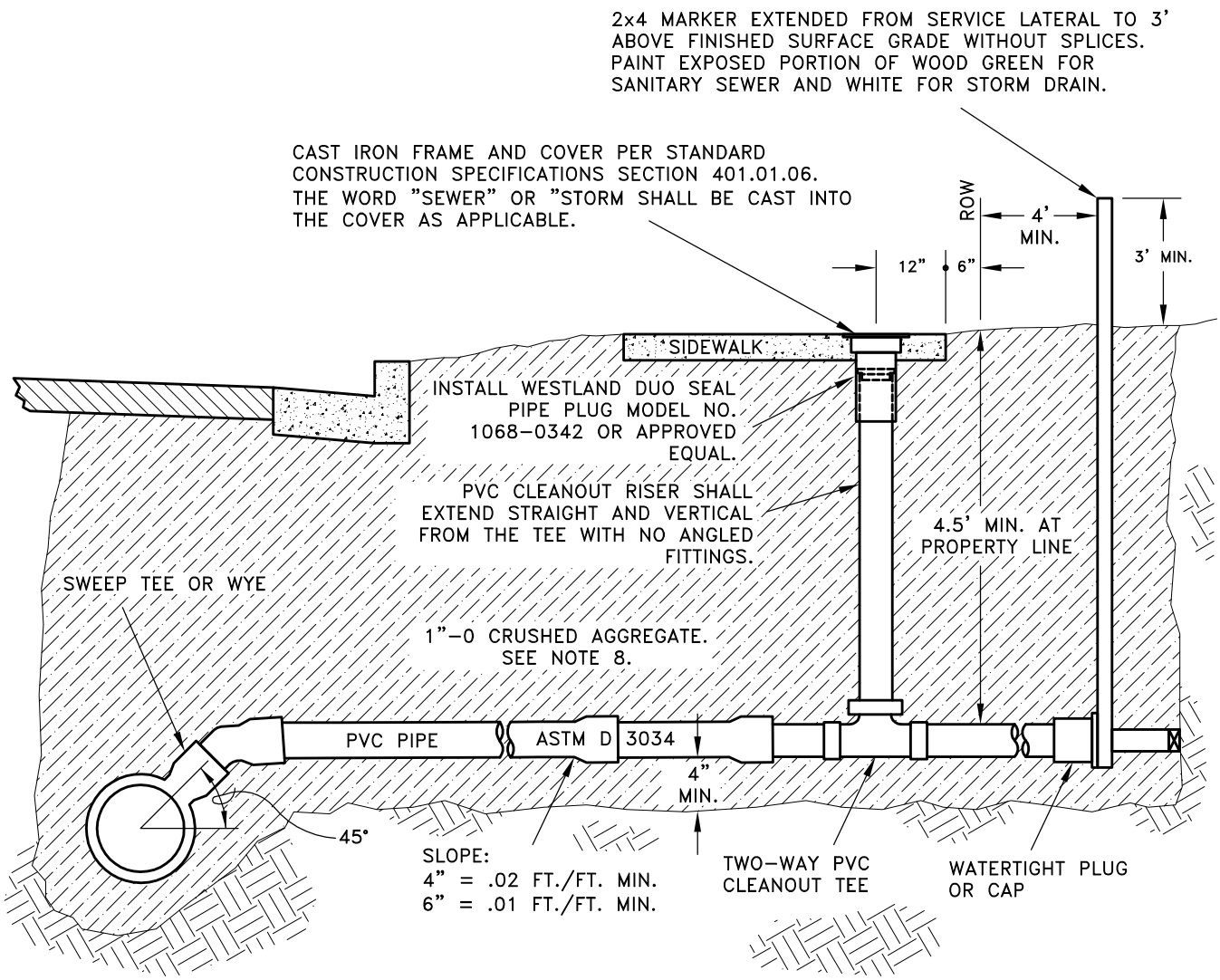
NOTES:

1. POST-CONSTRUCTION MANHOLE FRAME AND COVER ADJUSTMENT WILL ONLY BE ALLOWED WHEN APPROVED BY THE CITY ENGINEER.
2. FINISH ELEVATION OF MANHOLE FRAME AND COVER ASSEMBLIES SHALL BE WITHIN .01 FT. OF THE ADJACENT STREET FINISH GRADE. IF THE DIFFERENCE IN ELEVATION EXCEEDS .01 FT., THE MANHOLE FRAME AND COVER ASSEMBLY SHALL BE ADJUSTED AS SPECIFIED HEREIN.
3. A 4' DIAMETER CIRCLE OF ASPHALT SHALL BE REMOVED AND THE ENTIRE AREA EXCAVATED TO A DEPTH OF 10" BELOW FINISH GRADE OF THE STREET. CONCRETE SHALL BE PLACED TO A DEPTH OF 8" WITHIN THE ENTIRE CUT OUT AREA. THE CONCRETE SHALL BE COVERED WITH 1/2" DENSE ASPHALT WITH A MINIMUM DEPTH OF 2 INCHES.
4. MAXIMUM DISTANCE BETWEEN THE TOP OF THE CONE SECTION AND FINAL SURFACE GRADE SHALL NOT EXCEED 15".
5. NO INTERIOR GROUTING IS ALLOWED.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

POST-CONSTRUCTION MANHOLE FRAME AND COVER ADJUSTMENT

NO SCALE	JULY 2019	NO. 409



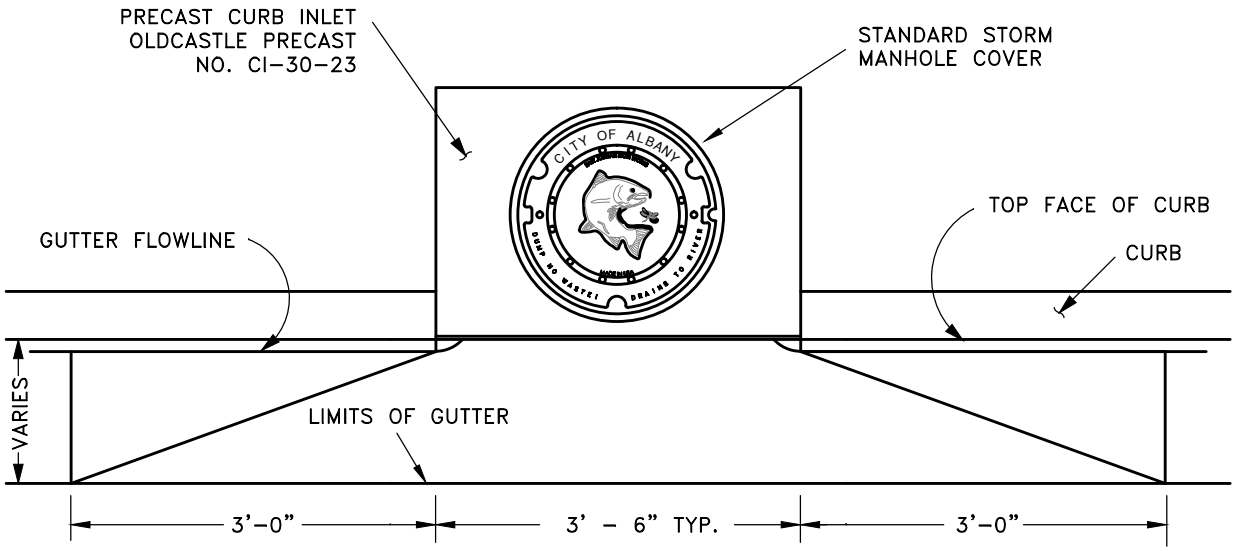
NOTES:

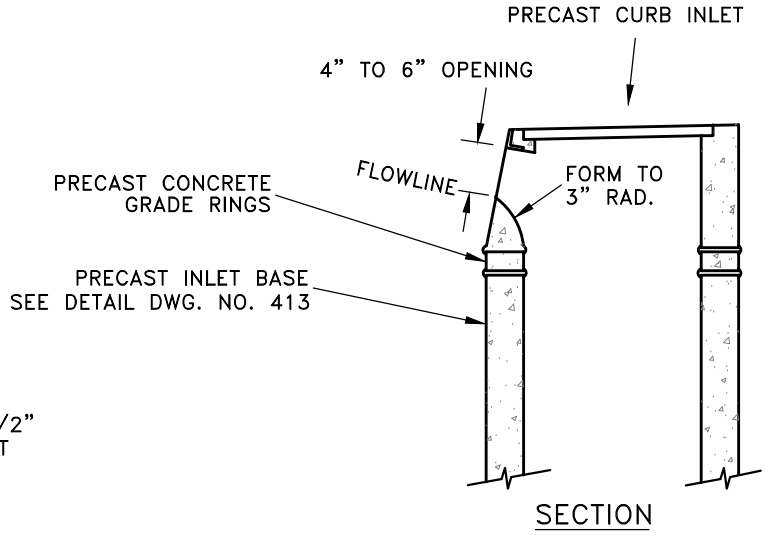
1. SWEEP TEES AND WYES SHALL BE SHALL BE USED IN NEW CONSTRUCTION AND FOR CUT-IN TAPS TO EXISTING PIPES.
2. CONNECTIONS TO EXISTING SANITARY SEWER AND STORM DRAIN PIPES SHALL BE MADE WITH APPROVED MECHANICAL TAPS OR CUT-IN SWEEP TEES AND WYES THAT ARE COMPATIBLE WITH THE SIZE AND TYPE OF PIPE BEING TAPPED. THE ENGINEER WILL DETERMINE THE APPROPRIATE TYPE OF TAP TO BE USED FOR A GIVEN APPLICATION.
3. EXISTING PIPE SHALL BE SAWCUT OR CORE DRILLED DEPENDING UPON THE TYPE OF TAP APPROVED FOR THE APPLICATION.
4. MECHANICAL TAPS SHALL BE STYLE "CB" SEWER SADDLES AS MANUFACTURED BY ROMAC INDUSTRIES, INC. OR APPROVED EQUAL.
5. CUT-IN TEE INSTALLATIONS SHALL UTILIZE PVC SWEEP TEES, OR WYES, PVC SPOOLS, AND FERNCO BRAND FLEXIBLE COUPLERS OR APPROVED EQUAL. FLEXIBLE COUPLERS SHALL NOT BE USED ON PVC PIPE. PVC PIPES SHALL BE JOINED BY GASKETED, SOLID-SLEEVE COUPLERS.
6. CLEANOUT FRAME AND COVER ASSEMBLIES SHALL BE INSTALLED IN CONCRETE SIDEWALKS. FRAME AND COVER ASSEMBLIES SHALL BE INSTALLED NOT LESS THAN 6" FROM THE EDGE OF THE SIDEWALK. IN LOCATIONS WHERE SIDEWALK WILL NOT BE CONSTRUCTED, LOCATE THE FRAME AND COVER ASSEMBLY AS CLOSE TO THE PROPERTY LINE AS APPLICABLE.
7. INSTALL CLEANOUT RISER 4" TO 8" BELOW FINISHED GRADE.
8. THE ENTIRE EXTENTS OF THE EXCAVATED TRENCH SHALL BE BACKFILLED WITH 1"-0 CRUSHED AGGREGATE TO FINISHED GRADE.
9. SANITARY SEWER SERVICE LATERALS SHALL NOT BE CONNECTED TO MANHOLES.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

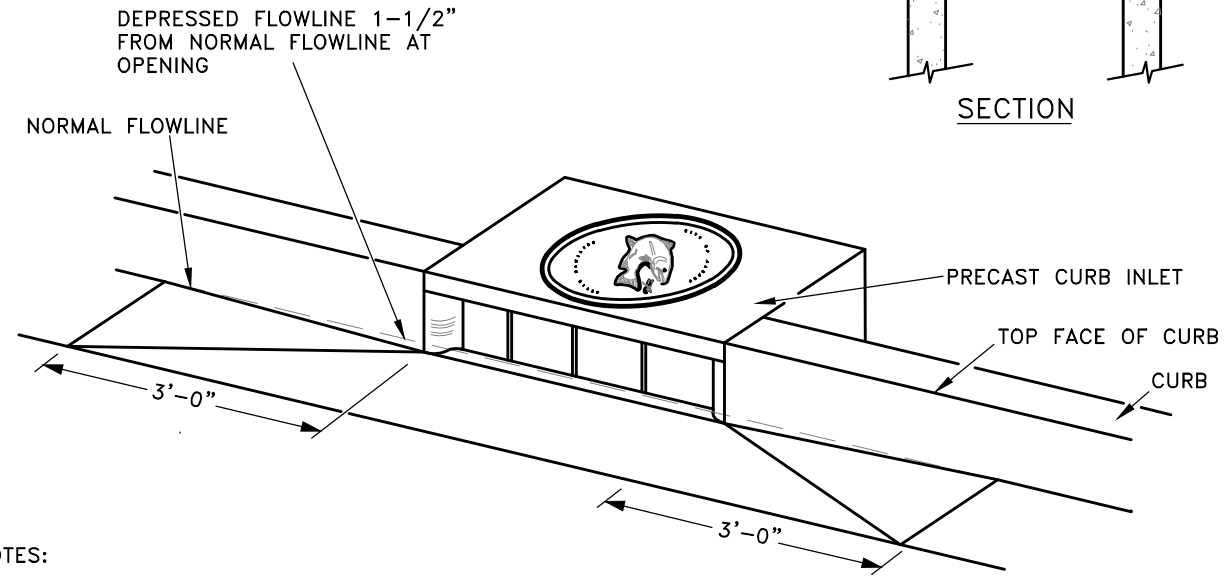
4" AND 6" SANITARY SEWER AND STORM DRAIN SERVICE CONNECTION DETAIL

NO SCALE	JANUARY 2015	NO. 411





SECTION



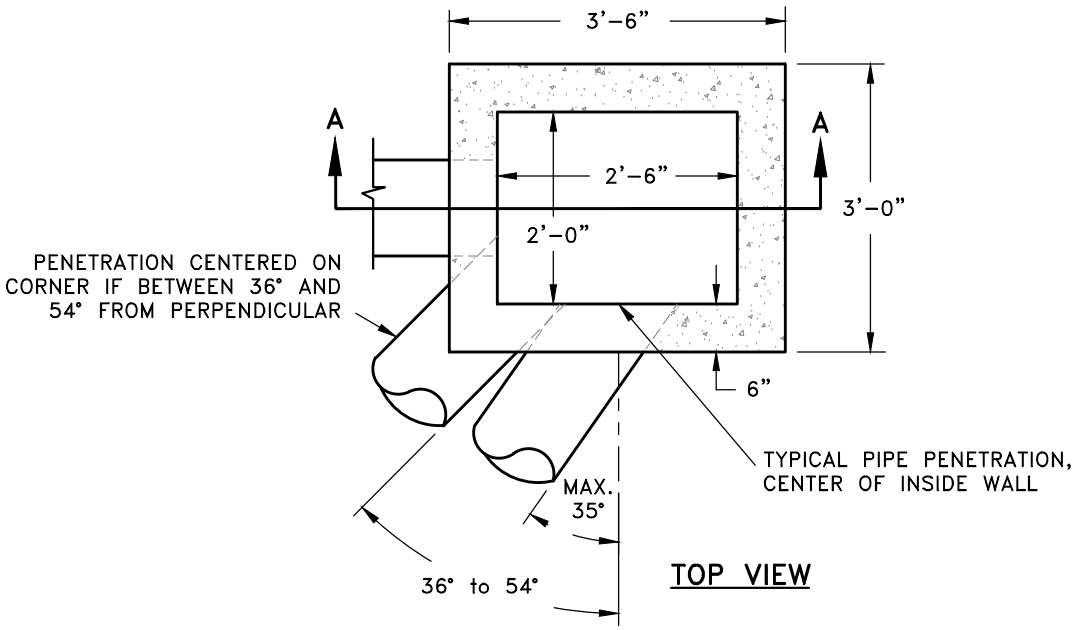
NOTES:

1. PRECAST CONCRETE INLET STRUCTURES SHALL CONFORM TO SECTION 402.01.05 OF THE STANDARD CONSTRUCTION SPECIFICATIONS.
2. MASONRY, CINDER BLOCKS, OR SIMILAR MATERIALS MAY BE USED TO ADJUST THE CURB INLET TO GRADE PRIOR TO GROUTING. WOOD OR OTHER NON-DURABLE MATERIALS SHALL NOT BE USED FOR THIS PURPOSE.
3. GROUTING SHALL BE SMOOTH AND FREE OF DEFECTS, AND SHALL BE SUFFICIENT TO PREVENT LEAKS BETWEEN THE PRECAST COMPONENTS OF THE COMPLETED STRUCTURE.

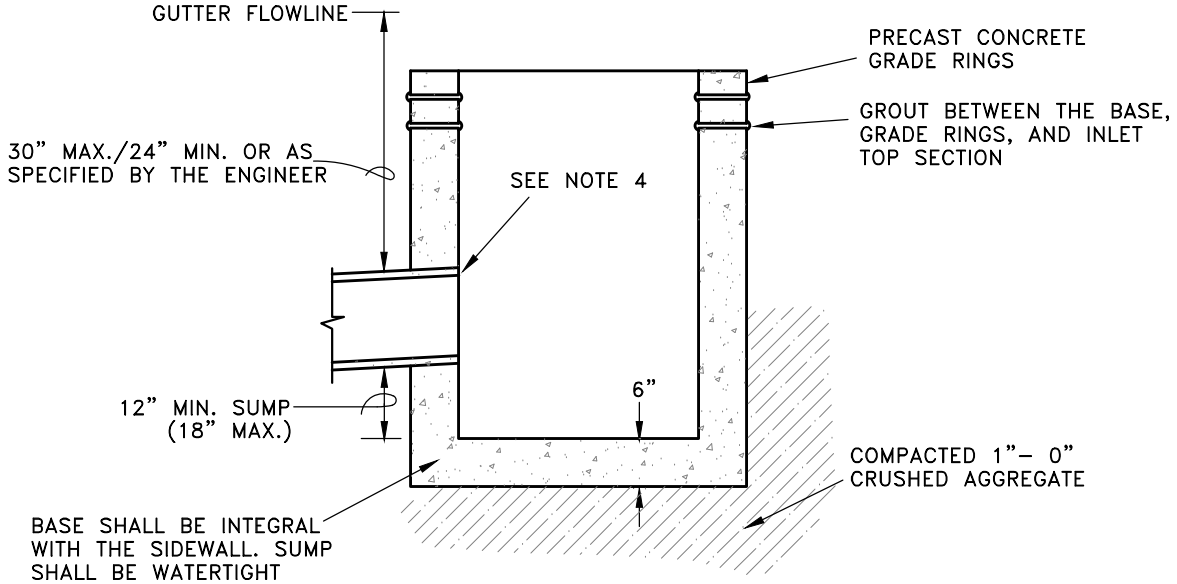
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD PRECAST CONCRETE CURB INLET

NO SCALE	OCTOBER 2013	NO. 412



TOP VIEW



SECTION A–A

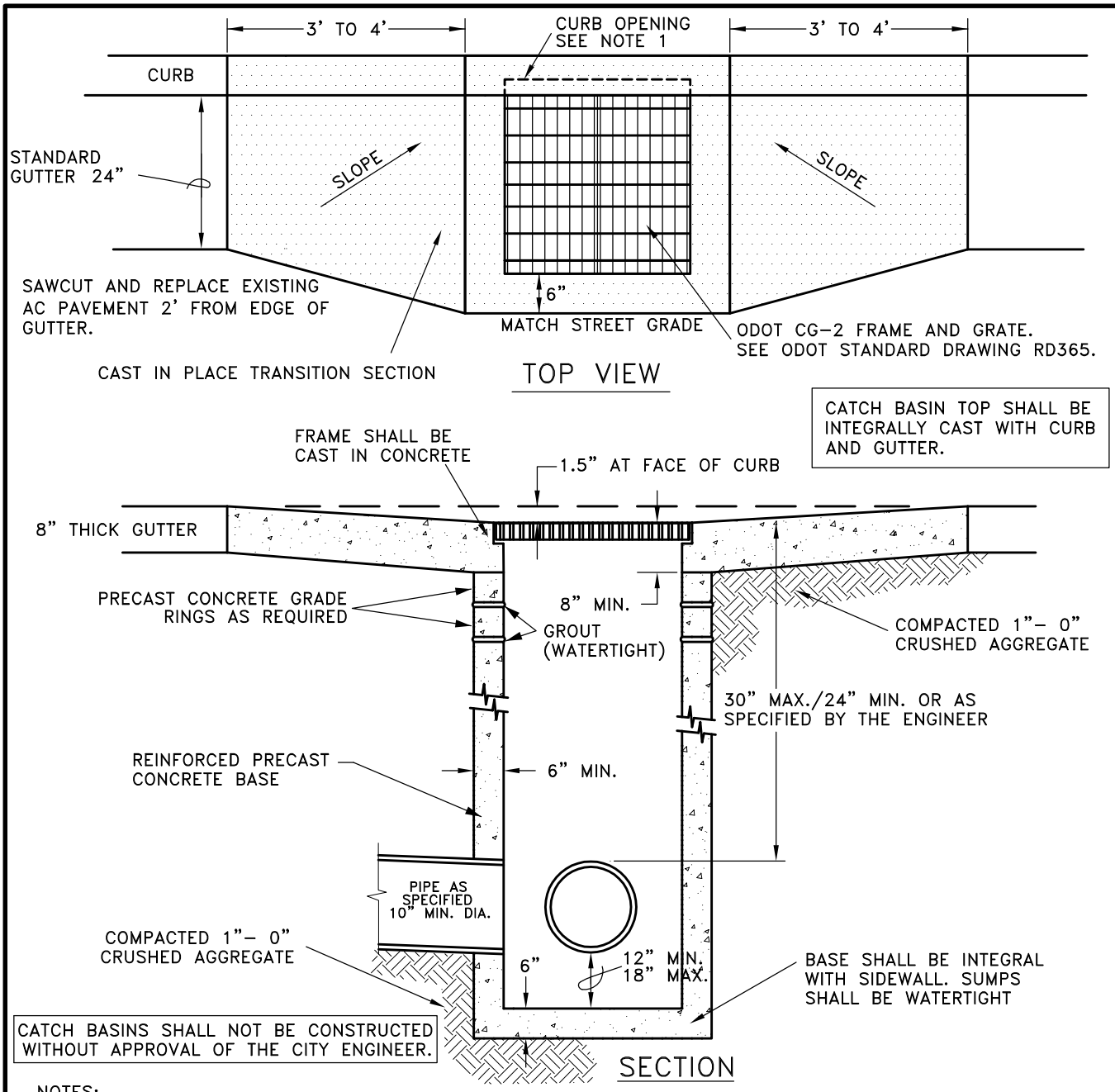
NOTES:

1. STANDARD CURB INLET BASES SHALL BE PRECAST OR CAST–IN–PLACE CONFORMING TO THE REQUIREMENTS OF SECTION 402.01.05 "STORM DRAIN INLETS AND CATCH BASINS" AND SECTION 402.02.03 "CONSTRUCTION OF INLETS AND CATCH BASINS" OF THE CITY OF ALBANY STANDARD CONSTRUCTION SPECIFICATIONS.
2. WHERE CAST–IN–PLACE BASES ARE USED, CONCRETE SHALL EXTEND FROM THE FORM TO THE EXTENTS OF THE EXCAVATION, SUCH THAT NO BACKFILL OF ANY OTHER MATERIAL MAY BE USED. WALL THICKNESSES FOR BASES SHALL BE 6" THICK AT A MINIMUM. THE SIDES AND BOTTOM OF THE STRUCTURE SHALL BE FORMED IN A SINGLE, CONTINUOUS OPERATION.
3. WHERE PRECAST BASES ARE USED, EXCAVATION SHALL EXTEND A MINIMUM OF ONE FOOT BEYOND THE EXTERIOR DIMENSIONS OF THE BASE TO ALLOW COMPACTION OF BACKFILL MATERIALS. ALL BACKFILL SHALL BE 1"–0" CRUSHED AGGREGATE COMPACTED TO 93% BY MODIFIED PROCTOR TEST METHOD ASTM D1557.
4. MINIMUM PIPE DIAMETER SHALL BE 10".
5. PIPE ENDS SHALL BE FLUSH WITH THE INNER WALL.
6. PIPE OPENINGS IN PRECAST BASE SECTIONS SHALL BE CORE DRILLED. IN CAST–IN–PLACE STRUCTURES, INCLUDING SLIP–FORMED, THE PIPE SHALL BE SET IN THE CORRECT POSITION PRIOR TO PLACING CONCRETE.
7. STANDARD INLET BASES SHALL NOT BE CONSTRUCTED OVER STORM DRAIN MAIN LINES.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD CURB INLET BASE

NO SCALE	OCTOBER 2013	NO. 413



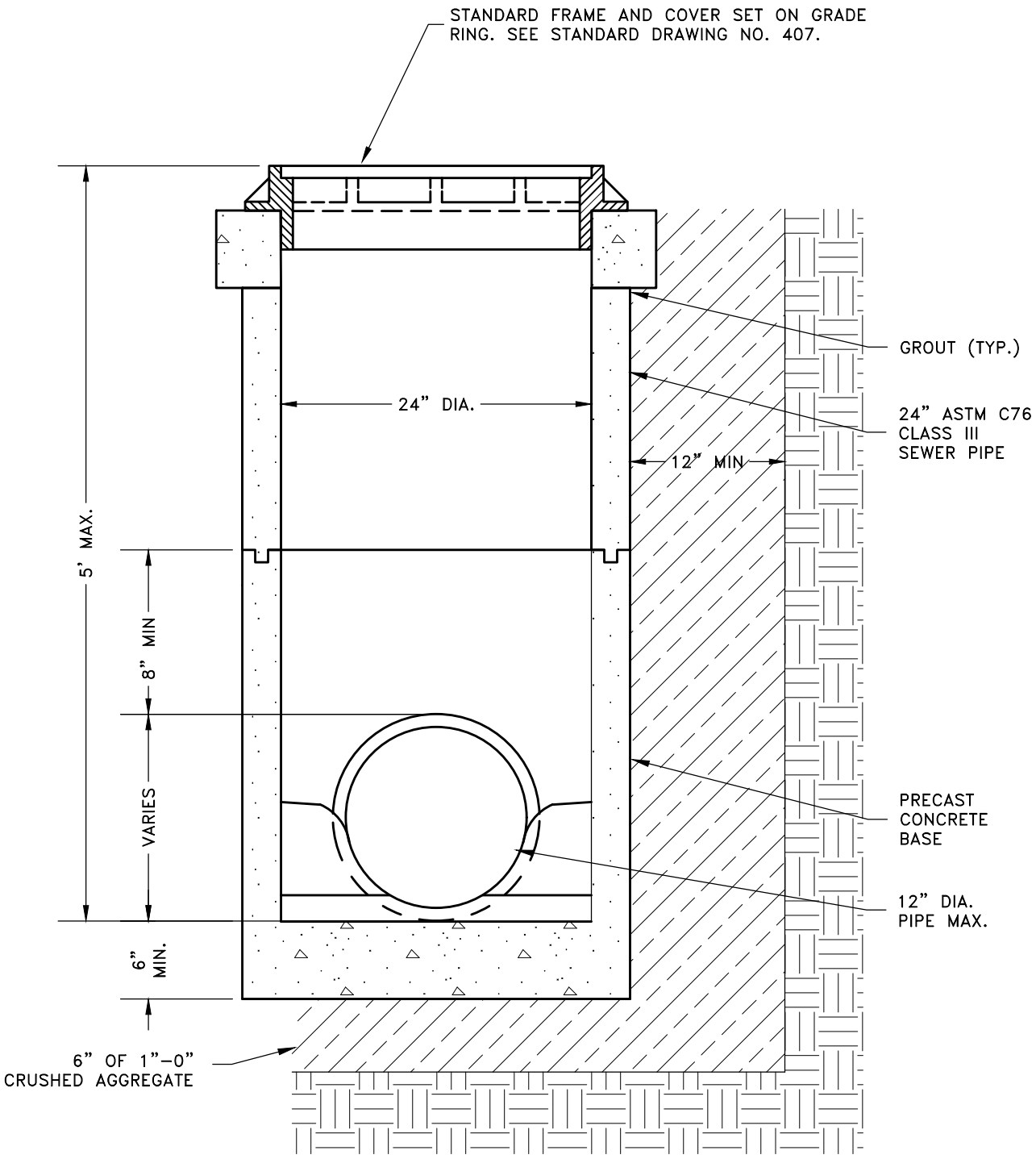
NOTES:

1. CATCH BASIN IS SIMILAR TO ODOT CG-2 INLET. SEE ODOT STANDARD DRAWING RD366 FOR ADDITIONAL DETAILS.
2. CATCH BASIN BASES SHALL BE PRECAST OR CAST-IN-PLACE CONFORMING TO THE REQUIREMENTS OF SECTION 402.01.05 "STORM DRAIN INLETS AND CATCH BASINS" AND SECTION 402.02.03 "CONSTRUCTION OF INLETS AND CATCH BASINS" OF THE CITY OF ALBANY STANDARD CONSTRUCTION SPECIFICATIONS.
3. WHERE CAST-IN-PLACE BASES ARE USED, CONCRETE SHALL EXTEND FROM THE FORM TO THE EXTENTS OF THE EXCAVATION, SUCH THAT NO BACKFILL OF ANY OTHER MATERIAL MAY BE USED. WALL THICKNESSES FOR BASES SHALL BE 6" MINIMUM. THE SIDES AND BOTTOM OF THE STRUCTURE SHALL BE FORMED IN A SINGLE, CONTINUOUS OPERATION.
4. WHERE PRECAST BASES ARE USED, EXCAVATION SHALL EXTEND A MINIMUM OF ONE FOOT BEYOND THE EXTERIOR DIMENSIONS OF THE BASE TO ALLOW COMPACTION OF BACKFILL MATERIALS. ALL BACKFILL SHALL BE 1"-0" CRUSHED AGGREGATE COMPACTED TO 93% BY MODIFIED PROCTOR TEST METHOD ASTM D1557.
5. MINIMUM PIPE DIAMETER SHALL BE 10".
6. PIPE ENDS SHALL BE FLUSH WITH THE INNER WALL.
7. PIPE OPENINGS IN PRECAST BASE SECTIONS SHALL BE CORE DRILLED. IN CAST-IN-PLACE STRUCTURES, INCLUDING SLIP-FORMED, THE PIPE SHALL BE SET AT FINAL LINE AND GRADE PRIOR TO PLACING CONCRETE.
8. CATCH BASINS SHALL NOT BE CONSTRUCTED OVER STORM DRAIN MAIN LINES OR LOCATED WITHIN DRIVEWAY AND PEDESTRIAN ACCESS RAMPS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CATCH BASIN

NO SCALE	JANUARY 2015	NO. 414



NOTES

1. THE ENTIRE EXTENTS OF THE EXCAVATED TRENCH SHALL BE BACKFILLED WITH 1"-0 CRUSHED AGGREGATE TO FINISHED GRADE. SEE STANDARD DRAWING NO. 205.
2. BASE SHALL BE PRECAST CONCRETE CONFORMING TO THE REQUIREMENTS OF ASTM C478.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

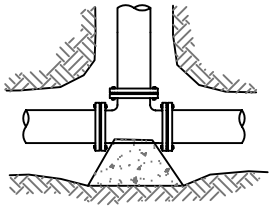
STANDARD SANITARY SEWER/ STORMDRAIN MAINLINE 24" MINI-MANHOLE CLEANOUT DETAIL

NO SCALE	FEBRUARY 2024	NO. 416

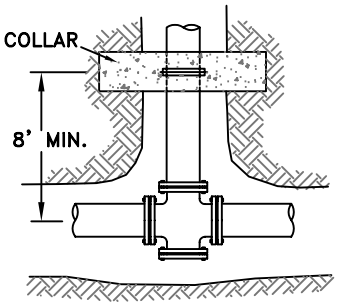
TABLE A – THRUST COLLAR DIMENSIONS			
PIPE SIZE	H	W	L
12" AND UNDER	1'–6"	2'	1'–6"
16"	2'	2'	2'–6"
20"	2'–6"	2'	2'–9"
24"	3'	2'	3'

NOTE:
TABLE VALUES ARE BASED ON 200 PSI WATER PRESSURE AND 2000 PSF SOIL BEARING CAPACITY.

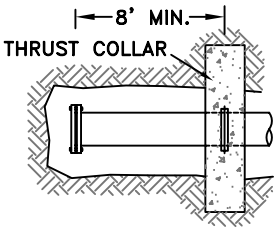
TABLE B – BEARING AREA IN SQ. FT.					
FITTING SIZE	TEE AND HYDRANT	90° BEND	45° BEND	22–1/2° BEND	11–1/4° BEND
4	1.3	1.8	1.0		
6	2.8	4.0	2.2	1.1	
8	5.0	7.1	3.8	2.0	1.0
10	7.9	11.1	6.0	3.1	1.5
12	11.3	16.0	8.7	4.4	2.2
16	20.1	28.4	15.4	7.8	3.9
20	31.4	44.4	24.0	12.3	6.2
24	45.2	64.0	34.6	17.7	8.9



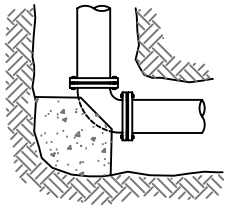
TEE
SEE TABLE B



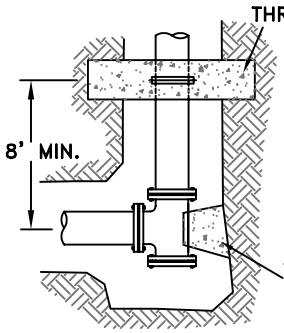
CROSS
SEE TABLE A



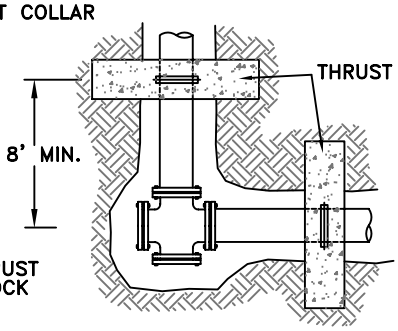
DEAD END MAIN
AND BLOWOFF ASSY.
SEE TABLE A



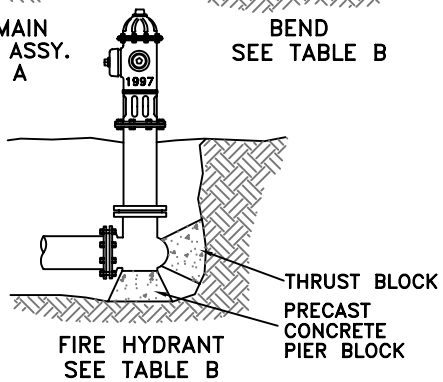
BEND
SEE TABLE B



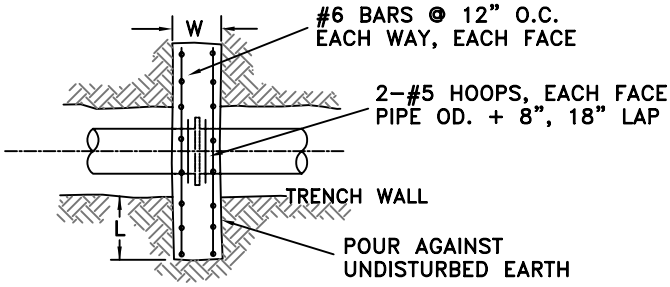
TEE
SEE TABLE A & B



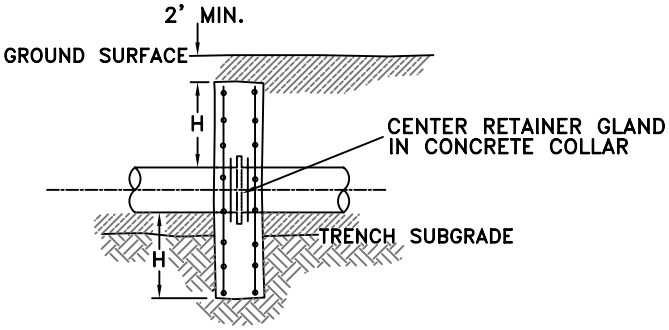
CROSS
SEE TABLE A



FIRE HYDRANT
SEE TABLE B



THRUST COLLAR
PLAN VIEW
SEE TABLE A



THRUST COLLAR
PROFILE VIEW
SEE TABLE A

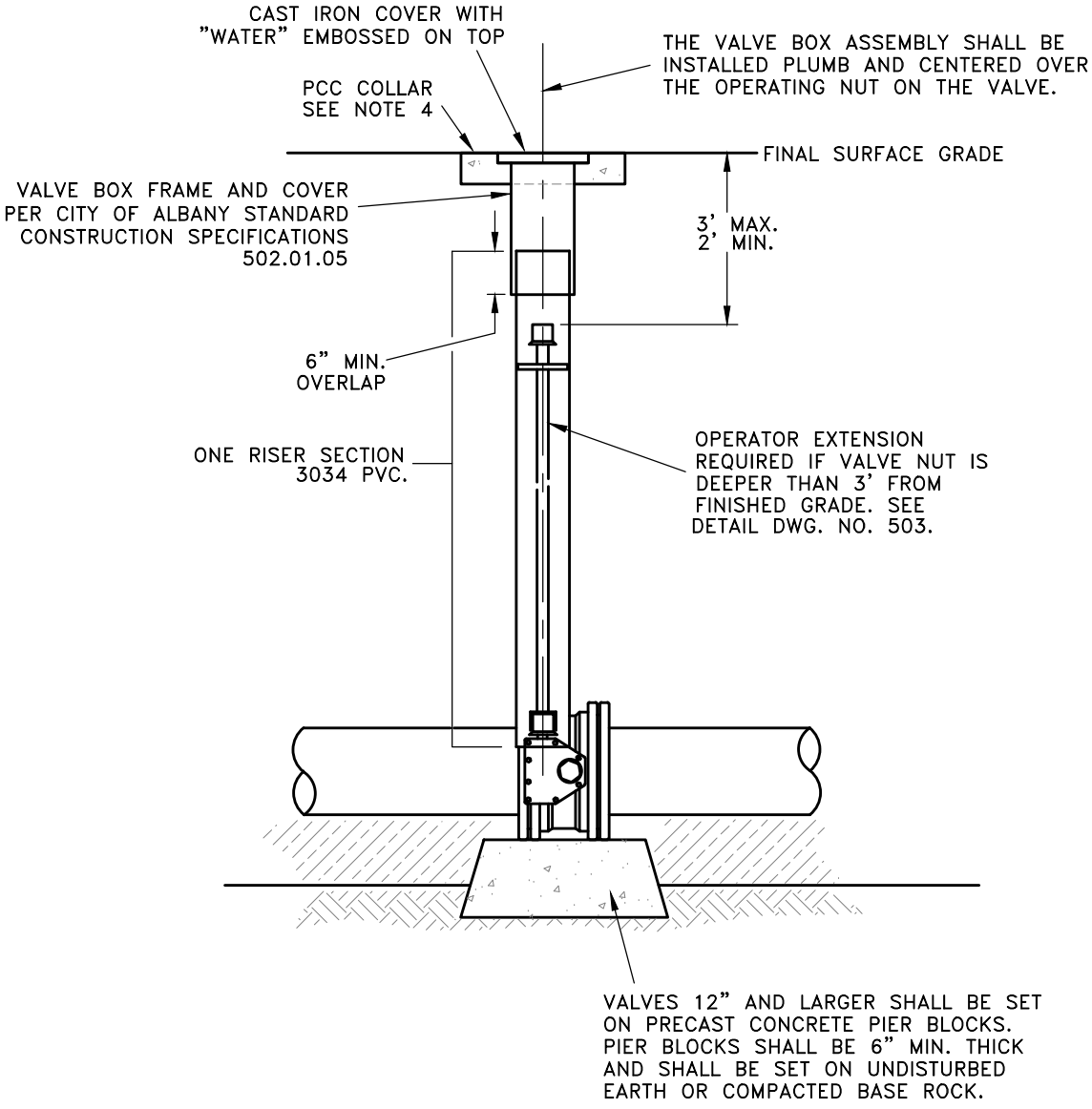
NOTES:

1. WATER PIPE AND FITTINGS SHALL BE MECHANICALLY OR INTERNALLY RESTRAINED WHERE POSSIBLE IN LIEU OF CONVENTIONAL CONCRETE BLOCKING. DETAILS RELATIVE TO MATERIALS AND LENGTH OF PIPE RUNS TO BE RESTRAINED WILL BE DETERMINED BY THE CITY ENGINEER. THE USE OF CONCRETE BLOCKING WILL BE LIMITED TO CERTAIN APPLICATIONS AND WILL REQUIRE APPROVAL OF THE CITY ENGINEER.
2. WHERE APPROVED, CONCRETE BLOCKING SHALL BE CONSTRUCTED AS SHOWN IN THESE DETAIL. DRAWINGS.
3. CONCRETE GRAVITY BLOCKING IS NOT PERMITTED UNDER ANY CIRCUMSTANCES.
4. THE USE OF TIE–BACK RODS WILL REQUIRE APPROVAL OF THE CITY ENGINEER. WHERE APPROVED, TIE–BACK ROD ASSEMBLIES SHALL BE 5/8 INCH MIN. DIA. GALVANIZED STEEL.
5. ALL JOINTS BETWEEN THRUST COLLARS AND FITTING ASSEMBLIES SHALL BE MECHANICALLY RESTRAINED.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD BLOCKING DETAILS

NO SCALE	FEBRUARY 2000	NO. 501



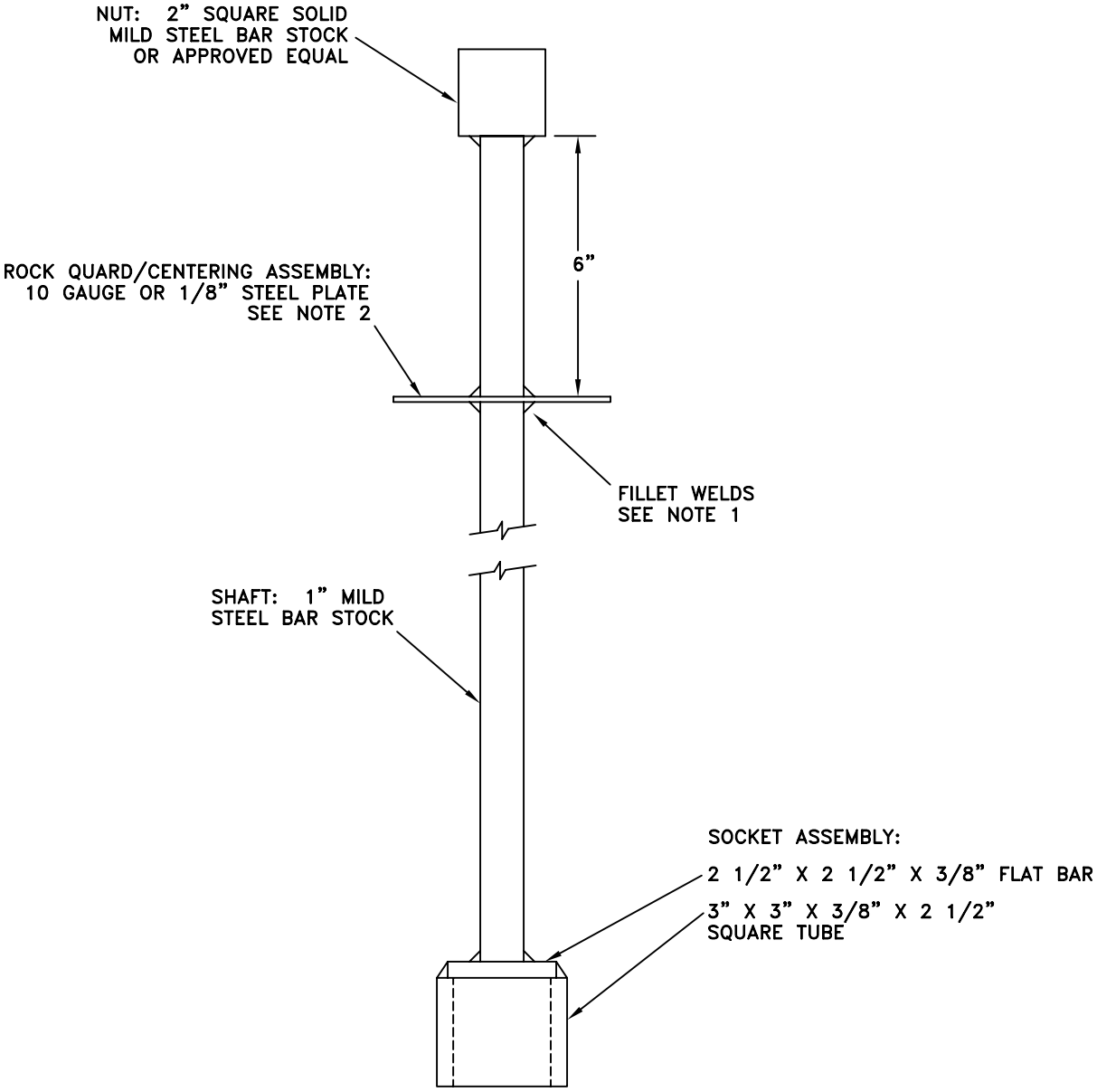
NOTES:

1. THE VALVE BOX ASSEMBLY SHALL CONSIST OF A MAXIMUM OF 3 COMPONENTS: THE ADJUSTABLE CAST IRON VALVE BOX FRAME AND COVER, AND A 6" DIAMETER SPOOL OF PVC 3034 PIPE IN ONE PIECE FROM THE VALVE TO 6" INSIDE THE VALVE BOX.
2. ADJUSTABLE VALVE BOXES SHALL BE SUPPLIED WITHOUT BOTTOM FLANGES.
3. THE VALVE BOX ASSEMBLY SHALL BE INSTALLED PLUMB AND CENTERED OVER THE OPERATING NUT ON THE VALVE.
4. WHERE VALVE BOXES ARE LOCATED ADJACENT TO PCC OR AC SURFACES, THOSE SURFACES SHALL BE EXTENDED TO CONSTRUCT A COLLAR AROUND THE VALVE BOX. WHERE VALVE BOXES ARE LOCATED OUTSIDE OF PCC OR AC SURFACES A PCC COLLAR SHALL BE CONSTRUCTED AROUND THE VALVE BOXES, MEASURING NO LESS THAN 18" X 18" X 4".

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD VALVE BOX DETAIL

NO SCALE	OCTOBER 2013	NO. 502



NOTES:

1. ALL WELDS SHALL BE 1/4" FILLET WELDS FOR FULL LENGTH OF CONTACT BETWEEN COMPONENTS.
2. DIAMETER OF CENTERING PLATE ASSEMBLY SHALL BE 1/4" LESS THAN THE INSIDE DIAMETER OF THE VALVE BOX RISER SECTION.
2. MINIMUM OVERALL LENGTH IS 12".

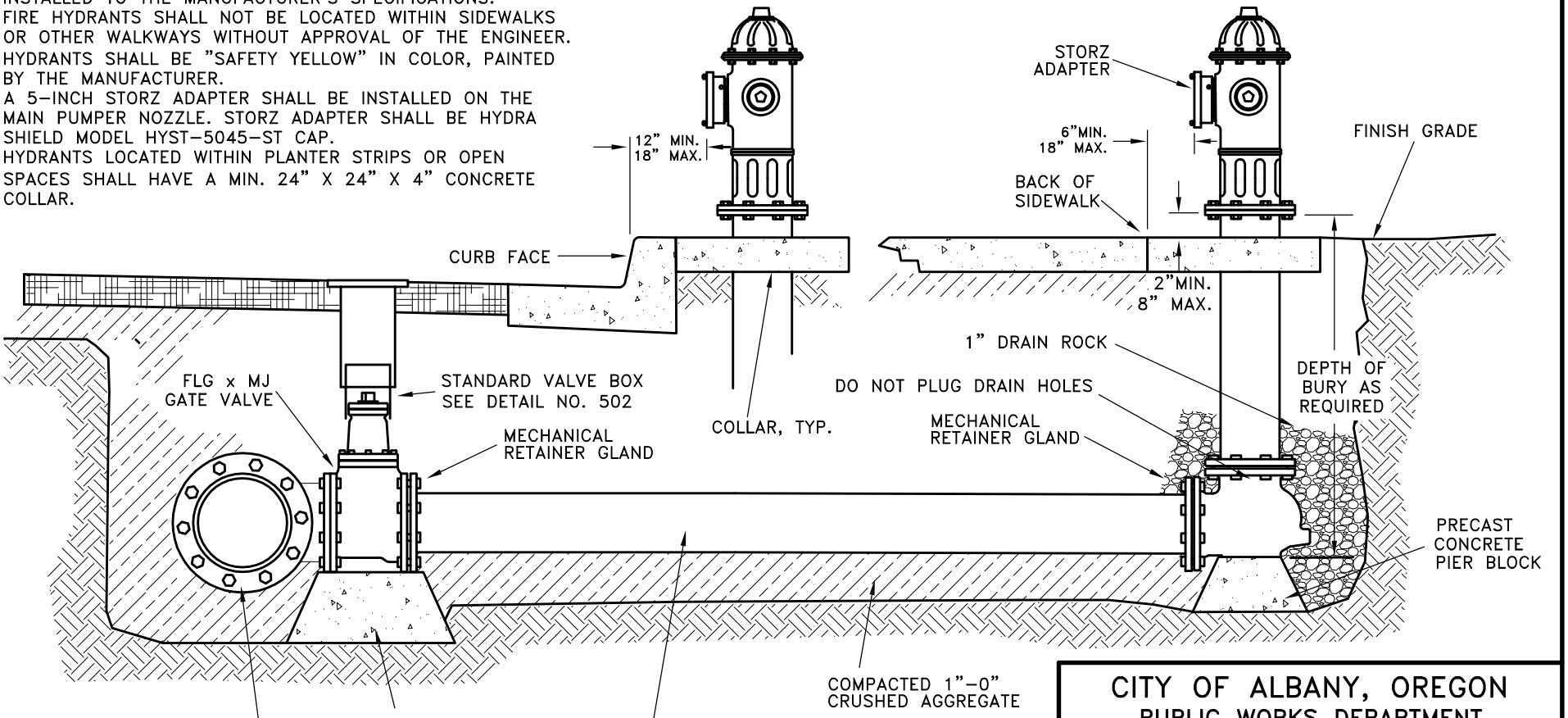
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

VALVE OPERATOR EXTENSION

NO SCALE	JULY 2005	NO. 503

NOTES:

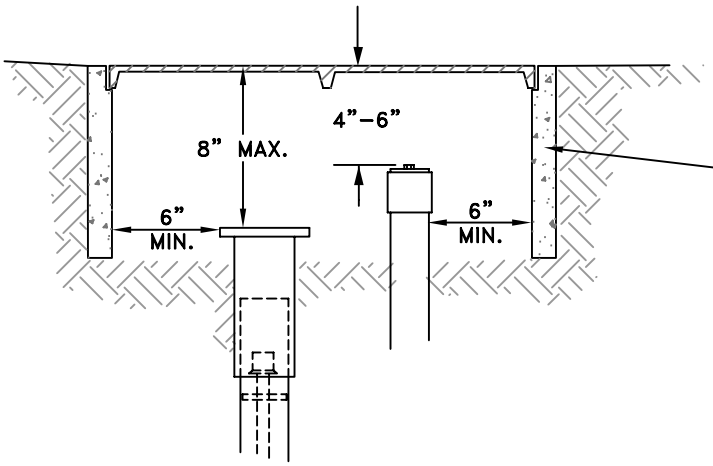
1. WHEN PLACED ADJACENT TO THE CURB, THE HYDRANT PORT SHALL BE 12"–18" FROM THE FACE OF THE CURB.
2. THE FACE OF CURB SHALL BE PAINTED YELLOW PER 503.02.02 FOR A DISTANCE OF 10 FEET FROM THE HYDRANT IN EITHER DIRECTION, OR TO THE NEAREST CURB RETURN, WHICHEVER IS CLOSER.
3. EXTENSIONS REQUIRED FOR HYDRANTS SET TOO LOW SHALL BE SUPPLIED BY THE CONTRACTOR. EXTENSIONS SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATIONS.
4. FIRE HYDRANTS SHALL NOT BE LOCATED WITHIN SIDEWALKS OR OTHER WALKWAYS WITHOUT APPROVAL OF THE ENGINEER.
5. HYDRANTS SHALL BE "SAFETY YELLOW" IN COLOR, PAINTED BY THE MANUFACTURER.
6. A 5–INCH STORZ ADAPTER SHALL BE INSTALLED ON THE MAIN PUMPER NOZZLE. STORZ ADAPTER SHALL BE HYDRA SHIELD MODEL HYST–5045–ST CAP.
7. HYDRANTS LOCATED WITHIN PLANTER STRIPS OR OPEN SPACES SHALL HAVE A MIN. 24" X 24" X 4" CONCRETE COLLAR.



CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD FIRE HYDRANT ASSEMBLY

NO SCALE	JANUARY 2018	NO. 504



CONCRETE METER BOX
WITH CAST IRON COVER
BROOKS 66S (C.I.)

DETAIL A

NON–TRAFFIC AREAS

GALVANIZED COUPLING AND
PLUG ASSEMBLED HAND TIGHT
WITH ANTI–SEIZE COMPOUND

FINISH GRADE

4"–6"

STANDARD VALVE BOX ASSEMBLY
SEE DETAIL DWG. NO. 502

INSTALL ADJUSTABLE
VALVE BOX OVER
BLOWOFF PIPE

PE PIPE WITH MJ CAP
AND MEGA–LUG RETAINER
GLAND. TAP SIZE AS
SPECIFIED (2" MIN.).

IRON BODY GATE VALVE
WITH 2" OPERATING NUT.
SIZE AS SPECIFIED (2" MIN.)

MECHANICALLY RESTRAINED
PIPE AND FITTINGS. SEE
NOTE NO. 4 BELOW.

GALV. PIPE AND
FITTINGS. SIZE AS
SPECIFIED (2" MIN.)

COMPACTED 1"–0"
CRUSHED AGGREGATE

DUCTILE IRON OR BRASS
PIPE. SIZE AS SPECIFIED
(2" MIN.)

PRECAST CONCRETE
PIER BLOCK

NOTES:

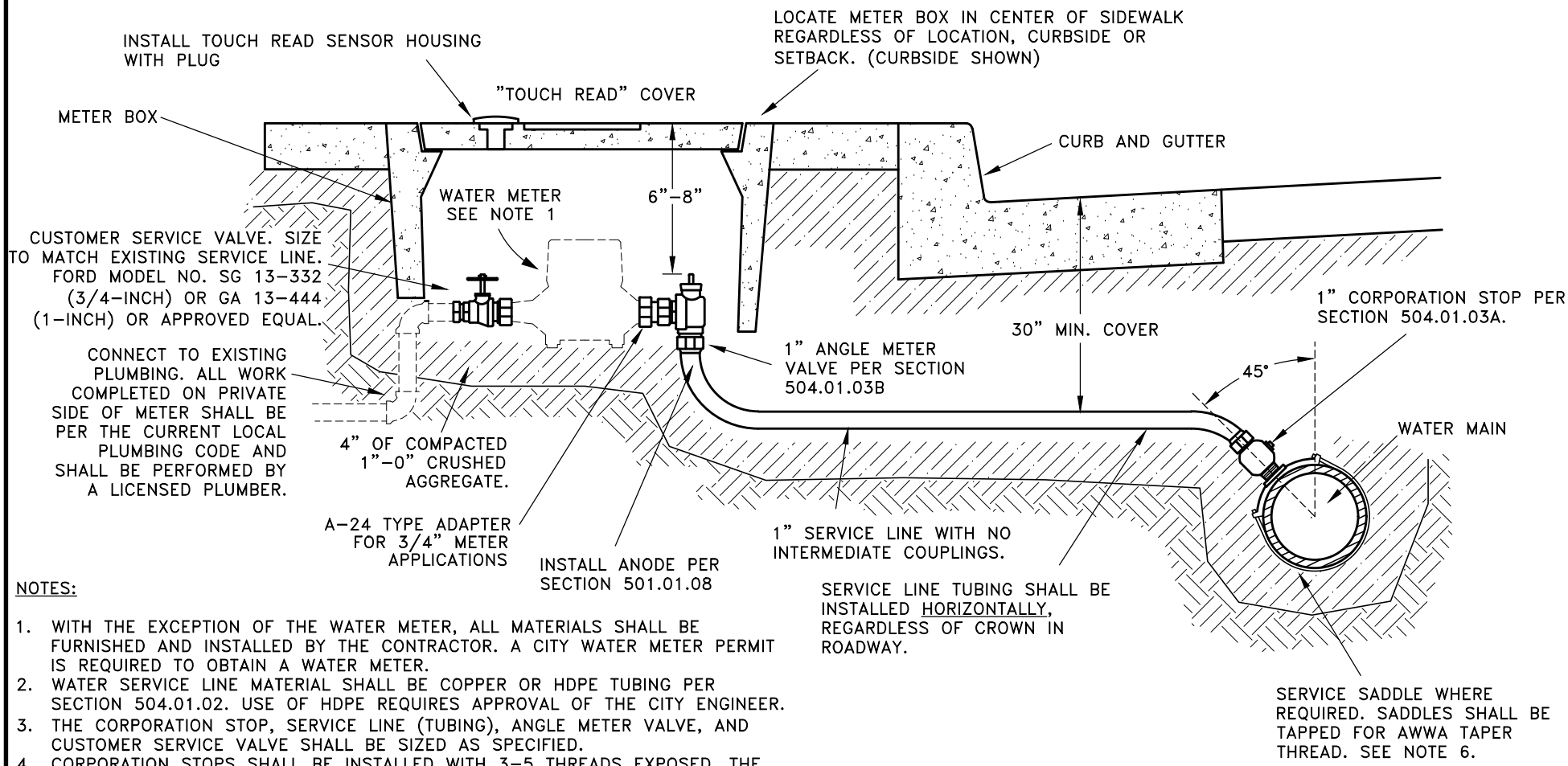
1. MINIMUM BLOWOFF PIPE DIA. SHALL BE 2". DESIGN OF BLOWOFF ASSEMBLIES FOR WATER LINES LARGER THAN 8" WILL REQUIRE APPROVAL OF CITY ENGINEER.
2. THREADED CONNECTIONS SHALL BE ASSEMBLED USING COMPOUNDS APPROVED FOR USE IN POTABLE WATER SYSTEMS.
3. IN AREAS EXPOSED TO TRAFFIC, INSTALL STANDARD VALVE BOX ASSEMBLIES ADJUSTED TO FINISH GRADE. IN NON–TRAFFIC AREAS, INSTALL STANDARD VALVE BOX OVER THE VALVE ONLY AND COVER THE VALVE BOX AND BLOWOFF PIPE WITH A BROOKS NO. 66S (C.I.) METER BOX WITH A CAST IRON COVER. SEE DETAIL A.
4. RUNS OF PIPE ENDING WITH BLOWOFF ASSEMBLIES SHALL BE MECHANICALLY RESTRAINED WITH LOCKING PUSH–ON GASKETS AND MEGA–LUG RETAINER GLANDS. DETAILS RELATIVE TO MATERIAL REQUIREMENTS AND THE LENGTH OF PIPE TO BE RESTRAINED WILL BE DETERMINED BY THE CITY ENGINEER. CONCRETE THRUST RESTRAINT SHALL NOT BE USED WITHOUT APPROVAL OF THE CITY ENGINEER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD DEAD–END MAIN WITH BLOWOFF

WATERLINES 8" DIA. AND SMALLER

NO SCALE	JULY 2005	NO. 506



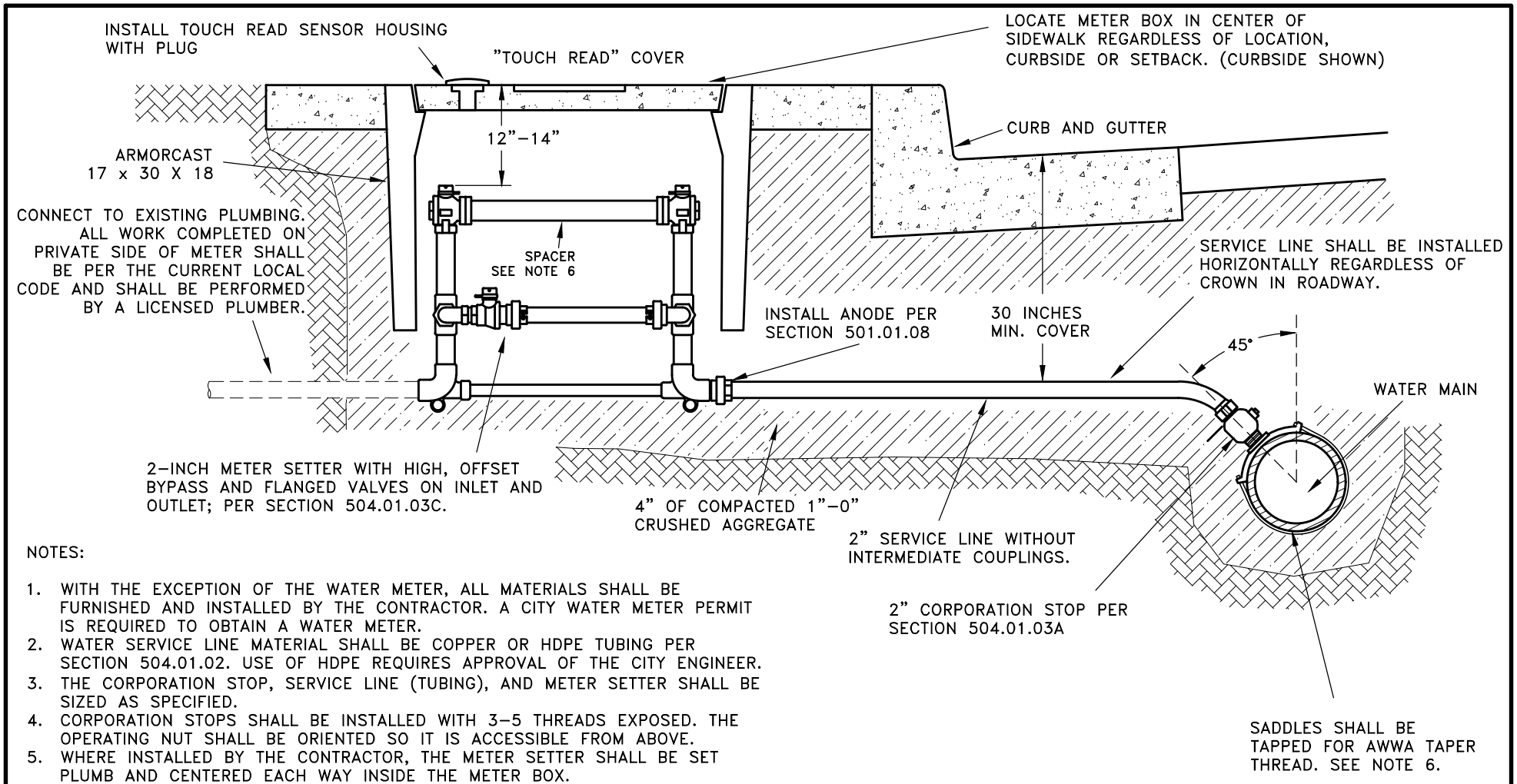
NOTES:

1. WITH THE EXCEPTION OF THE WATER METER, ALL MATERIALS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. A CITY WATER METER PERMIT IS REQUIRED TO OBTAIN A WATER METER.
2. WATER SERVICE LINE MATERIAL SHALL BE COPPER OR HDPE TUBING PER SECTION 504.01.02. USE OF HDPE REQUIRES APPROVAL OF THE CITY ENGINEER.
3. THE CORPORATION STOP, SERVICE LINE (TUBING), ANGLE METER VALVE, AND CUSTOMER SERVICE VALVE SHALL BE SIZED AS SPECIFIED.
4. CORPORATION STOPS SHALL BE INSTALLED WITH 3–5 THREADS EXPOSED. THE OPERATING NUT SHALL BE ORIENTED SO IT IS ACCESSIBLE FROM ABOVE.
5. WHERE INSTALLED BY THE CONTRACTOR, THE METER SHALL BE SET PLUMB AND CENTERED EACH WAY INSIDE THE METER BOX.
6. SERVICE SADDLES, WHEN REQUIRED, SHALL BE BRONZE (BRONZE DOUBLE STRAPS AND BRONZE BODIED) PER SECTION 504.01.04.
7. CATHODIC PROTECTION IS REQUIRED FOR NEW COPPER SERVICES AND TAPS ON EXISTING MAINS PER SECTION 501.01.08.
8. CUTTING, REAMING, SIZING, AND BENDING OF COPPER TUBING SHALL BE PERFORMED USING TOOLS AND PRACTICES SPECIFIC TO THOSE OPERATIONS.
9. ALL COPPER SERVICE LINES SHALL BE DIRECT BURIED IN ROCK BACKFILL TO AVOID ANY COPPER CONTACT WITH NATIVE SOIL. COPPER SERVICE LINES SHALL NOT BE INSTALLED BY JACKING OR BORING.
10. 12 GAUGE TRACER WIRE SHALL BE INSTALLED WITH HDPE SERVICE LINES. TRACER WIRE SHALL BE SECURELY GROUNDED TO THE CORPORATION STOP AND SHALL BE EASILY ACCESSIBLE IN THE METER BOX.
11. POLYPROPYLENE STIFFENERS SHALL BE INSTALLED WHERE HDPE SERVICE LINES CONNECT TO THE CORPORATION STOPS AND ANGLE METER VALVES.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

3/4" AND 1" WATER SERVICES

NO SCALE	FEBRUARY 2024	NO. 507



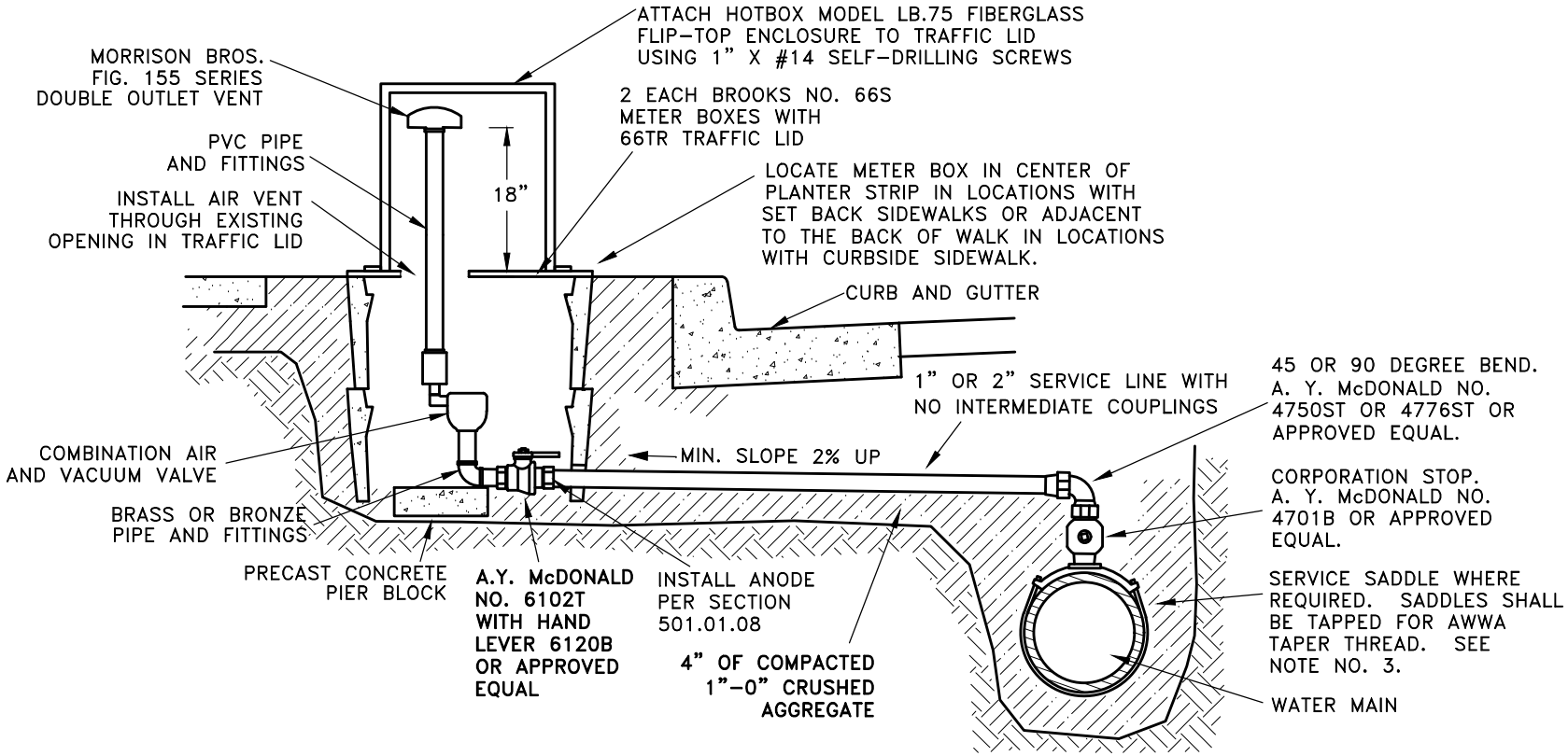
NOTES:

1. WITH THE EXCEPTION OF THE WATER METER, ALL MATERIALS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. A CITY WATER METER PERMIT IS REQUIRED TO OBTAIN A WATER METER.
2. WATER SERVICE LINE MATERIAL SHALL BE COPPER OR HDPE TUBING PER SECTION 504.01.02. USE OF HDPE REQUIRES APPROVAL OF THE CITY ENGINEER.
3. THE CORPORATION STOP, SERVICE LINE (TUBING), AND METER SETTER SHALL BE SIZED AS SPECIFIED.
4. CORPORATION STOPS SHALL BE INSTALLED WITH 3–5 THREADS EXPOSED. THE OPERATING NUT SHALL BE ORIENTED SO IT IS ACCESSIBLE FROM ABOVE.
5. WHERE INSTALLED BY THE CONTRACTOR, THE METER SETTER SHALL BE SET PLUMB AND CENTERED EACH WAY INSIDE THE METER BOX.
6. BRONZE SERVICE SADDLES (BRONZE DOUBLE STRAPS AND BRONZE BODIED) ARE REQUIRED FOR ALL SERVICE TAPS GREATER THAN 1" PER SECTION 504.01.04.
7. CATHODIC PROTECTION IS REQUIRED FOR NEW COPPER SERVICES AND TAPS ON EXISTING MAINS PER SECTION 501.01.08.
8. INSTALL METER SETTER WITH CITY–SUPPLIED SPACING SPOOL. THE CITY WILL RECOVER THE SPOOL WHEN INSTALLING THE METER. THE SPACING SPOOL IS NOT REQUIRED IF THE SETTER IS SUPPLIED AND PROPERLY INSTALLED WITH THE FACTORY SPACER INTACT.
9. CUTTING, REAMING, SIZING, AND BENDING OF COPPER TUBING SHALL BE PERFORMED USING TOOLS AND PRACTICES SPECIFIC TO THOSE OPERATIONS.
10. ALL COPPER SERVICE LINES SHALL BE DIRECT BURIED IN ROCK BACKFILL TO AVOID ANY COPPER CONTACT WITH NATIVE SOIL. COPPER SERVICE LINES SHALL NOT BE INSTALLED BY JACKING OR BORING.
11. 12 GAUGE TRACER WIRE SHALL BE INSTALLED WITH HDPE SERVICE LINES.
12. STAINLESS STEEL STIFFENERS SHALL BE USED FOR 2" HDPE SERVICE LINES.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

1 1/2" AND 2" WATER SERVICES

NO SCALE	FEBRUARY 2024	NO. 508



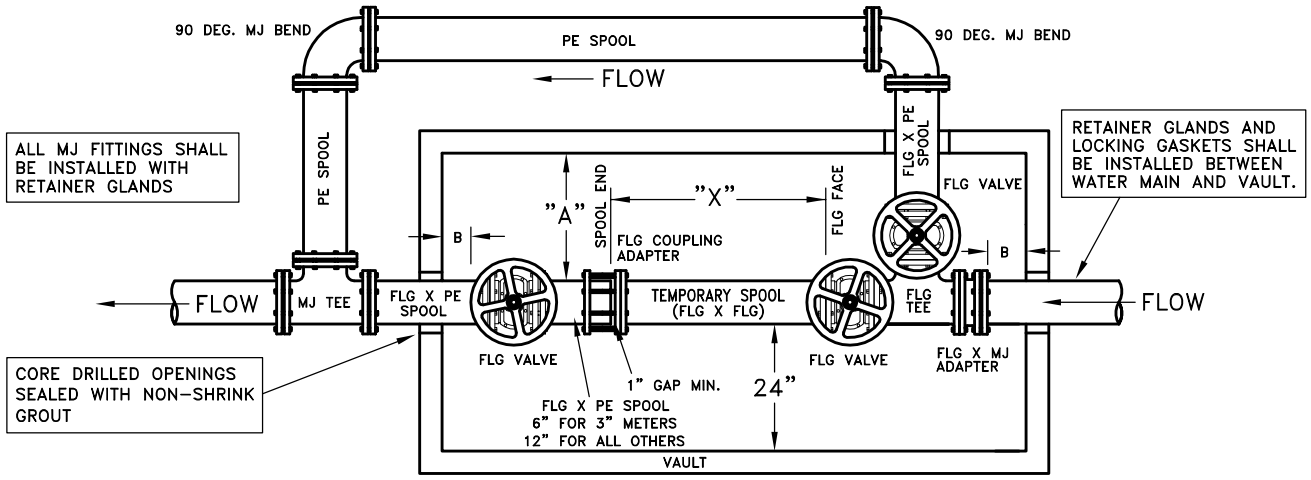
NOTES:

1. ALL MATERIALS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
2. CORPORATION STOP, 90° BEND, COPPER CONDUIT OR BRASS PIPE, HAND VALVE, AIR/VACUUM VALVE, AND VENT PIPING SHALL BE SIZED AS FOLLOWS: 1" COMPONENTS FOR 12" AND SMALLER WATER LINES AND 2" COMPONENTS FOR 16" AND LARGER WATER LINES.
3. SERVICE SADDLES, WHEN REQUIRED, SHALL BE BRONZE (BRONZE DOUBLE STRAPS AND BRONZE BODIED) PER SECTION 504.01.04.
4. ALL COMPONENTS INSTALLED BETWEEN THE HAND VALVE AND THE AIR/VACUUM VALVE SHALL BE BRASS OR BRONZE. SERVICE LINES SHALL BE PER STANDARD DRAWING NO. 507 OR 508.
5. THE AIR/VACUUM VALVE SHALL BE SET PLUMB AND CENTERED EACH WAY IN THE METER BOX.
6. CATHODIC PROTECTION WILL BE REQUIRED WHEN CONNECTING TO EXISTING MAINS PER SECTION 501.01.08.
7. AIR VALVE VENT SHALL BE EXTENDED ABOVE GRADE TO PREVENT BACKFLOW CONTAMINATION. LOCATION OF THE VENT WILL BE SITE SPECIFIC AND WILL BE DETERMINED BY THE ENGINEER.
8. CUTTING, REAMING, SIZING AND BENDING OF COPPER TUBING SHALL BE PERFORMED USING TOOLS AND PRACTICES SPECIFIC TO THOSE OPERATIONS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

1" AND 2" COMBINATION AIR/VACUUM RELEASE VALVE

NO SCALE	FEBRUARY 2024	NO. 509



METER SIZE	TEMP SPOOL LENGTH	DIMENSION "A" (MINIMUM)	DIMENSION "B" (MINIMUM)	DIMENSION "X"	VAULT MODEL NUMBER	MODEL TYPE	TEMP SPOOL LENGTH	DIMENSION "A" (MINIMUM)	VAULT MODEL NUMBER
3	32″	18″	2″	32″	4484-LA	COMPACT FIRELINE	NA	NA	4484-LA
4	21″	18″	6″	21″	4484-LA	COMPACT FIRELINE	34″	18″	4484-LA
6	25″	18″	6″	25″	4484-LA	COMPACT FIRELINE	46″	20″	612-LA
8				31.5″		COMPACT FIRELINE	54″	23″	612-LA
10				42.5″		COMPACT FIRELINE	69″	25″	612-LA

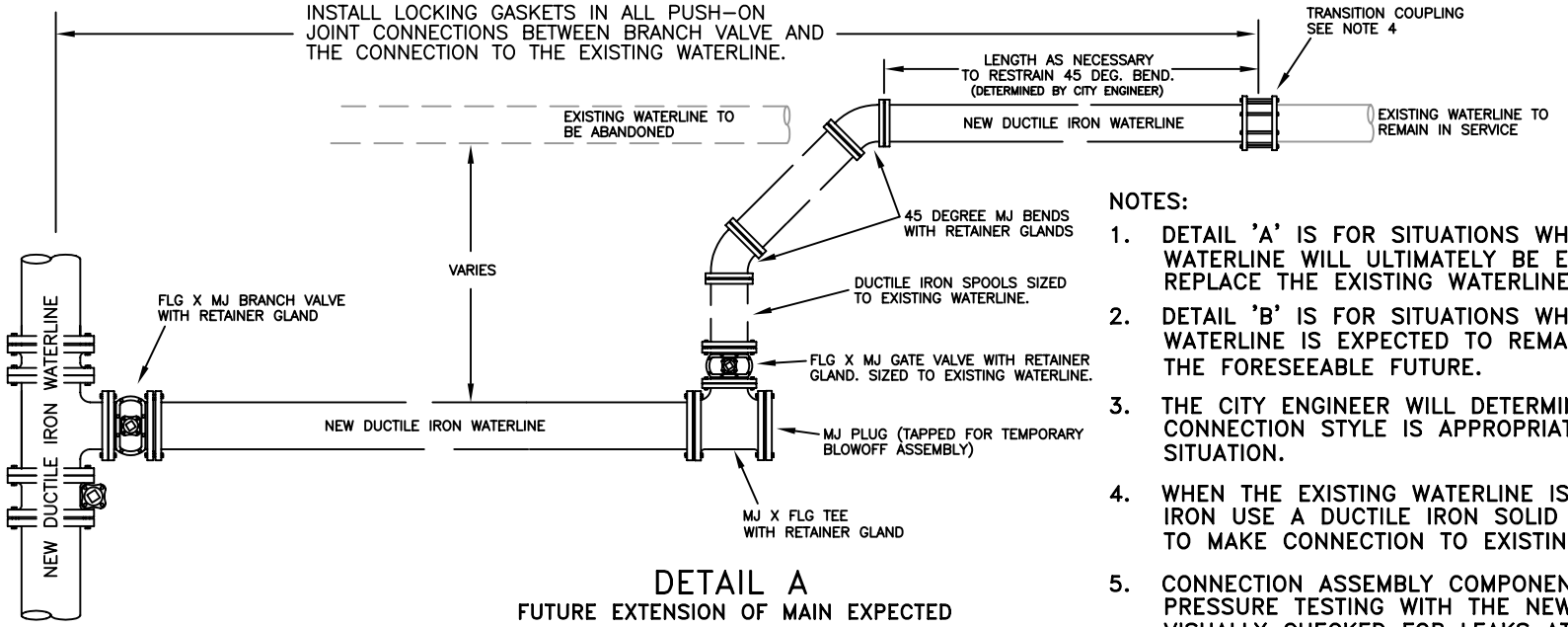
NOTES

1. ALL MATERIALS, EXCEPT THE TEMPORARY SPOOL, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. TEMPORARY SPOOLS, WHEN REQUIRED, SHALL BE PROVIDED BY THE CITY.
2. ALL REQUIRED OPENINGS IN THE VAULT SHALL BE CORE DRILLED REGARDLESS OF THE PRESENCE OF "KNOCKOUTS".
3. THE MINIMUM DIAMETER OF PIPE, VALVES, AND FITTINGS SHALL BE 4".
4. A PERMIT WILL BE REQUIRED TO OBTAIN A WATER METER. THE METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.
5. ALL VALVES SHALL BE RISING-STEM STYLE AND SHALL BE INSTALLED WITH HAND WHEELS. HAND WHEELS SHALL MEET ALL REQUIREMENTS OF AWWA C509-94, SEC. 4.11.
6. MINIMUM VERTICAL CLEARANCE BETWEEN VAULT CEILING AND TOP OF HAND WHEEL SHALL BE 36". VERTICAL CLEARANCE BETWEEN VAULT FLOOR AND BOTTOM OF PIPE SHALL BE A MINIMUM OF 12" AND A MAXIMUM OF 24".
7. USE GRINNEL ADJ. SADDLE PIPE SUPPORTS, OR APPROVED EQUAL, UNDER EACH METER ISOLATION VALVE.
8. METER VAULTS SHALL BE SUPPLIED WITH SYRACUSE EXKD-3672AL ALUMINUM DOORS (300 PSF) LOCATED DIRECTLY OVER THE METER. WHEN PLACED WHERE IT WILL BE EXPOSED TO VEHICULAR TRAFFIC, AN H-20 RATED ACCESS DOOR APPROVED BY THE CITY WILL BE REQUIRED.
9. MANHOLE STYLE LIDS WILL NOT BE ACCEPTED.
10. VAULTS SHALL BE EQUIPPED WITH A GALVANIZED STEEL LADDER AND AN ALUMINUM EXTENSION.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

WATER METER VAULTS

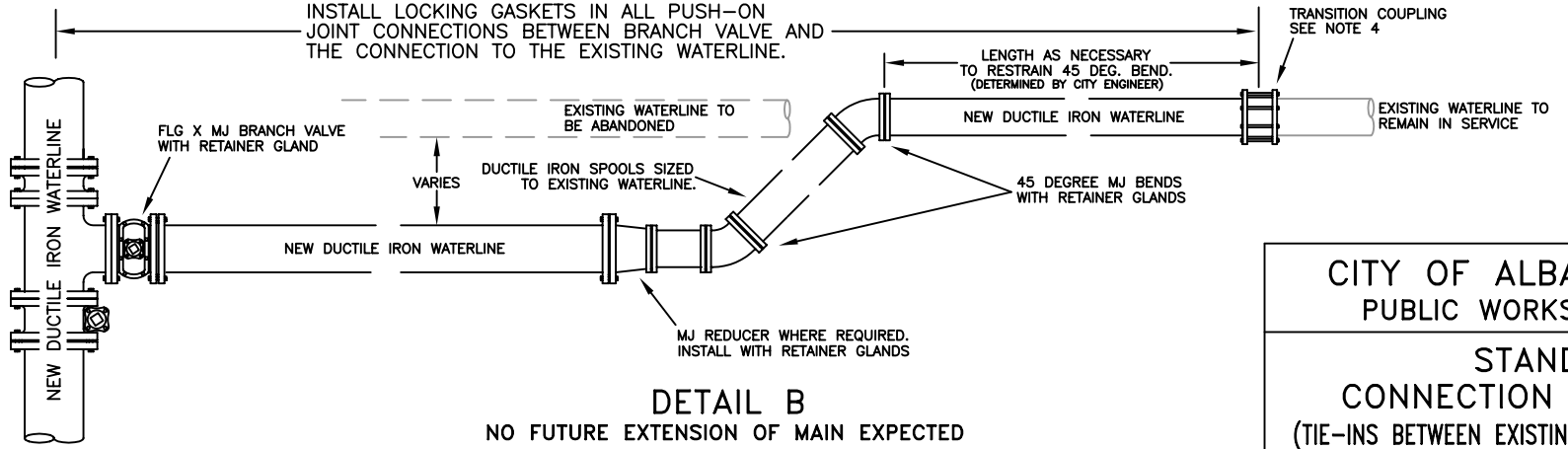
NO SCALE	JULY 2019	NO. 510



DETAIL A
FUTURE EXTENSION OF MAIN EXPECTED

NOTES:

1. DETAIL 'A' IS FOR SITUATIONS WHERE THE NEW WATERLINE WILL ULTIMATELY BE EXTENDED TO REPLACE THE EXISTING WATERLINE.
2. DETAIL 'B' IS FOR SITUATIONS WHERE THE EXISTING WATERLINE IS EXPECTED TO REMAIN IN SERVICE FOR THE FORESEEABLE FUTURE.
3. THE CITY ENGINEER WILL DETERMINE WHICH CONNECTION STYLE IS APPROPRIATE FOR A GIVEN SITUATION.
4. WHEN THE EXISTING WATERLINE IS DUCTILE OR CAST IRON USE A DUCTILE IRON SOLID SLEEVE MJ COUPLING TO MAKE CONNECTION TO EXISTING WATERLINE.
5. CONNECTION ASSEMBLY COMPONENTS NOT SUBJECTED TO PRESSURE TESTING WITH THE NEW MAINLINE WILL BE VISUALLY CHECKED FOR LEAKS AT LINE PRESSURE. VERIFICATION OF RESTRAINT REQUIREMENTS AND VISUAL INSPECTIONS WILL BE PERFORMED BY THE CITY ENGINEER.

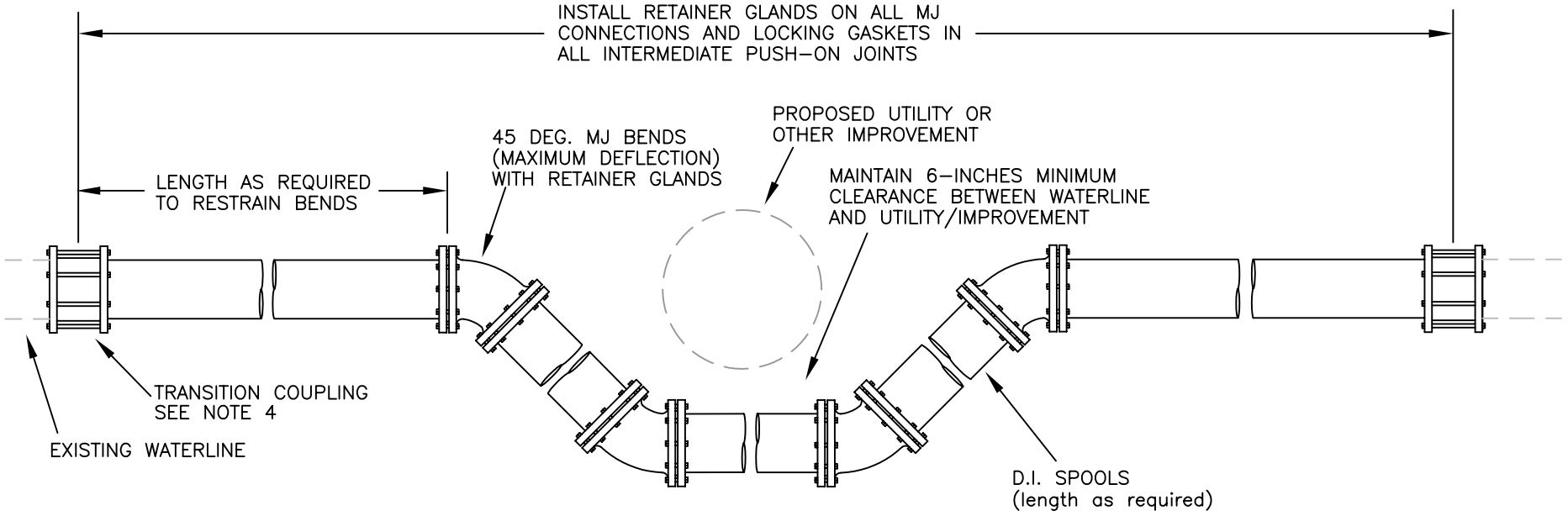


DETAIL B
NO FUTURE EXTENSION OF MAIN EXPECTED

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STANDARD CONNECTION ASSEMBLIES
(TIE-INS BETWEEN EXISTING AND NEW WATERLINES)

NO SCALE	JULY 2005	NO. 511



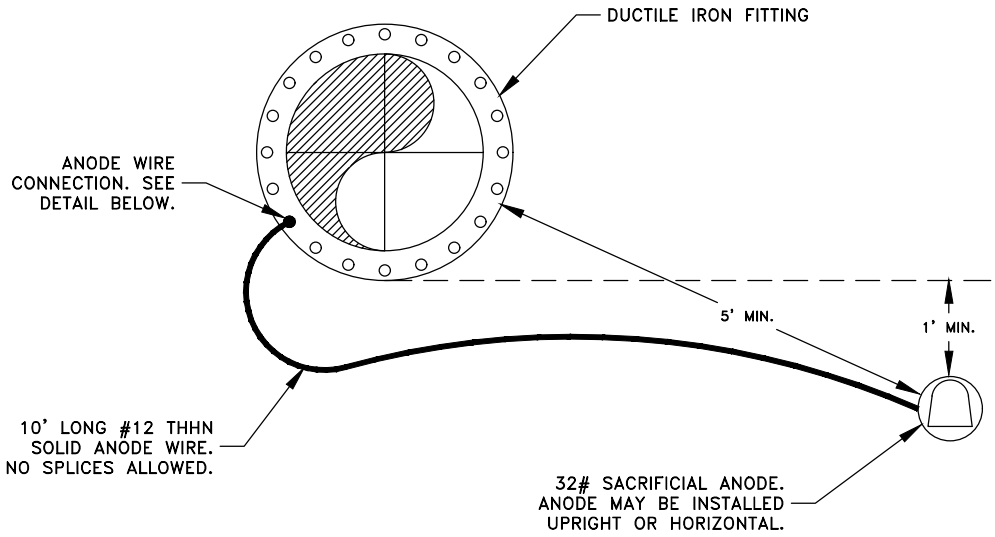
NOTES:

1. THIS DETAIL DRAWING GENERALLY APPLIES TO SITUATIONS WHERE AN EXISTING WATERLINE NEEDS TO BE RELOCATED UNDER A PROPOSED IMPROVEMENT. THE NEED FOR ADDITIONAL REQUIREMENTS, SUCH AS VALVES, ASSEMBLIES, ETC., WILL BE DETERMINED BY THE CITY ENGINEER ON A CASE BY CASE BASIS.
2. ALL NEW MATERIALS SHALL BE CLEANED AND DISINFECTED IN ACCORDANCE WITH THE STANDARD CONSTRUCTION SPECIFICATIONS (DIVISION 5, WATER).
3. NEW PIPEWORK INSTALLED IN EXISTING WATERLINES WILL BE VISUALLY CHECKED FOR LEAKS AT LINE PRESSURE. VERIFICATION OF RESTRAINT REQUIREMENTS AND VISUAL INSPECTIONS WILL BE PERFORMED BY THE CITY ENGINEER.
4. WHEN EXISTING WATERLINE IS DUCTILE OR CAST IRON USE A DUCTILE IRON SOLID SLEEVE MJ COUPLING TO MAKE CONNECTION TO EXISTING WATERLINE.

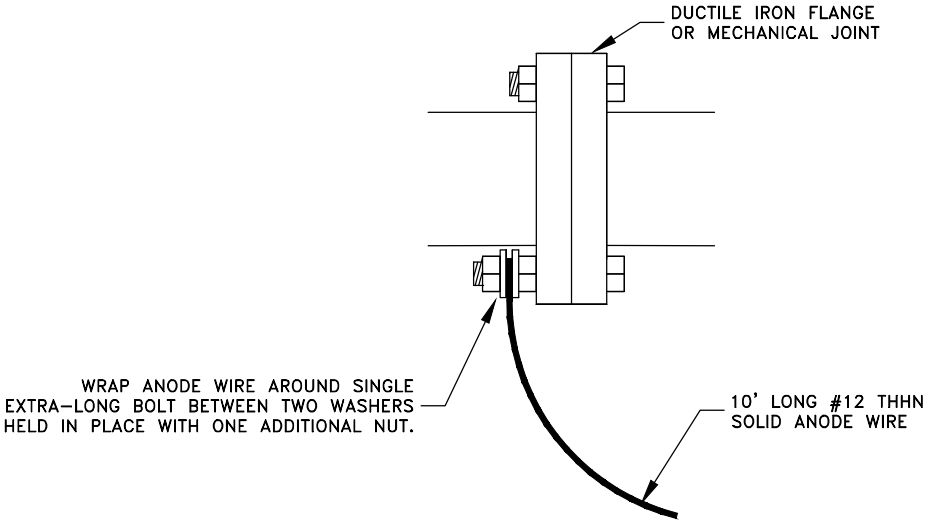
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TYPICAL WATER LINE UNDERCROSSING

NO SCALE	JULY 2005	NO. 512



ANODE WIRE CONNECTION DETAIL



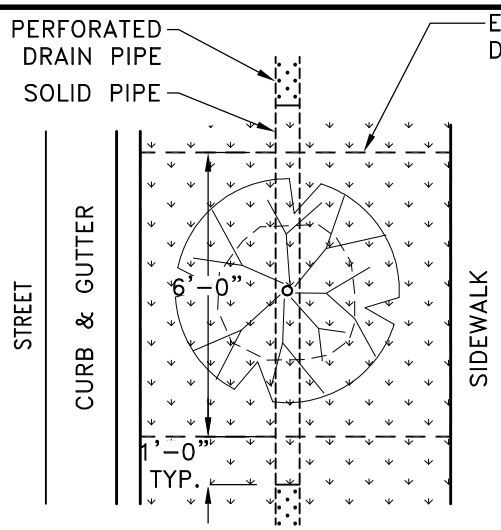
NOTES:

1. SACRIFICIAL ANODES SHALL BE INSTALLED ON DUCTILE IRON FLANGED FITTINGS IN ALL APPLICATIONS.
2. SACRIFICIAL ANODES SHALL BE INSTALLED ON ALL DUCTILE IRON FITTINGS AND VALVES WHEN SOILS ARE HIGHLY CORROSIVE AS DETERMINED BY THE CITY ENGINEER.
3. SACRIFICIAL ANODES SHALL BE 32# ULTRAMAG HIGH POTENTIAL MAGNESIUM ANODES (TYPE 32D5) WITH A MINIMUM 10-FOOT #12 THHN SOLID WIRE BY FARWEST CORROSION CONTROL COMPANY, OR APPROVED EQUAL.
4. LOCATE SACRIFICIAL ANODES A MINIMUM OF 5 FEET FROM ALL WATER PIPES AND ANODES
5. PLACE SACRIFICIAL ANODE IN CLEAN NATIVE BACKFILL AND COMPACT TO ONE FOOT ABOVE ANODE. FILL REMAINDER OF EXCAVATION WITH SELECT BACKFILL.

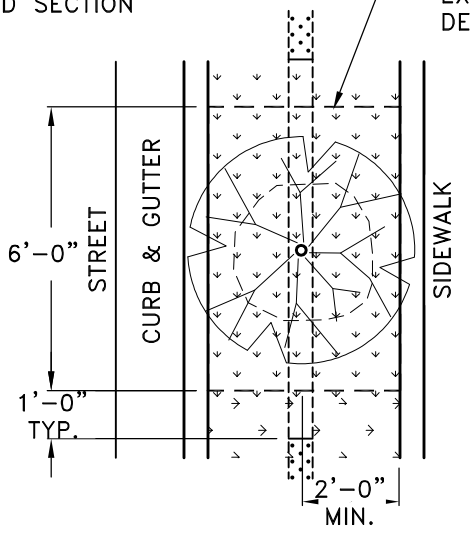
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

DUCTILE IRON FITTING SACRIFICIAL ANODE DETAIL

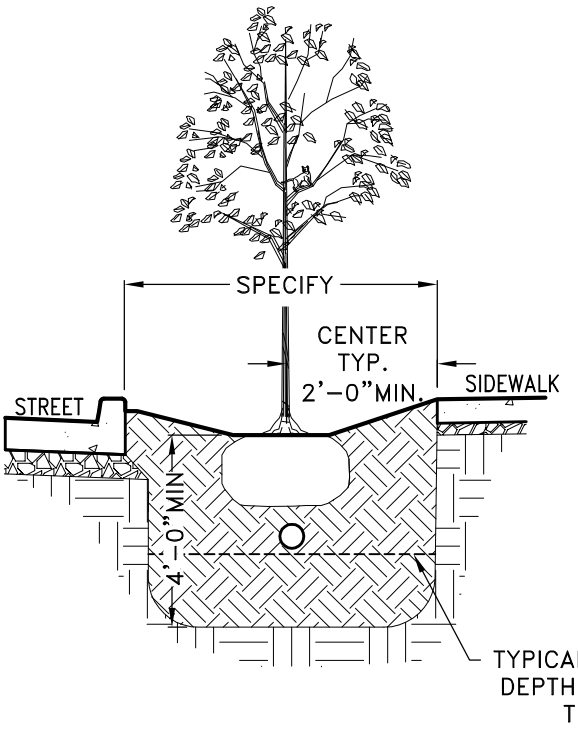
NO SCALE	FEBRUARY 2024	NO. 513



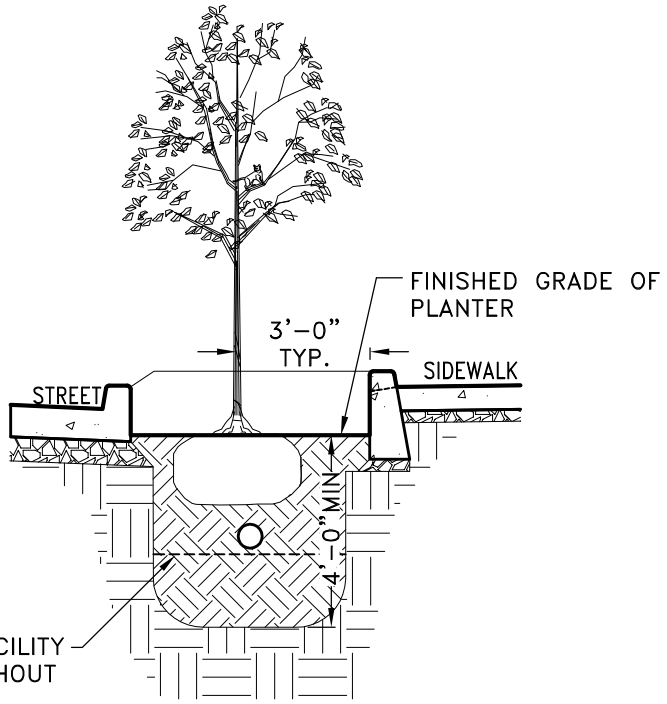
TREE WELL IN SWALE PLAN VIEW



TREE WELL IN PLANTER PLAN VIEW



STREET TREE IN SWALE



STREET TREE IN PLANTER

NOTES

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. FOR ADDITIONAL INFORMATION ON STREET TREE REQUIREMENTS SEE STANDARD SPECIFICATION SECTION 210 – STREET TREE STANDARDS.
3. CONSTRUCT DEEPER SECTION OF GROWING MEDIUM WHERE STREET TREES ARE PLANTED MINIMUM 4 FT WIDE, 6 FT LONG, 4 FT DEEP.

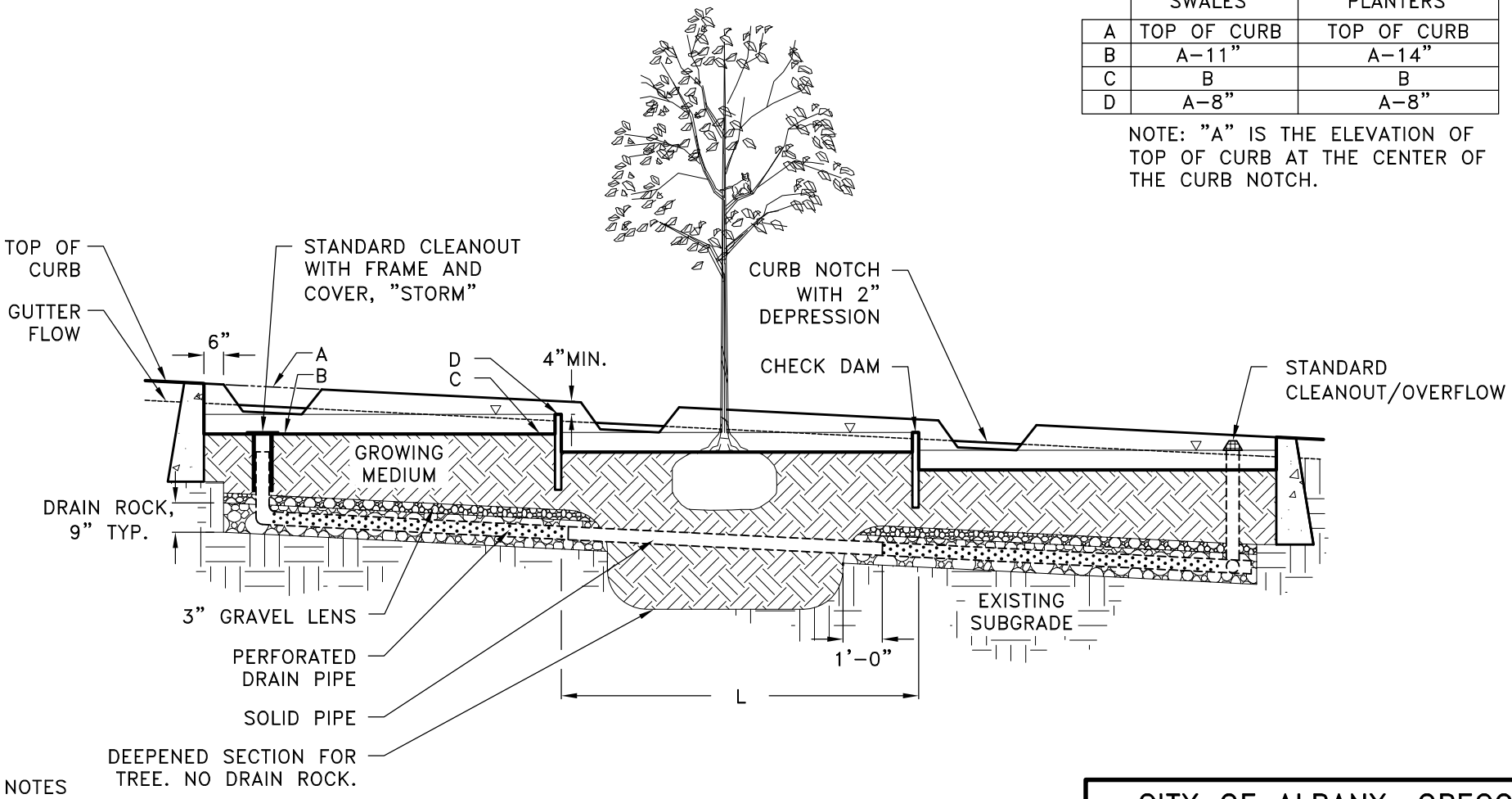
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREET TREE DETAIL IN STORMWATER FACILITIES

NO SCALE	JANUARY 2015	NO. 601

	ELEVATION CHART	
	SWALES	PLANTERS
A	TOP OF CURB	TOP OF CURB
B	A–11"	A–14"
C	B	B
D	A–8"	A–8"

NOTE: "A" IS THE ELEVATION OF TOP OF CURB AT THE CENTER OF THE CURB NOTCH.



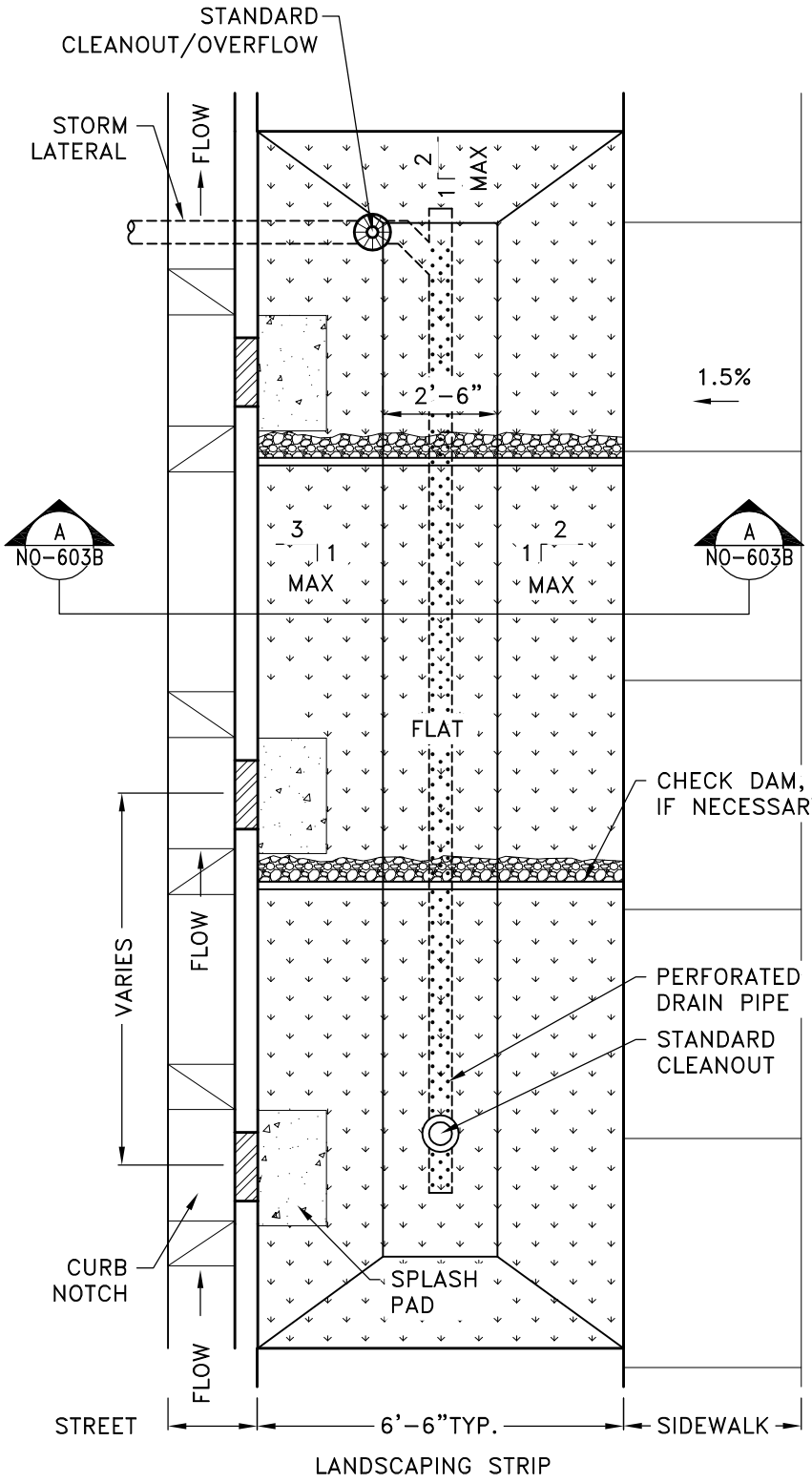
NOTES

1. LENGTH OF CELLS, "L", SHALL BE AS SHOWN ON PROJECT PLANS. LENGTH VARIES.
2. CUT SUBGRADE TO MATCH CURB SLOPE. DRAIN ROCK AND GRAVEL LENS DEPTHS SHALL BE CONSTANT. GROWING MEDIUM DEPTH VAIRES WITH CURB SLOPE, 18" MIN.
3. DRAIN PIPE SHALL BE INSTALLED TO MATCH CURB SLOPE. IN UNLINED FACILITIES, BOTTOM OF DRAIN PIPE SHALL BE SET AT 2 1/2" ABOVE EXISTING SUBGRADE. IN LINED FACILITIES, DRAIN PIPE SHALL BE SET AT BOTTOM OF DRAIN ROCK.
4. ELEVATIONS ARE NOT IMPACTED BY INCLUSION OF A STEP OUT ZONE IN A STANDARD STREETSIDE PLANTER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

MULTI–CELL STORMWATER QUALITY FACILITIES (PLANTER SHOWN)

NO SCALE	JANUARY 2015	NO. 602



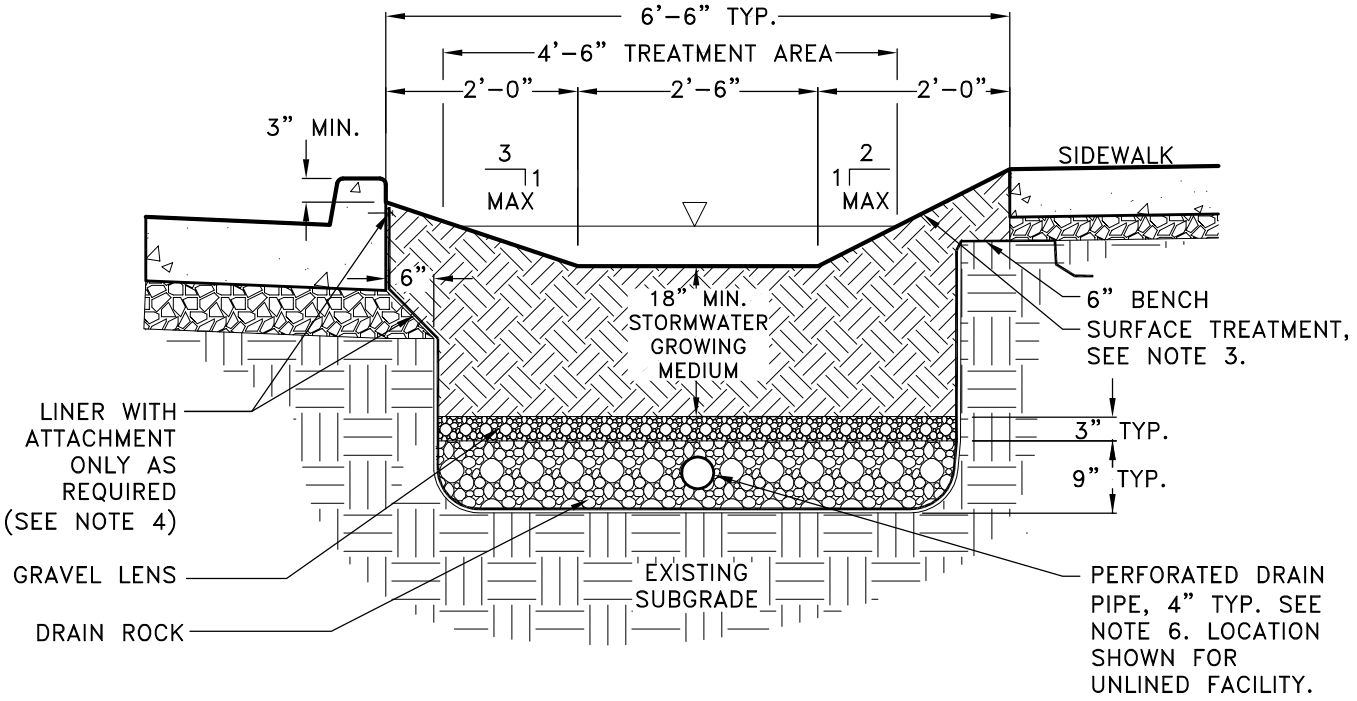
NOTES

1. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE. SIDEWALK ELEVATION TO BE SET AT 1.5% RISE FROM TOP OF FACE OF CURB.
2. ALL PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS AND SHALL HAVE A LIGHT BROOM TEXTURED FINISH.
3. STREETSIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
4. ACTUAL ELEVATIONS AND RELATIONSHIPS BETWEEN FEATURES TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.
5. SPLASH PAD: INSTALL CONCRETE SPLASH PAD AT EACH CURB NOTCH.
6. CHECK DAMS SHALL BE PLACED ACCORDING TO INDIVIDUAL PROJECT PLANS.
7. SWALE SHALL HAVE A FLAT BOTTOM IN ALL DIRECTIONS TO WITHIN A HALF INCH.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREETSIDE SHALLOW SWALE PLAN VIEW

NO SCALE	JANUARY 2018	NO. 603A



NOTES

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.

2. GROWING MEDIUM SHALL BE PLACED IN EVEN LIFTS NO GREATER THAN 8 INCHES IN DEPTH, AS MEASURED LOOSELY. LIFTS SHALL BE MODERATELY COMPACTED BY USE OF A SAND OR WATER FILLED LAWN ROLLER. MECHANICAL COMPACTION WITH JUMPING JACKS OR SIMILAR EQUIPMENT IS PROHIBITED.

3. GROWING MEDIUM IN EACH FACILITY SHALL BE PLACED AND SHAPED THE SAME DAY AND IMMEDIATELY UPON COMPLETION ITS SURFACE SHALL BE PROTECTED WITH STRAW MATTING OR JUTE MATTING.

4. IMPERMEABLE LINER SHALL BE USED ONLY IF REQUIRED ON PROJECT PLANS.

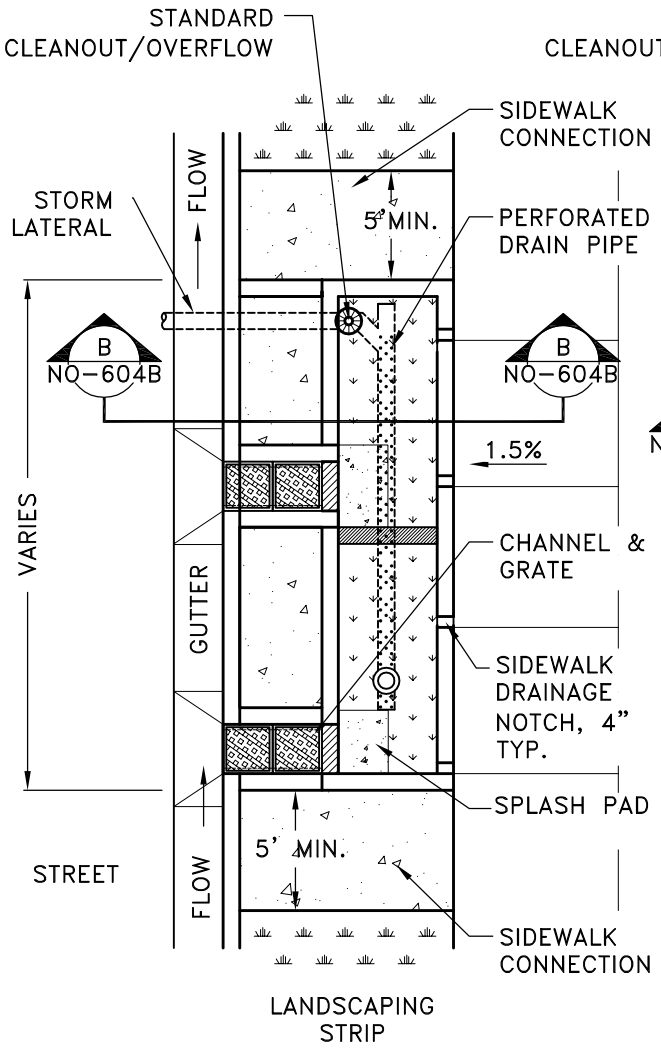
5. VEGETATION: INSTALL PER PLANTING SCHEDULE.

6. IN UNLINED FACILITIES, BOTTOM OF PERFORATED DRAIN PIPE SHALL BE SET AT 2 1/2" ABOVE EXISTING SUBGRADE. IN LINED FACILITIES, BOTTOM PERFORATED DRAIN PIPE SHALL BE SET AT BASE OF DRAIN ROCK LAYER.

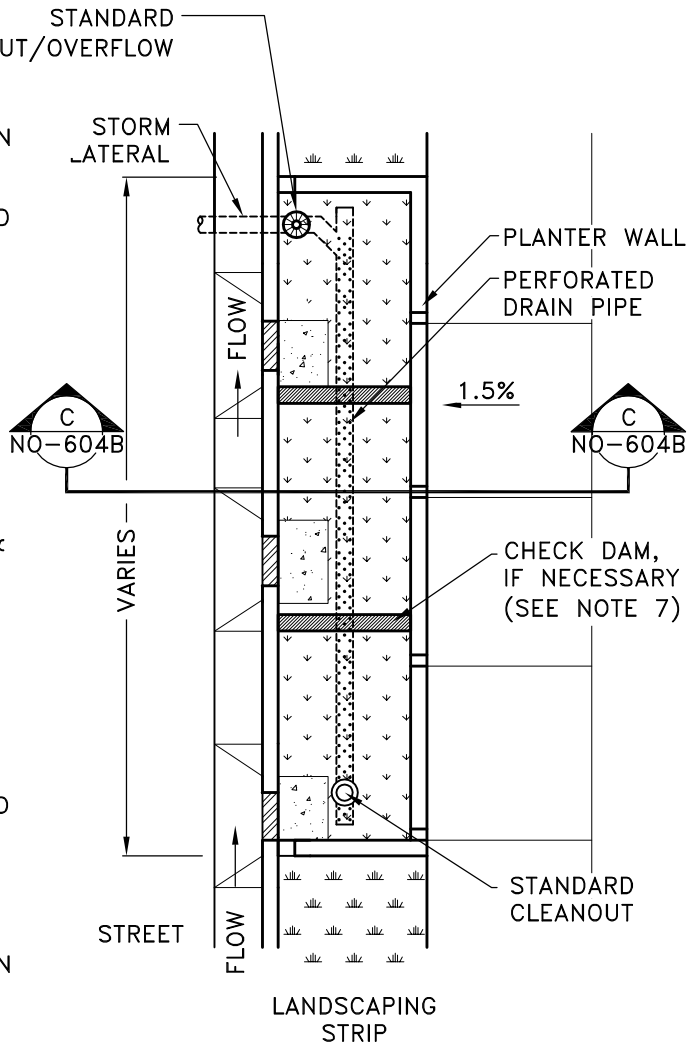
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREETSIDE SHALLOW SWALE SECTION VIEW

NO SCALE	JANUARY 2015	NO. 603B



PLANTER WITH PARKING



PLANTER WITHOUT PARKING

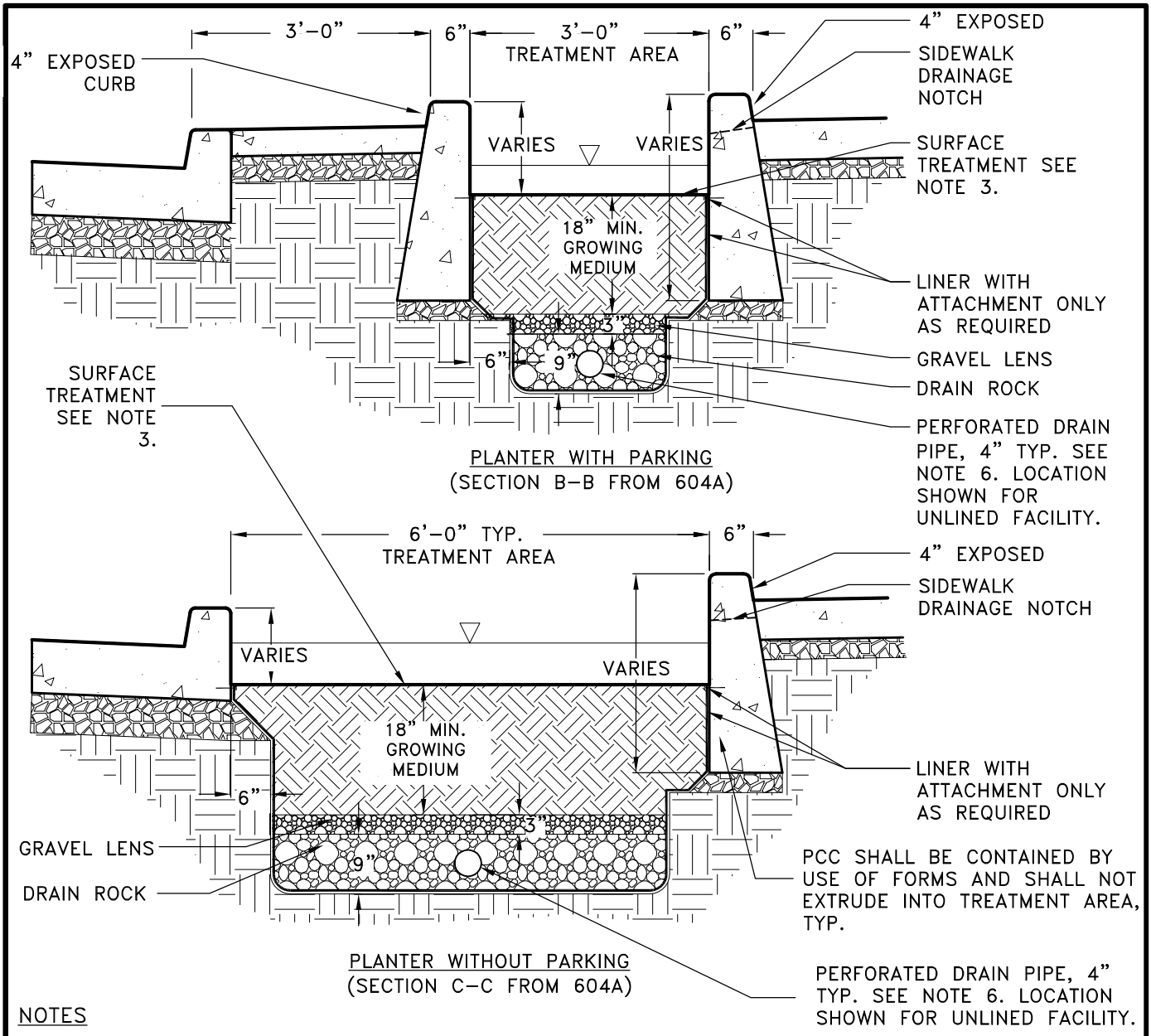
NOTES

1. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE. SIDEWALK ELEVATION TO BE SET AT 1.5% RISE FROM TOP OF FACE OF CURB.
2. MINIMUM INTERIOR PLANTER WIDTH IS 3 FEET. A MINIMUM OF 4 FEET INTERIOR PLANTER WIDTH IS REQUIRED FOR STREET TREES IN PLANTER.
3. PLANTER SHALL BE FLAT BOTTOM IN ALL DIRECTIONS TO WITHIN A HALF INCH.
4. STREETSIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
5. SIDEWALK DRAINAGE NOTCH: 1" LOWER THAN SIDEWALK, SLOPED TO FACILITY. SIDEWALK DRAINAGE NOTCHES SHALL ALIGN WITH SIDEWALK CONTRACTION JOINTS AND LOW POINTS.
6. SPLASH PAD: INSTALL CONCRETE SPLASH PAD AT EACH CURB NOTCH.
7. CHECK DAMS SHALL BE PLACED ACCORDING TO INDIVIDUAL PROJECT PLANS.
8. ALL PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS, AND SHALL HAVE A LIGHT BROOM FINISH.
9. ACTUAL ELEVATIONS AND RELATIONSHIPS BETWEEN FIGURES TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREETSIDE PLANTERS
PLAN VIEW

NO SCALE	JULY 2019	NO. 604A



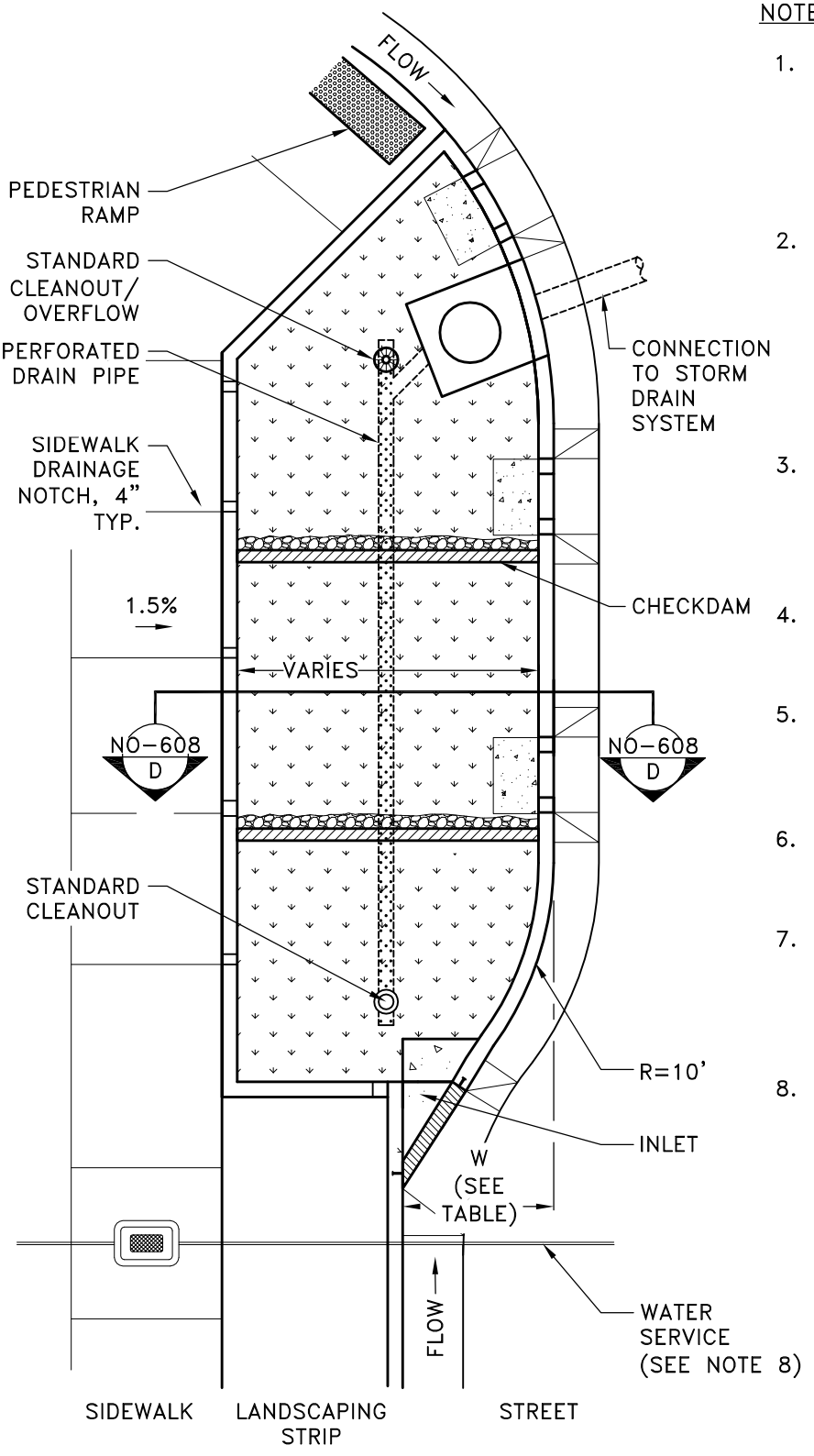
NOTES

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. GROWING MEDIUM SHALL BE PLACED IN EVEN LIFTS NO GREATER THAN 8 INCHES IN DEPTH, AS MEASURED LOOSELY. LIFTS SHALL BE MODERATELY COMPACTED BY USE OF A SAND OR WATER FILLED LAWN ROLLER. MECHANICAL COMPACTION WITH JUMPING JACKS OR SIMILAR EQUIPMENT IS PROHIBITED.
3. GROWING MEDIUM IN EACH FACILITY SHALL BE PLACED AND SHAPED THE SAME DAY AND IMMEDIATELY UPON COMPLETION ITS SURFACE SHALL BE PROTECTED WITH STRAW MATTING OR JUTE MATTING.
4. IMPERMEABLE LINER SHALL BE USED ONLY IF REQUIRED ON PROJECT PLANS.
5. VEGETATION: INSTALL PER PLANTING SCHEDULE.
6. IN UNLINED FACILITIES, BOTTOM OF PERFORATED DRAIN PIPE SHALL BE SET AT 2 1/2" ABOVE EXISTING SUBGRADE. IN LINED FACILITIES, BOTTOM PERFORATED DRAIN PIPE SHALL BE SET AT BASE OF DRAIN ROCK LAYER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREETSIDE PLANTERS SECTION VIEW

NO SCALE	JANUARY 2018	NO. 604B



NOTES

1. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE.
2. THROUGH VEGETATED CURB EXTENSIONS SIDEWALK ELEVATION SHALL BE SET AT 1.5% RISE FROM CALCULATED TOP FACE OF CURB ELEVATION, DETERMINED AS IF CURB WAS RUNNING ON A STRAIGHT, HORIZONTAL ALIGNMENT.
3. MINIMUM INTERIOR PLANTER WIDTH IS 3 FEET. A MINIMUM OF 4 FEET INTERIOR PLANTER WIDTH IS REQUIRED FOR STREET TREES IN PLANTER.
4. PLANTER SHALL BE FLAT BOTTOM IN ALL DIRECTION TO WITHIN HALF AN INCH.
5. ALL PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS, AND SHALL HAVE A LIGHT BROOM TEXTURED FINISH.
6. STREETSIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
7. ACTUAL ELEVATIONS AND RELATIONSHIPS BETWEEN FEATURES TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.
8. WATER SERVICES SHALL BE LOCATED NO CLOSER TO CURB EXTENSIONS THAN POINT OF TANGENCY.

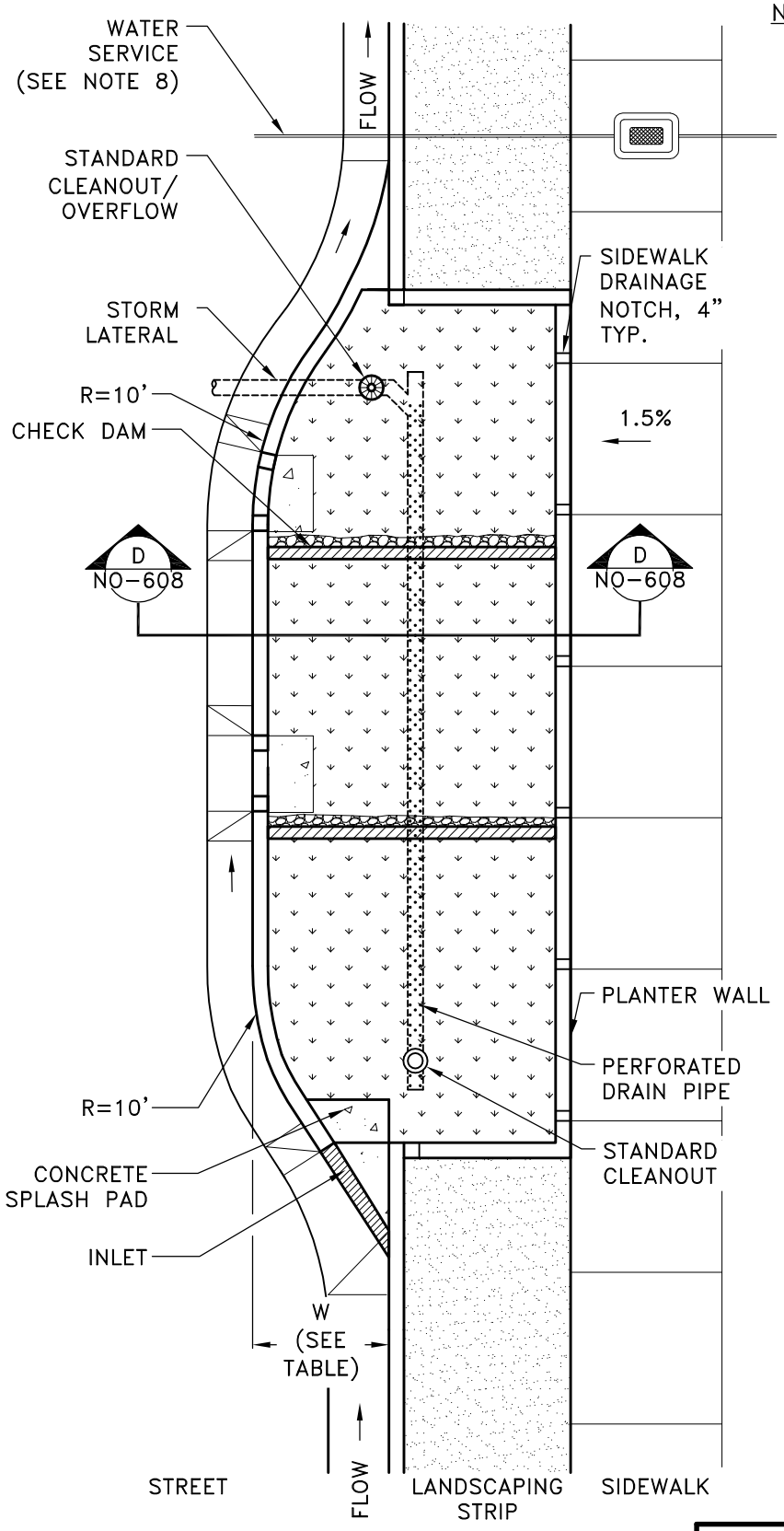
CURB EXTENSION WIDTH TABLE

STREET WIDTH	W
28'	3'-0"
≥30'	4'-0"

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CURB EXTENSION PLANTER AT INTERSECTION

NO SCALE	JANUARY 2018	NO. 605



NOTES

1. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR OVERFLOW PIPING SYSTEM AS APPLICABLE.
2. THROUGH VEGETATED CURB EXTENSIONS SIDEWALK ELEVATION SHALL BE SET AT 1.5% RISE FROM CALCULATED TOP FACE OF CURB ELEVATION, DETERMINED AS IF CURB WAS RUNNING ON A STRAIGHT, HORIZONTAL ALIGNMENT.
3. MINIMUM INTERIOR FACILITY WIDTH IS 3 FEET. A MINIMUM OF 4 FEET INTERIOR FACILITY WIDTH IS REQUIRED FOR STREET TREES IF INCLUDING STREET TREES.
4. PLANTER SHALL BE FLAT BOTTOM IN ALL DIRECTION TO WITHIN HALF AN INCH.
5. ALL PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS AND SHALL HAVE A LIGHT BROOM TEXTURED FINISH.
6. STREETSIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
7. ACTUAL ELEVATIONS AND RELATIONSHIPS BETWEEN FEATURES TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.
8. WATER SERVICE LINE SHALL BE LOCATED NO CLOSER TO CURB EXTENSIONS THAN POINT OF TANGENCY.

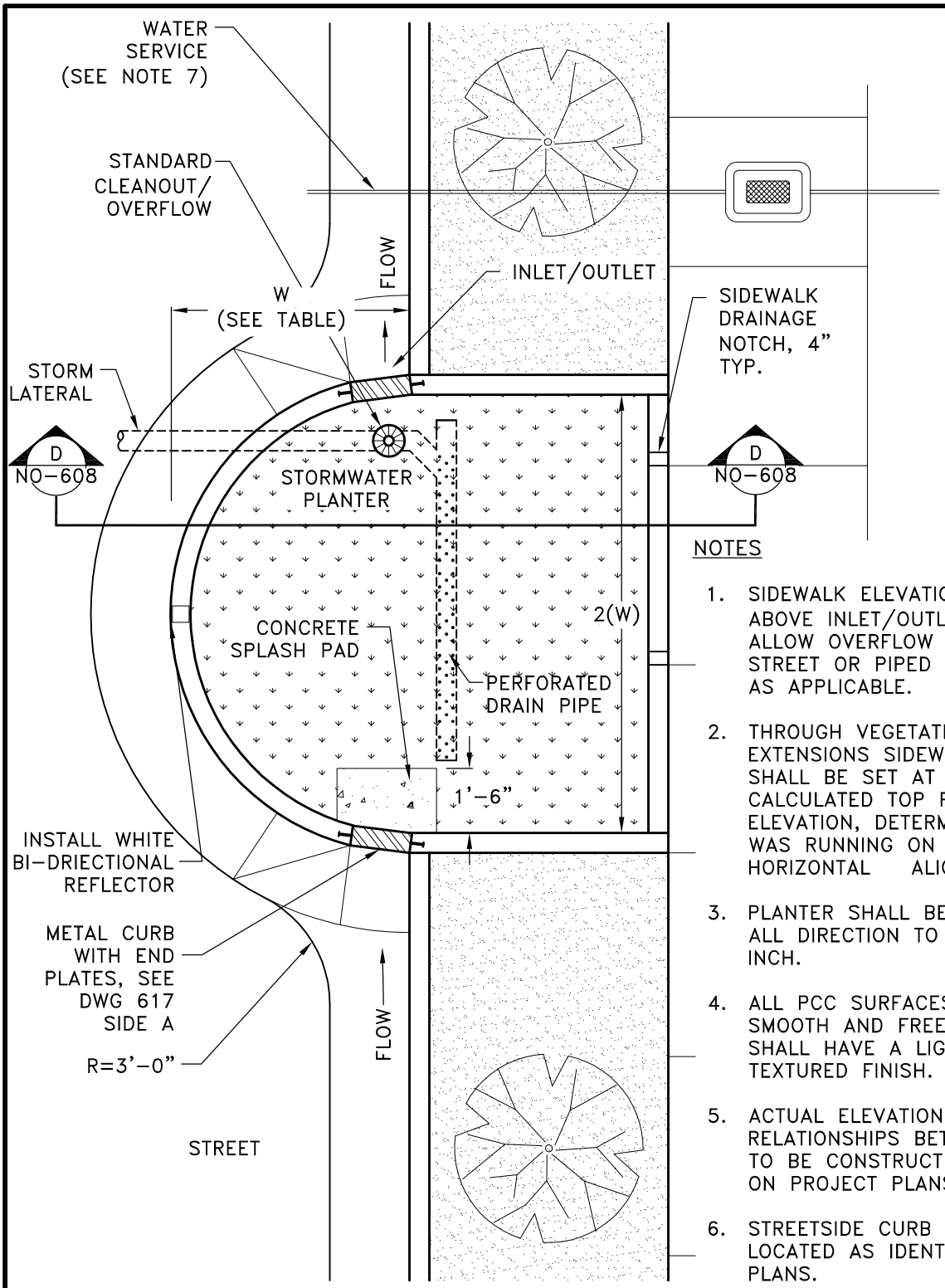
CURB EXTENSION WIDTH TABLE

STREET WIDTH	W
28'	4'-0"
≥30'	5'-0"

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CURB EXTENSION PLANTER PLAN VIEW

NO SCALE	JANUARY 2018	NO. 606



NOTES

1. SIDEWALK ELEVATION MUST BE SET ABOVE INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE.
2. THROUGH VEGETATED CURB EXTENSIONS SIDEWALK ELEVATION SHALL BE SET AT 1.5% RISE FROM CALCULATED TOP FACE OF CURB ELEVATION, DETERMINED AS IF CURB WAS RUNNING ON A STRAIGHT, HORIZONTAL ALIGNMENT.
3. PLANTER SHALL BE FLAT BOTTOM IN ALL DIRECTION TO WITHIN HALF AN INCH.
4. ALL PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS AND SHALL HAVE A LIGHT BROOM TEXTURED FINISH.
5. ACTUAL ELEVATIONS AND RELATIONSHIPS BETWEEN FEATURES TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.
6. STREETSIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
7. WATER SERVICES SHALL BE LOCATED NO CLOSER TO CURB EXTENSIONS THAN POINT OF TANGENCY.

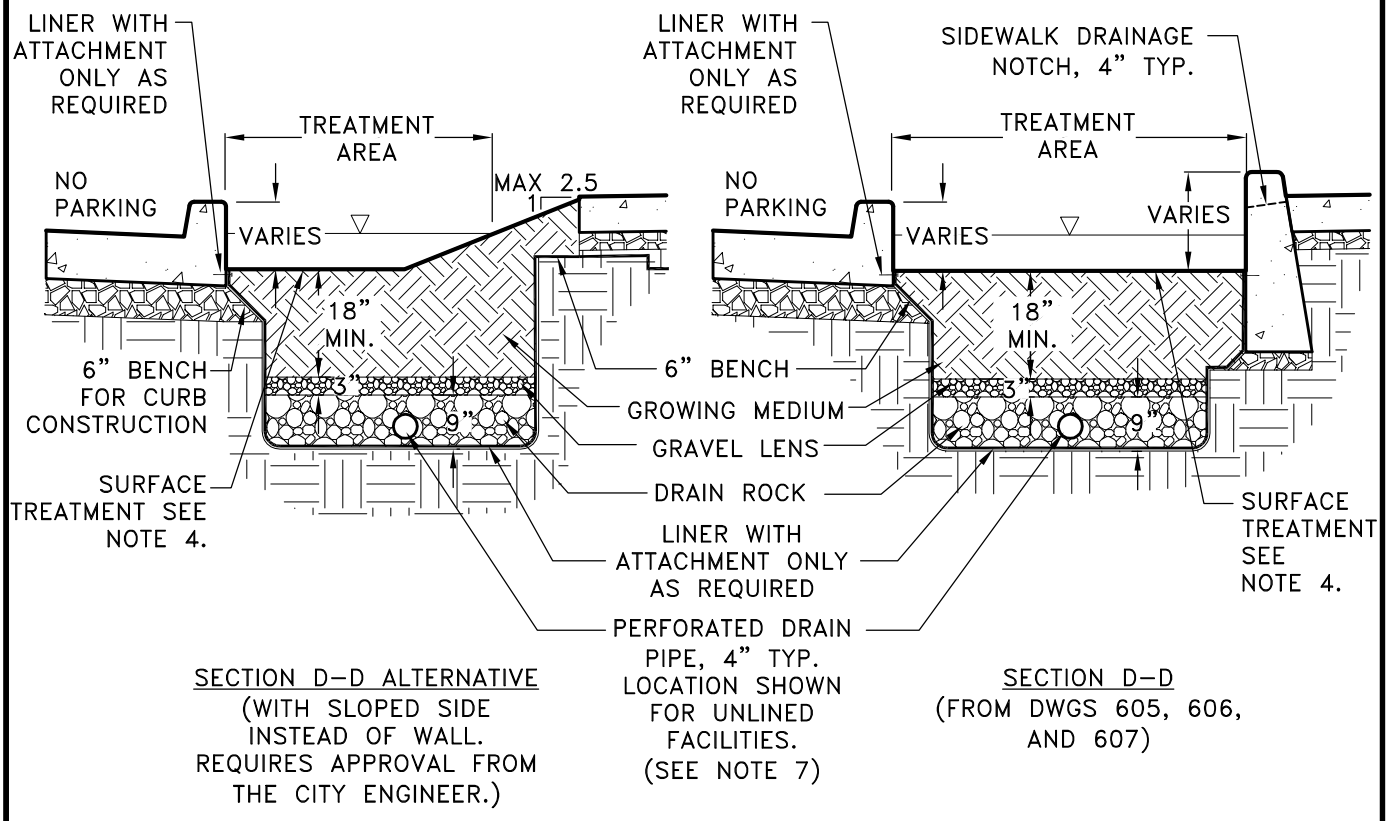
CURB EXTENSION WIDTH TABLE

STREET WIDTH	W
28'	4'-0"
≥30'	5'-0"

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CURB EXTENSION POD PLAN VIEW

NO SCALE	JANUARY 2018	NO. 607



SECTION D–D ALTERNATIVE
(WITH SLOPED SIDE INSTEAD OF WALL. REQUIRES APPROVAL FROM THE CITY ENGINEER.)

SECTION D–D
(FROM DWGS 605, 606, AND 607)

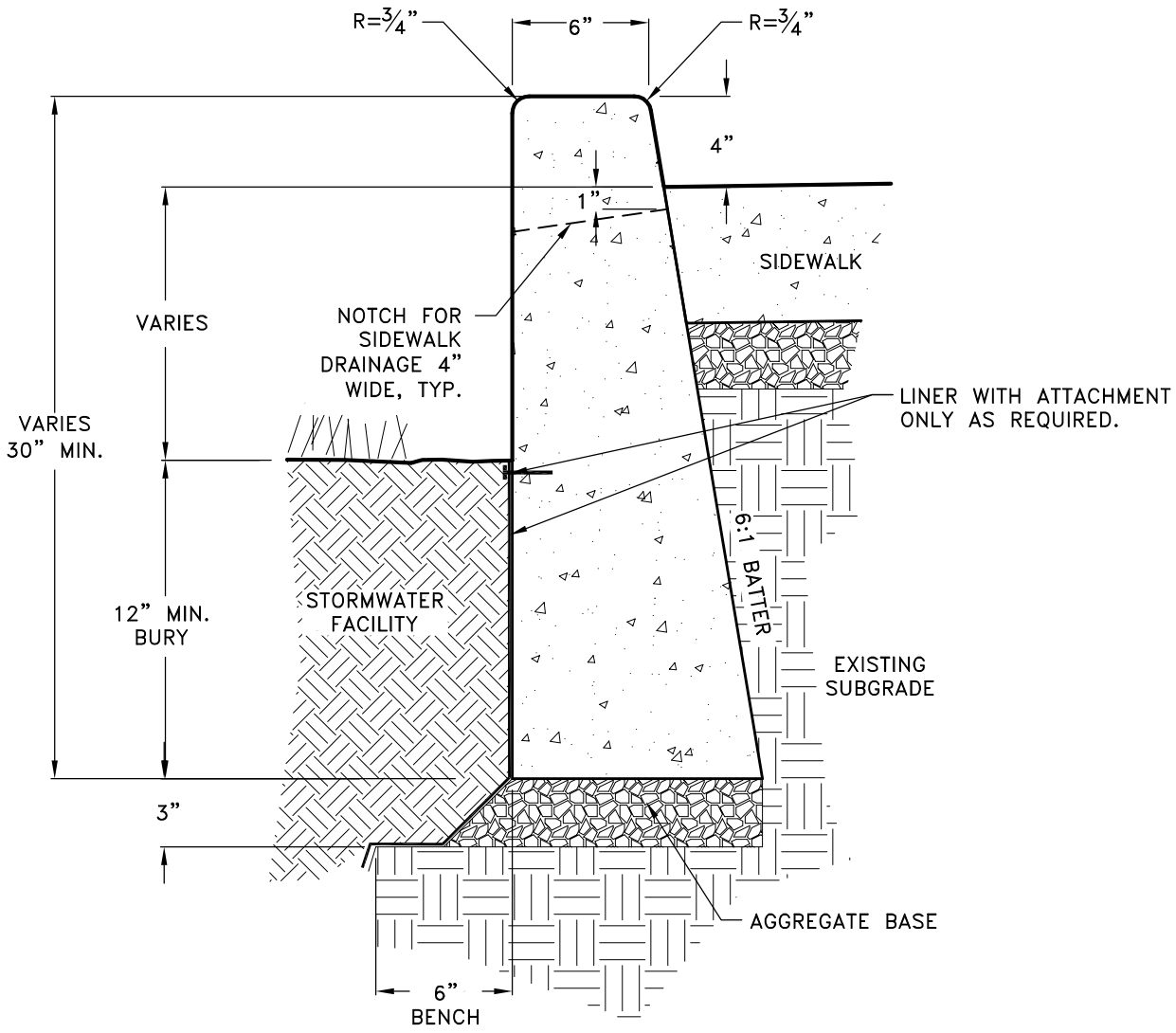
NOTES

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
3. GROWING MEDIUM SHALL BE PLACED IN EVEN LIFTS NO GREATER THAN 8 INCHES IN DEPTH, AS MEASURED LOOSELY. LIFTS SHALL BE MODERATELY COMPACTED BY USE OF A SAND OR WATER FILLED LAWN ROLLER. MECHANICAL COMPACTION WITH JUMPING JACKS OR SIMILAR EQUIPMENT IS PROHIBITED.
4. GROWING MEDIUM IN EACH FACILITY SHALL BE PLACED AND SHAPED THE SAME DAY AND IMMEDIATELY UPON COMPLETION ITS SURFACE SHALL BE PROTECTED WITH STRAW MATTING OR JUTE MATTING.
5. IMPERMEABLE LINER SHALL BE USED ONLY IF REQUIRED ON PROJECT PLANS.
6. VEGETATION: INSTALL PER PLANTING SCHEDULE.
7. IN UNLINED FACILITIES, BOTTOM OF PERFORATED DRAIN PIPE SHALL BE SET AT 2 1/2" ABOVE EXISTING SUBGRADE. IN LINED FACILITIES, BOTTOM PERFORATED DRAIN PIPE SHALL BE SET AT BASE OF DRAIN ROCK LAYER.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CURB EXTENSION PLANTER & POD SECTION VIEWS

NO SCALE	JANUARY 2015	NO. 608



NOTES

1. ALL PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS AND SHALL HAVE A LIGHT BROOM TEXTURED FINISH.

2. PLANTER WALLS EXCEEDING 40 FEET IN LENGTH REQUIRE SPECIAL DESIGN CONSIDERATION FOR A KEYED JOINT.

3. PLACE A CONTRACTION JOINT IN THE FACE OF THE WALL AT EACH SIDEWALK DRAINAGE NOTCH. CONTRACTION JOINTS SHALL BE PLACED IN LINE WITH ONE OF THE DRAINAGE NOTCH CORNERS.

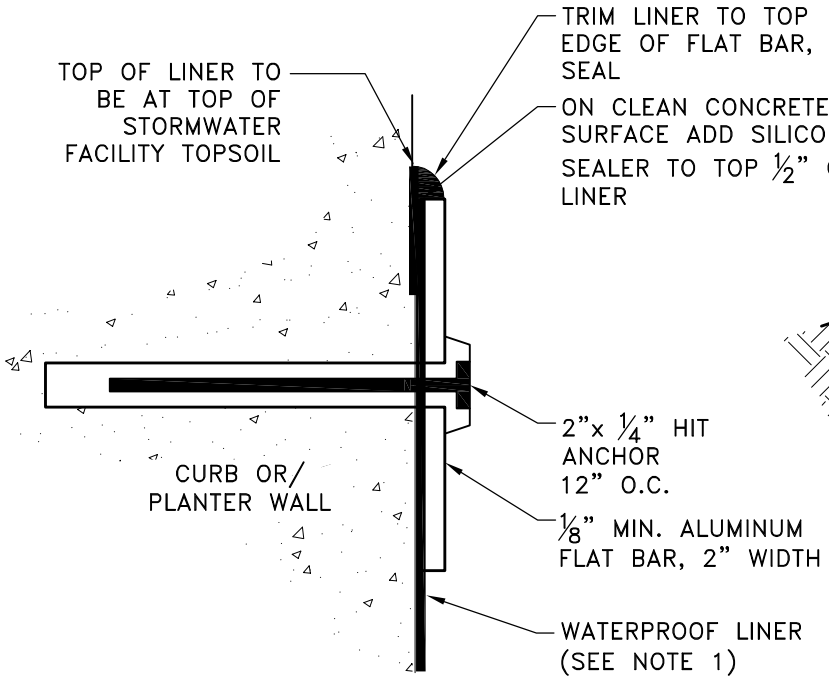
4. CONTRACTION JOINT SPACING SHALL NOT EXCEED 10 FEET REGARDLESS OF LOCATION OF DRAINAGE NOTCH.

5. SIDEWALK ELEVATION MUST BE SET ABOVE STREET INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE.

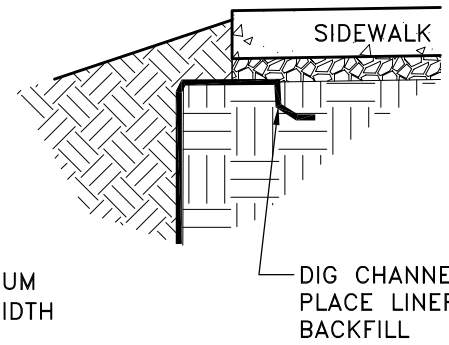
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

PLANTER WALL

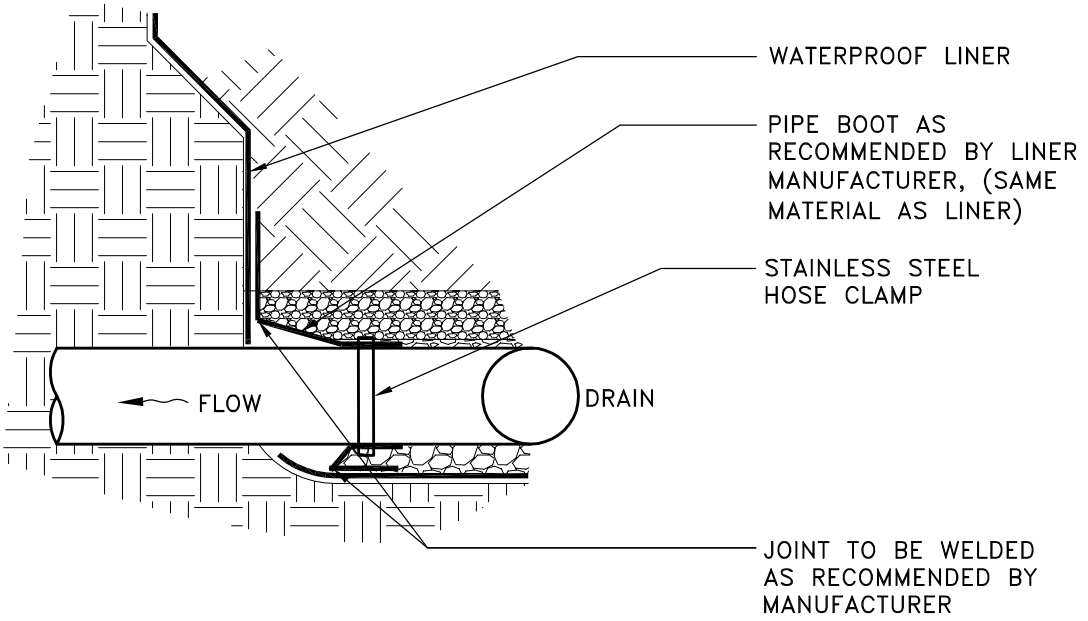
NO SCALE	JANUARY 2015	NO. 609



LINER ATTACHMENT TO WALL



LINER EMBEDMENT ON SLOPED FACILITY



PIPE BOOT ATTACHMENT TO LINER

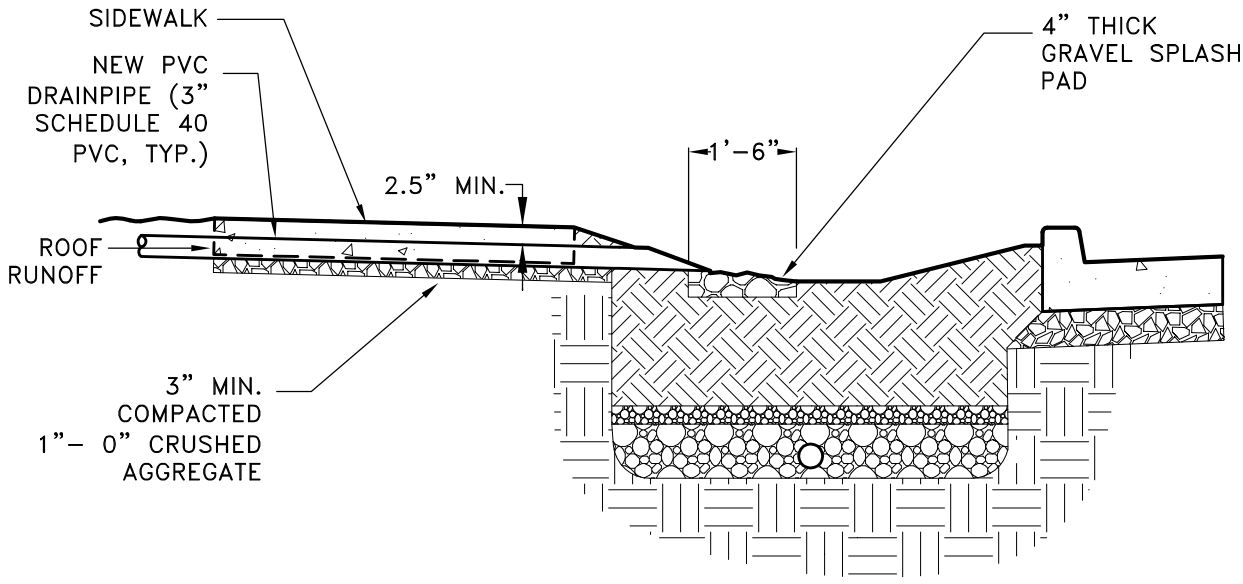
NOTES

1. LINER MATERIALS TO BE PER 603.03.00. LINER TO EXTEND FROM TOP OF TOPSOIL TO THE BOTTOM OF EXCAVATION.

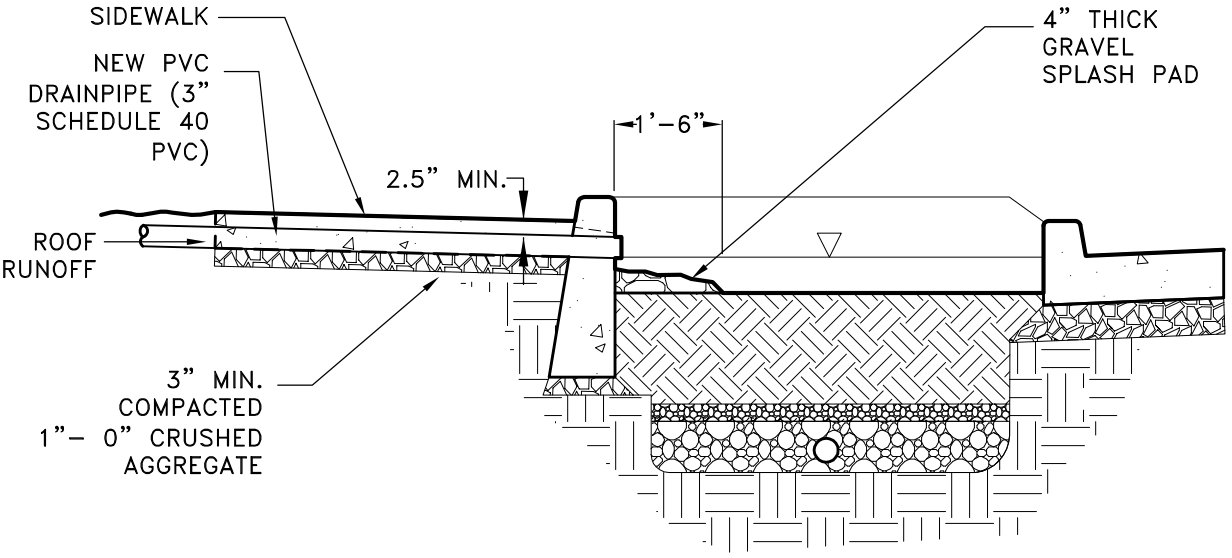
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

LINER ATTACHMENT DETAILS

NO SCALE	JANUARY 2015	NO. 610



ROOF DRAIN TO SWALE

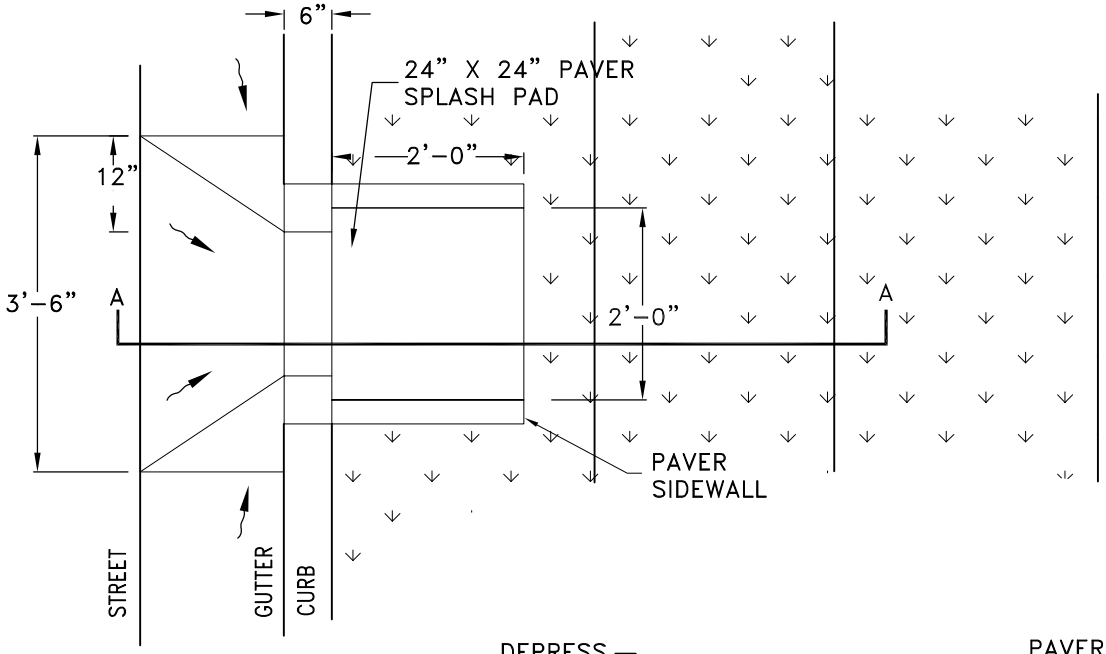


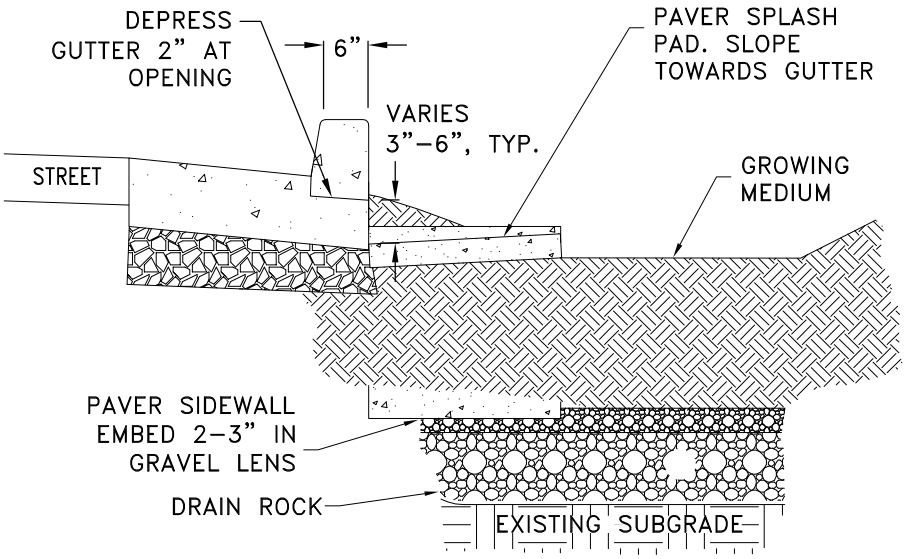
ROOF DRAIN TO PLANTER

NOTES

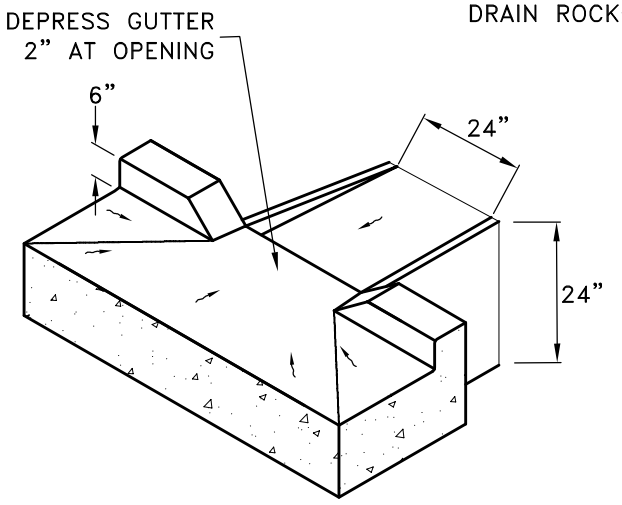
1. INVERT ELEVATION OF ROOF DRAIN PIPE SHALL BE SET TO MATCH GUTTER FLOW ELEVATION.
2. MITER PIPE END TO MATCH SIDE SLOPE OF SWALE. CONCRETE COLLAR REQUIRED TO PROTECT PIPE END AT SWALE.

CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
ROOF DRAIN CONNECTION TO SWALE AND PLANTER		
NO SCALE	JANUARY 2015	NO. 611





SECTION A-A



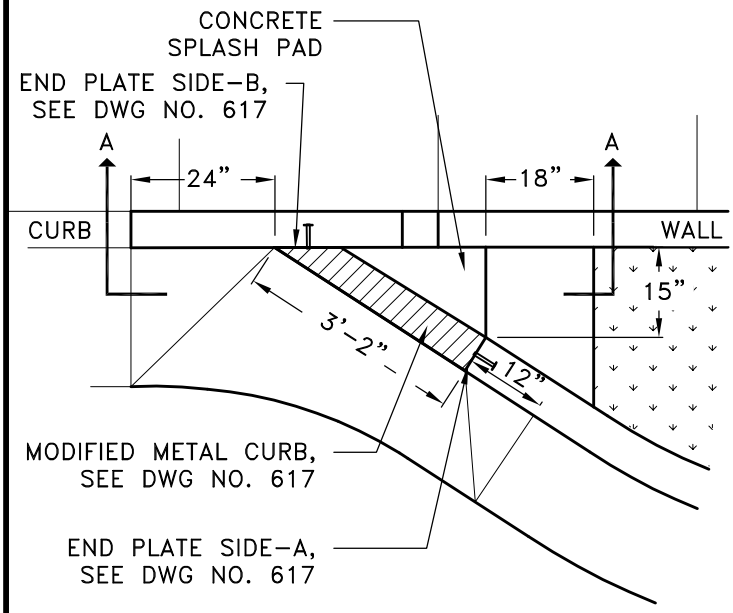
NOTES

1. SIDEWALL AND SPLASH PAD PAVER STONES SHALL BE WILLAMETTE GRAYSTONE 24" X 24" CITYSTONE XL, OR APPROVED EQUAL.
2. PLAN AND PROFILE VIEWS ON THIS DRAWING DEPICT A PAVER SPLASH PAD INSTALLED IN A STREETSIDE SHALLOW SWALE.
3. ALL EXPOSED PCC SURFACES SHALL BE SMOOTH AND FREE OF DEFECTS, AND SHALL HAVE A LIGHT BROOM FINISH.

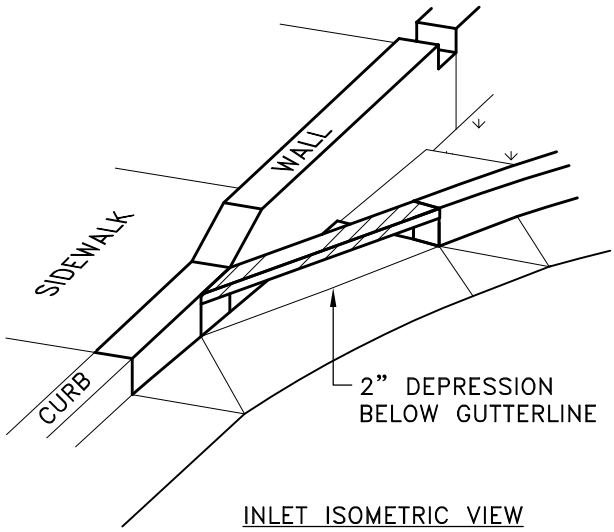
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

TYPICAL STREETSIDE CURB NOTCH PAVER SPLASH PAD

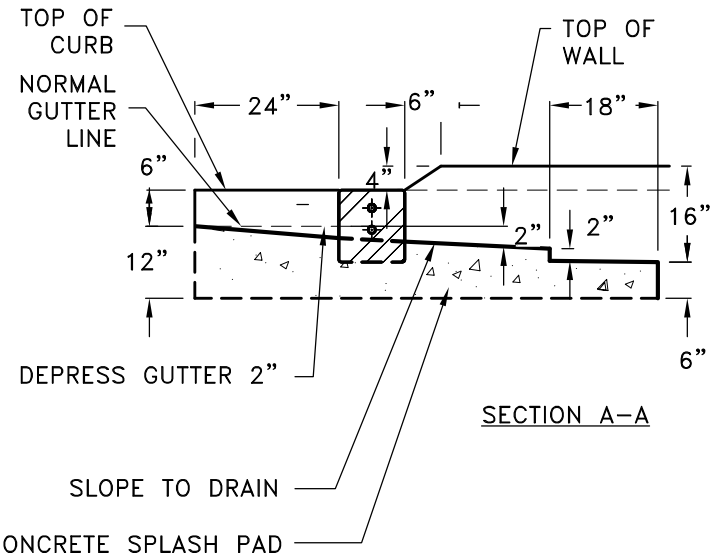
NO SCALE	AUGUST 2020	NO. 612



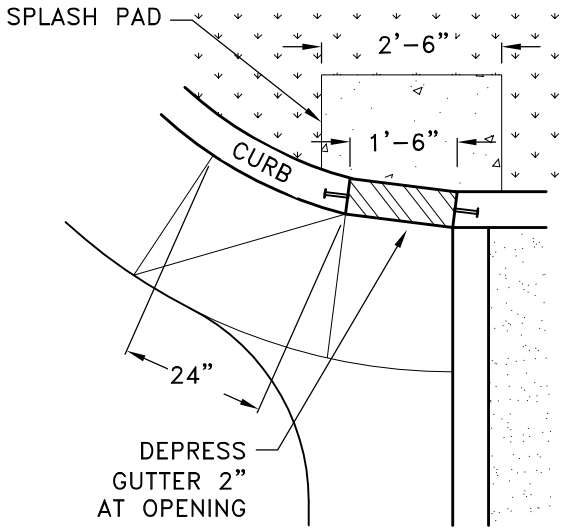
INLET PLAN VIEW



INLET ISOMETRIC VIEW



SECTION A–A



POD INLET PLAN VIEW

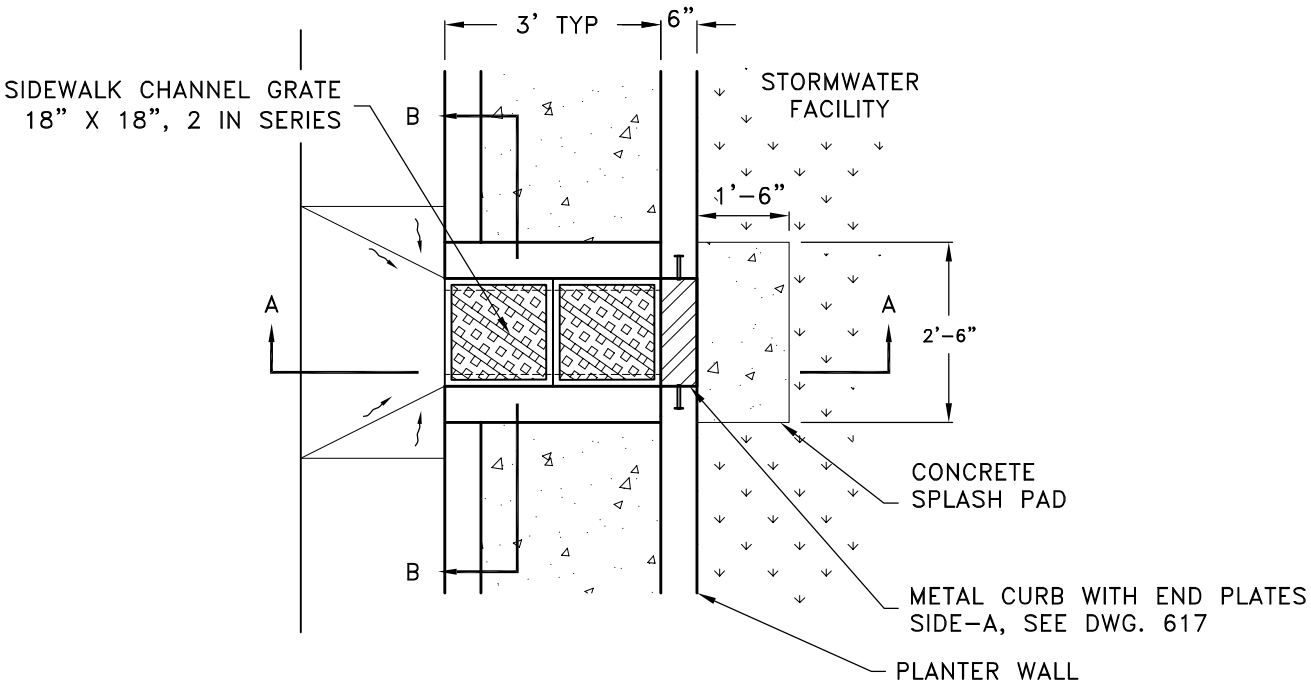
NOTES

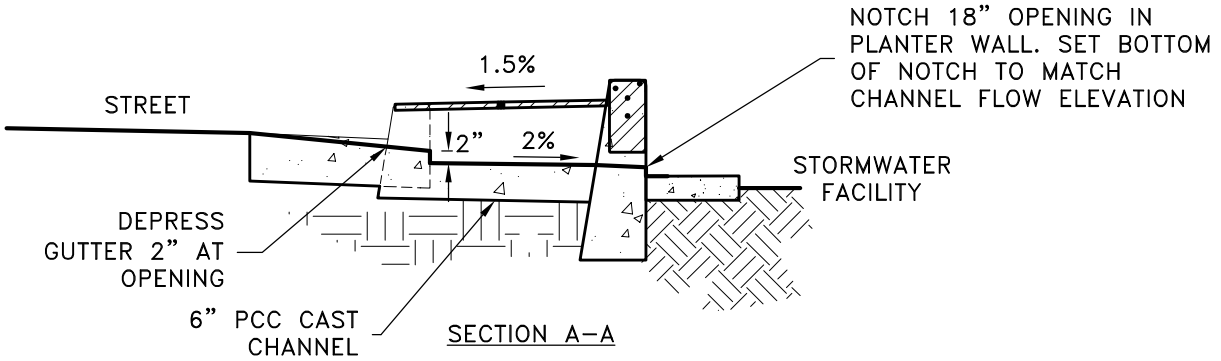
1. ADDITIONAL CURB NOTCHES MAY BE ADDED IMMEDIATELY DOWNSTREAM OF EACH CHECK DAM TO MINIMIZE POTENTIAL BACKFLOW.
2. INLET MAY BE MODIFIED WITH APPROVAL OF CITY ENGINEER TO MAXIMIZE FLOW ENTRY TO STORMWATER FACILITY.

CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

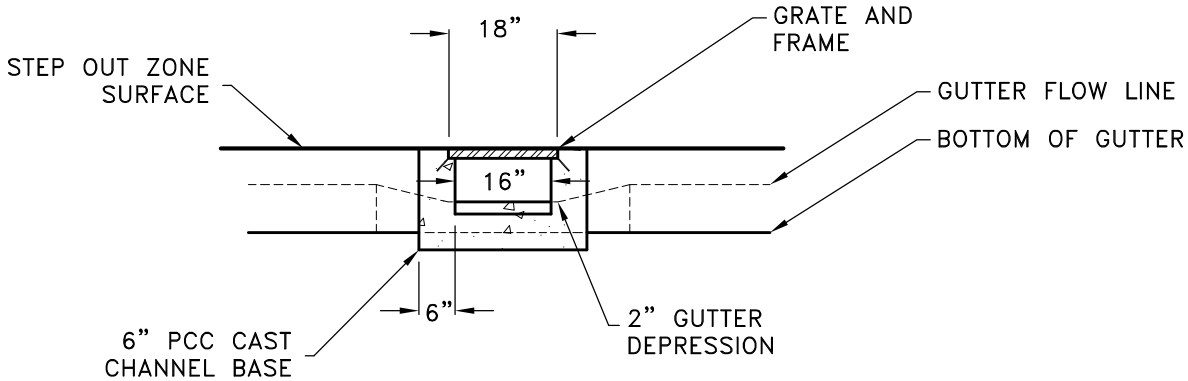
CURB EXTENSION INLET

NO SCALE	JULY 2019	NO. 613





SECTION A-A



SECTION B-B

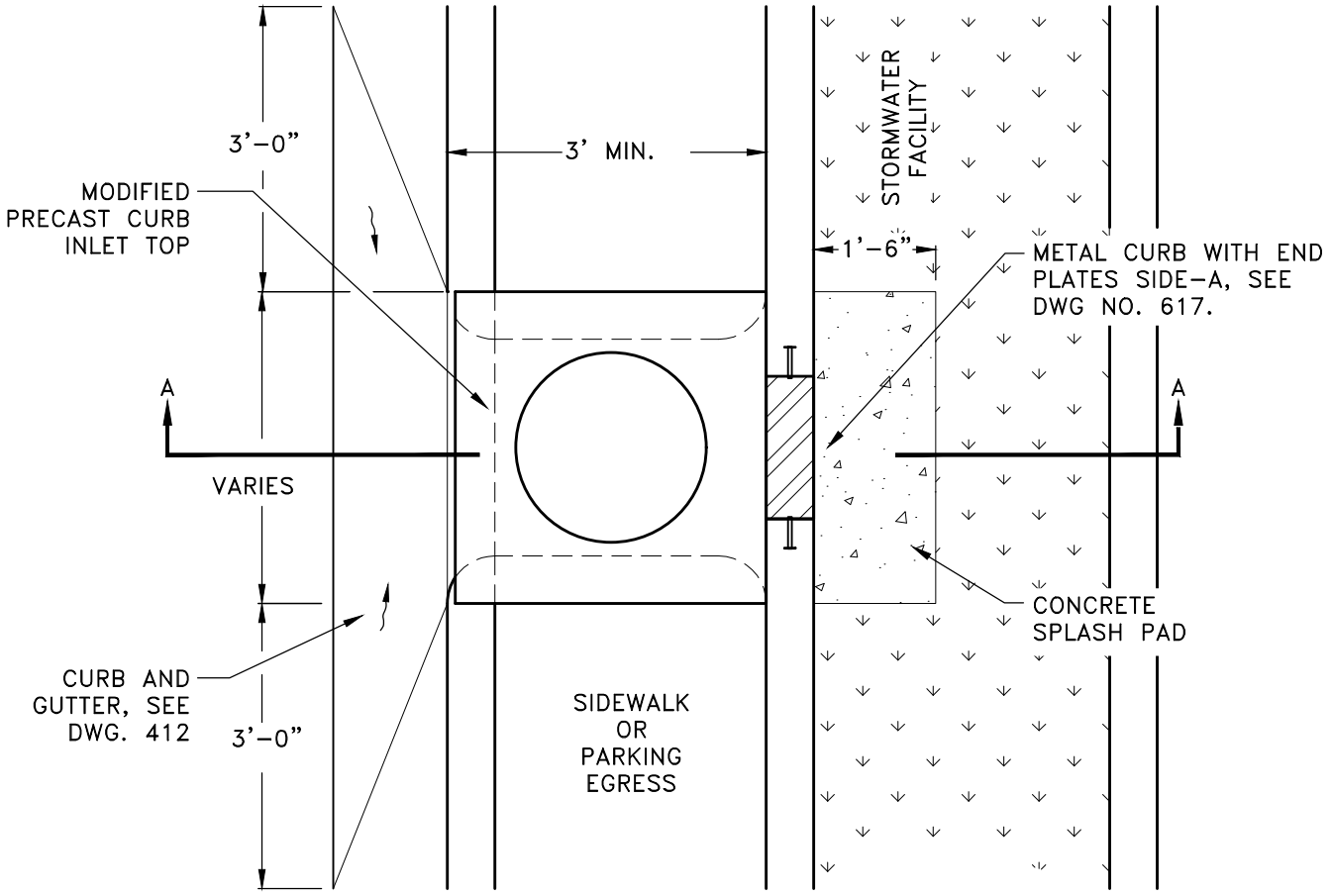
NOTES

1. CHANNEL GRATES SHALL BE "INTERLAKEN" 18" GRATE AS MANUFACTURED BY IRON AGE DESIGNS, MODEL IN18-18I13.
2. FRAME TYPE FOR CHANNEL GRATES SHALL BE "E" EMBED STYLE AS PROVIDED BY CHANNEL GRATE MANUFACTURER.

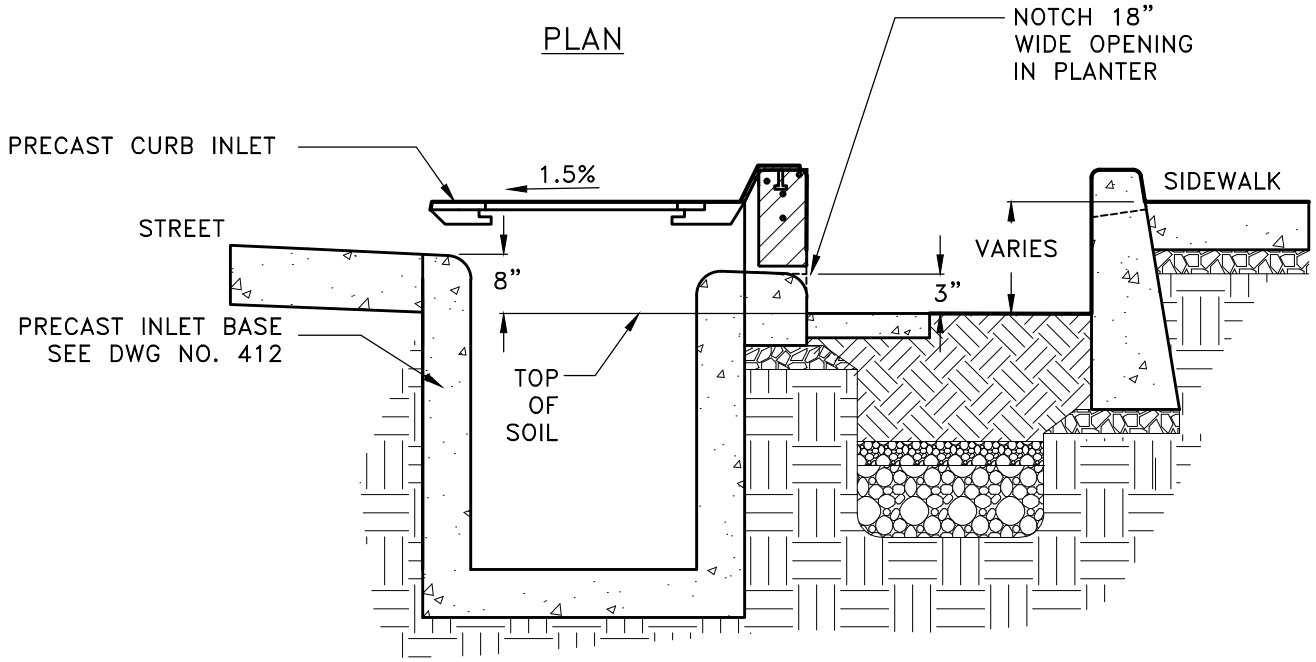
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

STREETSIDE GRATED INLET

NO SCALE	JULY 2019	NO. 614



PLAN



SECTION A-A

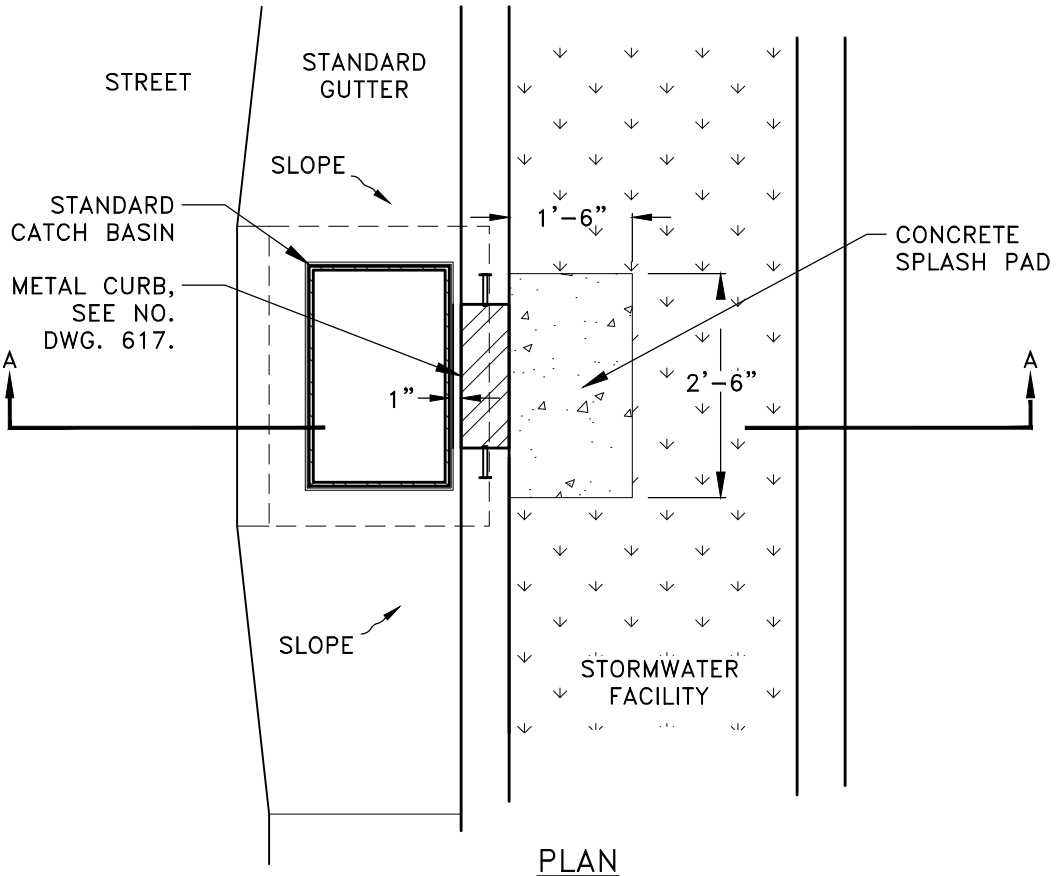
NOTES

1. CURB INLET TOP SHALL BE CUSTOM CAST FOR CURB OPENING ON BOTH SIDES.
2. USE STANDARD STORM MANHOLE COVER FOR LID.
3. HANDRAIL MAY BE REQUIRED WHEN DEPTH OF PLANTER ADJACENT TO SIDEWALK EXCEEDS 20".

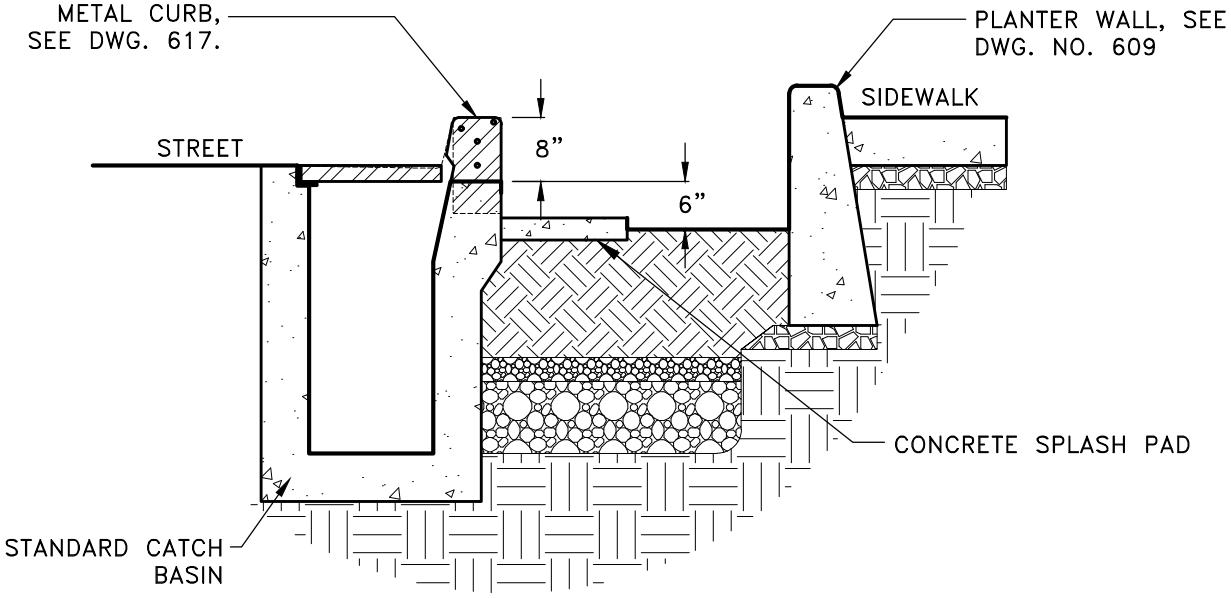
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CURB INLET SEDIMENT COLLECTOR WITH PLANTER

NO SCALE	FEBRUARY 2024	NO. 615



PLAN



SECTION A-A

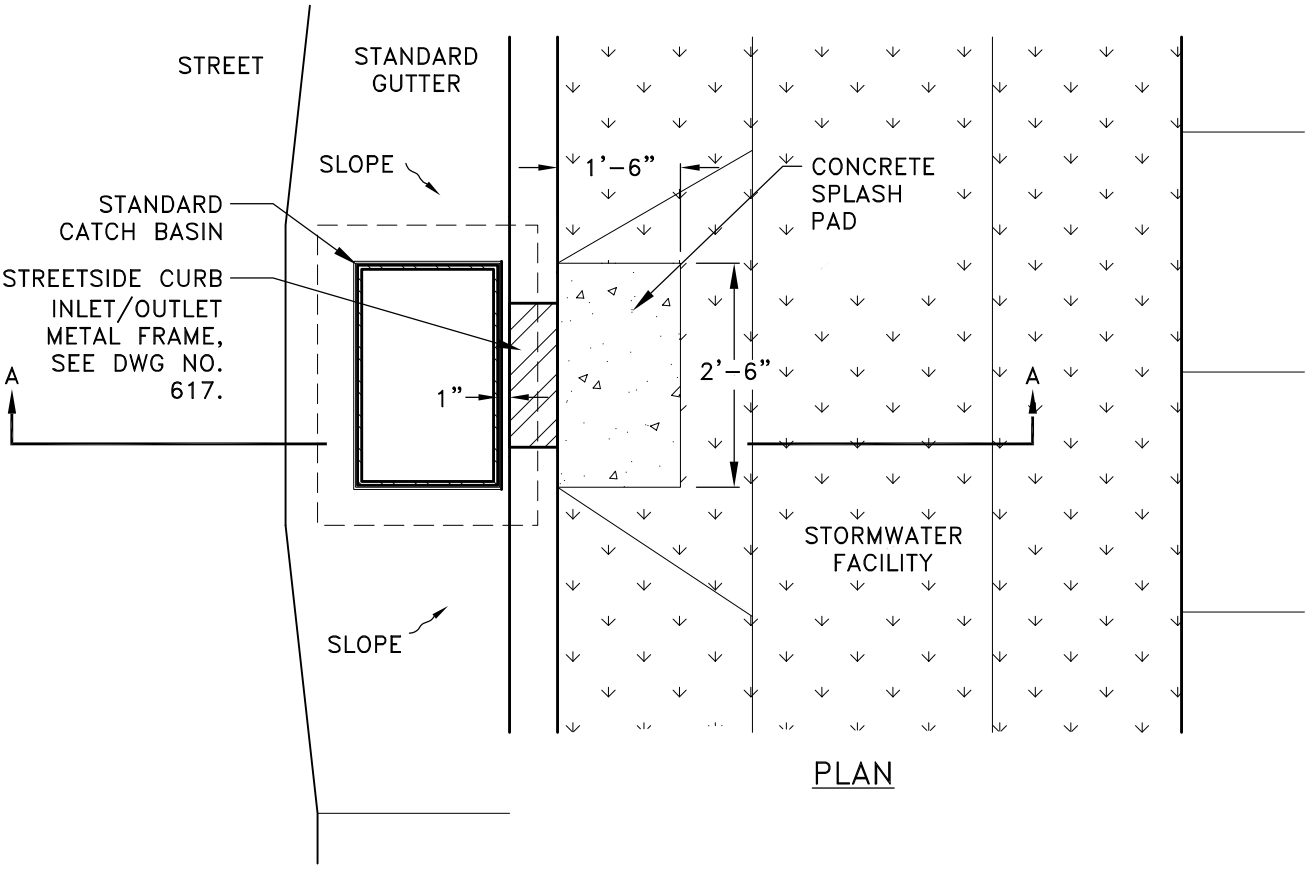
NOTES

1. HANDRAIL MAY BE REQUIRED WHEN DEPTH OF PLANTER ADJACENT TO SIDEWALK EXCEEDS 20".

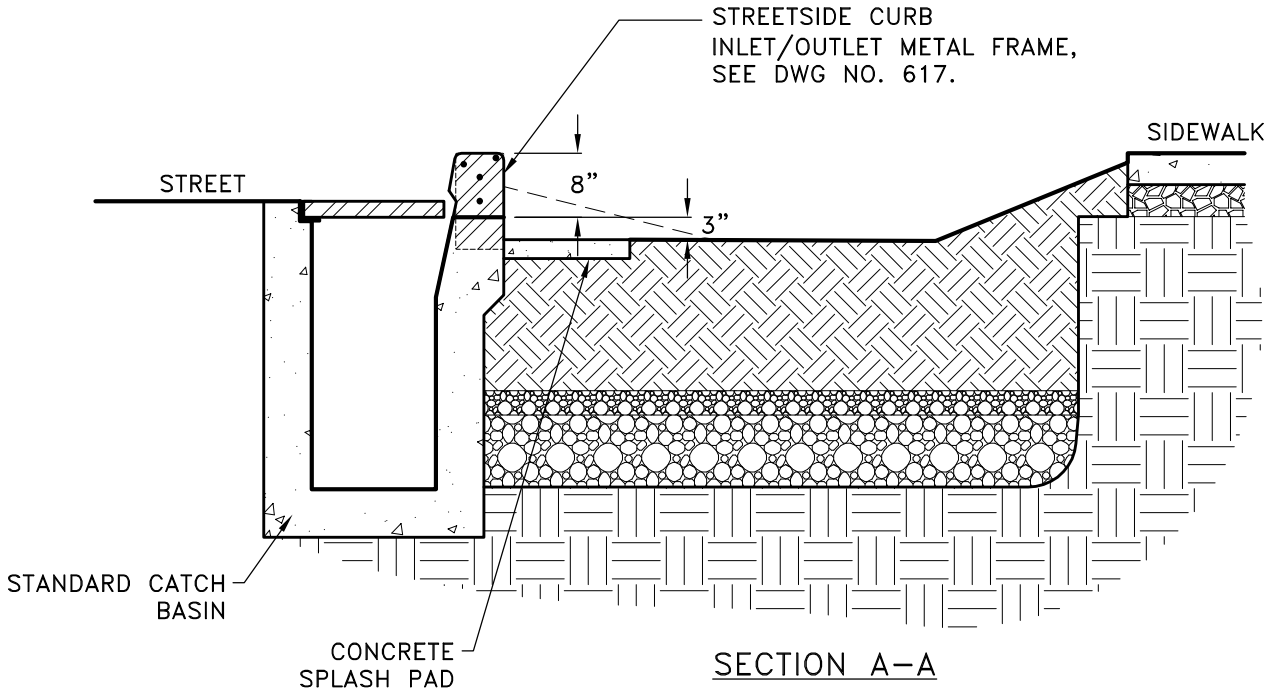
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

CATCH BASIN SEDIMENT COLLECTOR WITH PLANTER

NO SCALE	FEBRUARY 2024	NO. 616A

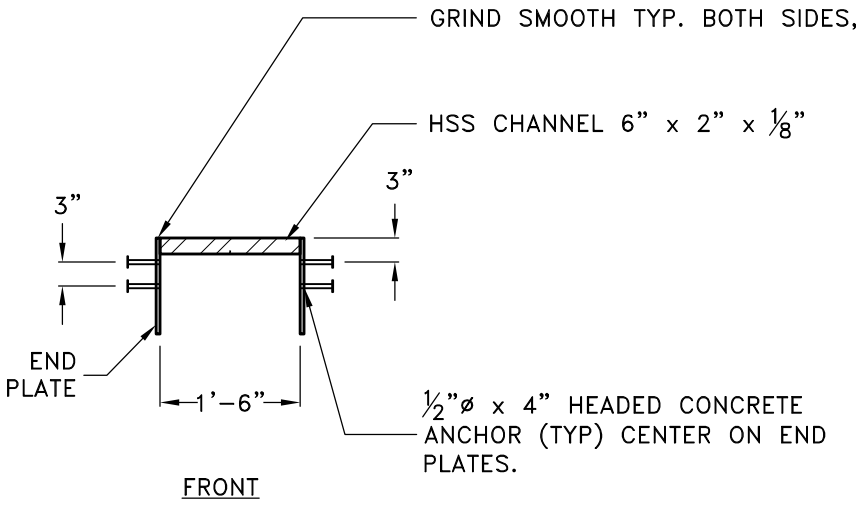


PLAN

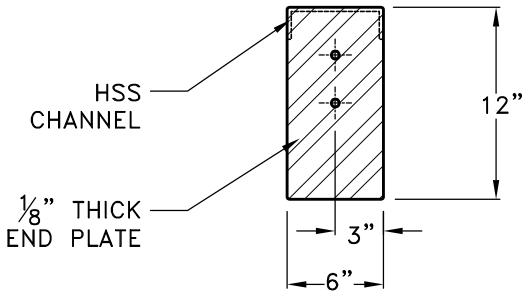


SECTION A-A

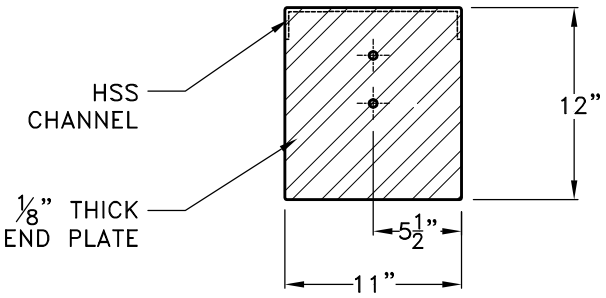
CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
CATCH BASIN SEDIMENT COLLECTOR WITH SWALE		
NO SCALE	JULY 2019	NO. 616B



FRONT



END PLATE SIDE-A

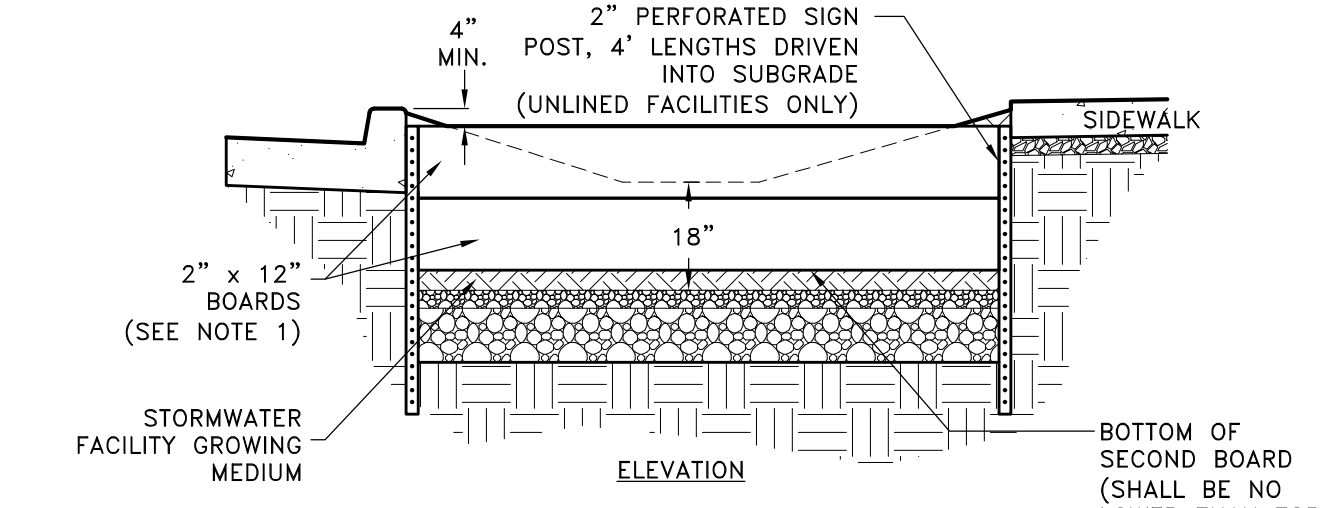


END PLATE SIDE-B

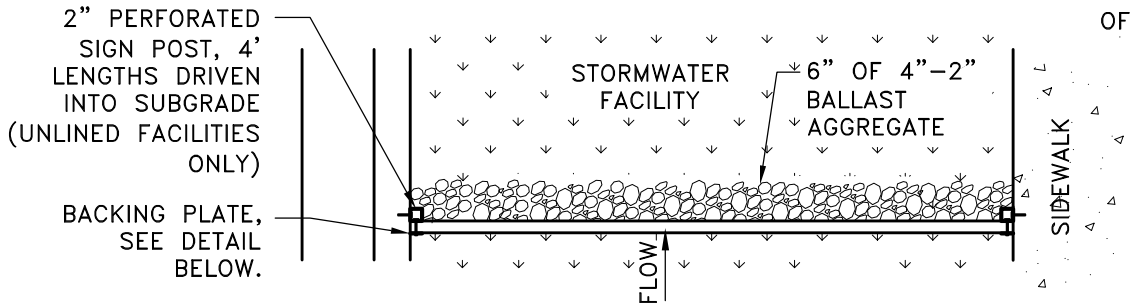
NOTES

1. SINGLE BEVEL GROOVE WELD.

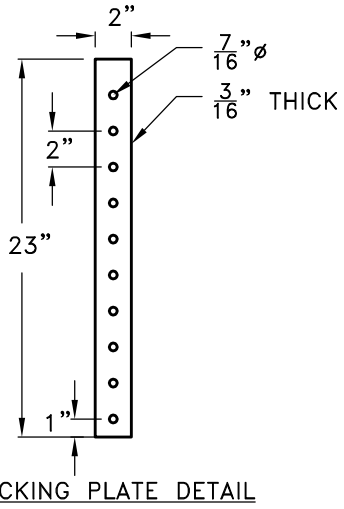
CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
METAL CURB DETAILS		
NO SCALE	JANUARY 2015	NO. 617



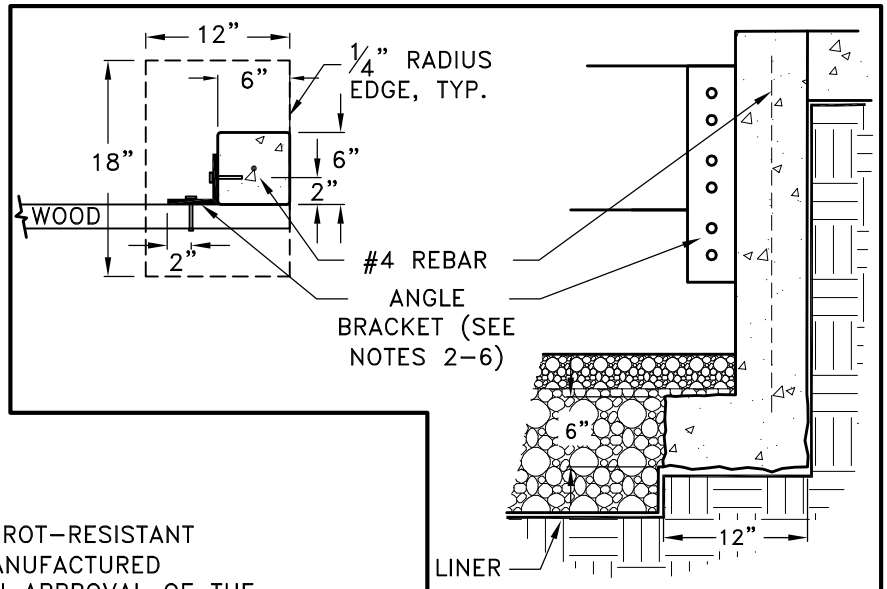
ELEVATION



PLAN



BACKING PLATE DETAIL



COLUMN DETAIL

NOTE: COLUMN DETAIL FOR USE IN LINED FACILITIES ONLY.

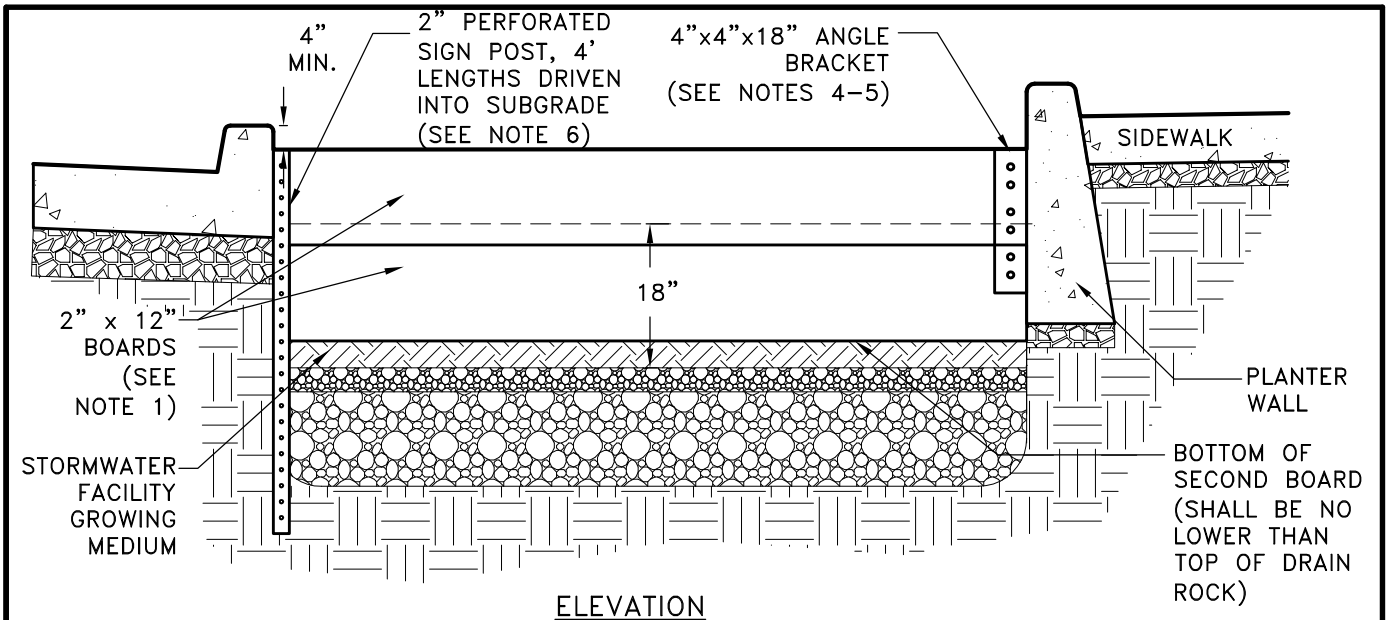
NOTES

1. LUMBER TO BE A NATURALLY ROT–RESISTANT WOOD (E.G. CEDAR, ETC.). MANUFACTURED PRODUCTS CAN BE USED WITH APPROVAL OF THE CITY ENGINEER. NO CHEMICALLY TREATED WOOD WILL BE ALLOWED.
2. FASTENERS TO BE STAINLESS STEEL.
3. 4" X 4" X 18" ANGLE BRACKET AND BACKING PLATE TO BE MADE OF MIN. 3/16" STAINLESS STEEL.
4. TOP OF BACKING PLATE, ANGLE BRACKET, AND SIGN POSTS TO BE NO HIGHER THAN TOP OF CHECK DAM.
5. MIN. 3 BOLTS TO CONCRETE, MIN. 2 BOLTS PER BOARD. USE 5/16" DIA. BOLTS.
6. SEE BRACKET DETAIL ON DWG 619.

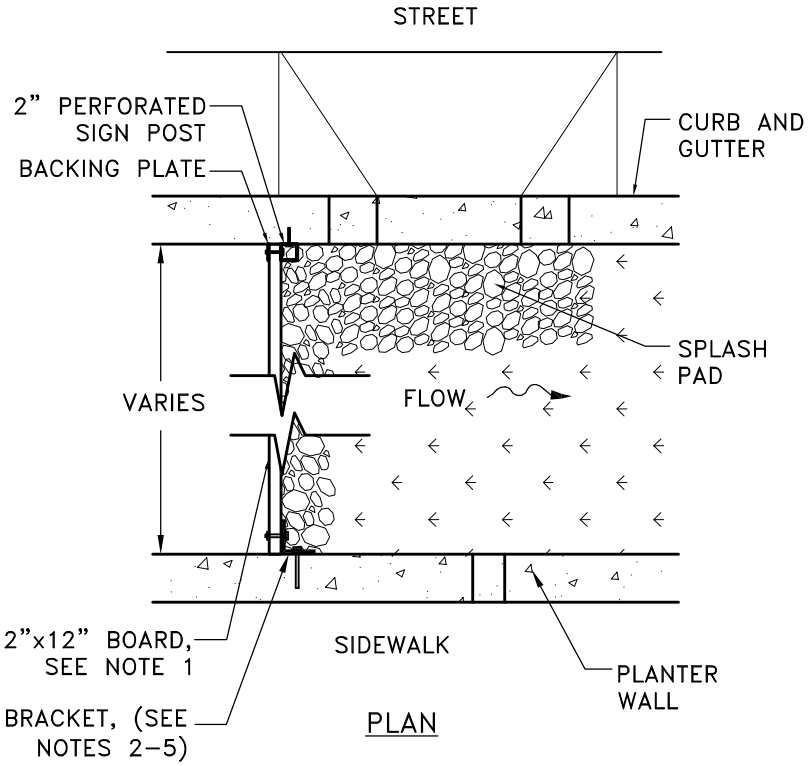
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

WOOD CHECK DAM FOR SWALE

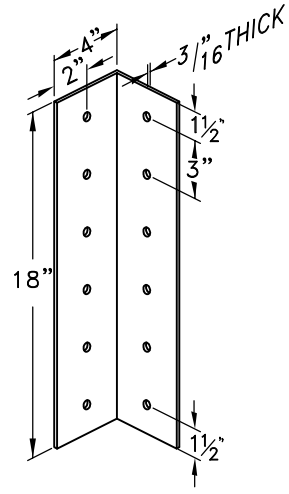
NO SCALE	JANUARY 2015	NO. 618



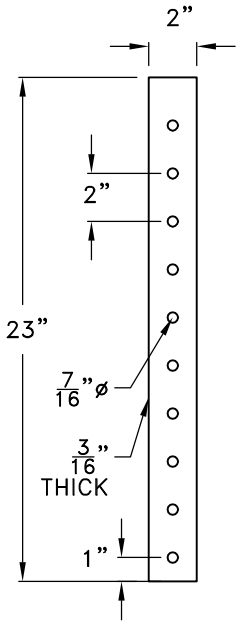
ELEVATION



PLAN



BRACKET DETAIL



BACKING PLATE DETAIL

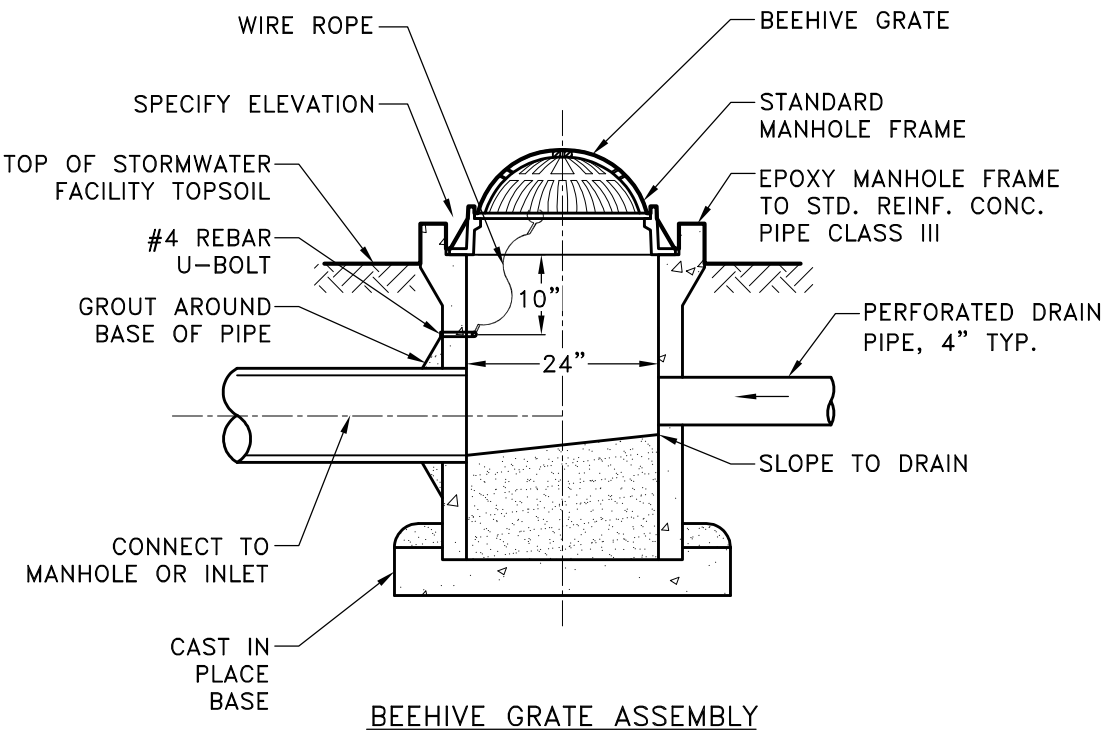
NOTES

1. LUMBER TO BE A NATURALLY ROT-RESISTANT WOOD (E.G. CEDAR, ETC.). MANUFACTURED PRODUCTS CAN BE USED WITH APPROVAL. NO CHEMICALLY TREATED WOOD WILL BE ALLOWED.
2. ALL FASTENERS TO BE STAINLESS STEEL OR ALUMINUM.
3. 4" X 4" X 18" ANGLE BRACKET TO BE MADE OF MIN. 3/16" STAINLESS STEEL, OR ALUMINUM.
4. TOP OF BRACKET TO BE NO HIGHER THAN TOP OF CHECK DAM.
5. MIN. 3 BOLTS TO CONCRETE, MIN. 2 BOLTS PER BOARD. USE 5/16" DIA. BOLTS.
6. FOR LINED FACILITIES USE, COLUMN DETAIL FROM DWG. 618 FOR STREET CURB SIDE.

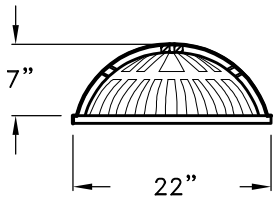
CITY OF ALBANY, OREGON
PUBLIC WORKS DEPARTMENT

WOOD CHECK DAM FOR PLANTER

NO SCALE	JANUARY 2015	NO. 619



BEEHIVE GRATE ASSEMBLY



BEEHIVE GRATE

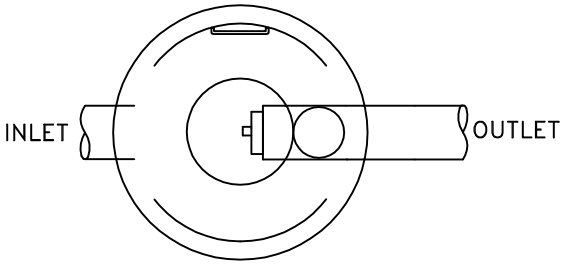
NOTES

1. WIRE ROPE TO BE 1/8" TO 3/16" STAINLESS STEEL, 7 STRANDS OF 19 WIRES.
2. SECURE GRATE IN PLACE WITH 54-INCHES OF WIRE ROPE. LOOP ENDS OF WIRE ROPE AROUND U-BOLT AND GRATE. CRIMP EACH END OF WIRE ROPE WITH 3" OVERLAP.
3. DRILL 2" DEEP HOLES INTO PIPE AND EPOXY #4 REBAR U-BOLT (2"X4") IN HOLES.
4. BEEHIVE GRATE: SEE STANDARD CONSTRUCTION SPECIFICATION.

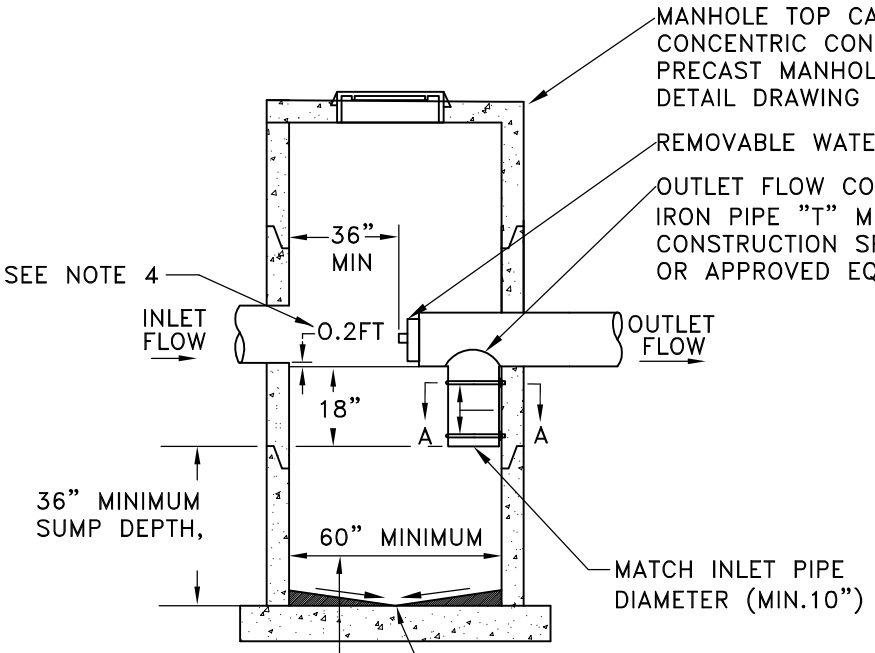
CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
BEEHIVE OVERFLOW INLET GRATE		
NO SCALE	JANUARY 2015	NO. 620

NOTES:

1. MANHOLE, BASES, BARRELS AND CONE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND APPLICABLE PROVISIONS OF THE STANDARD CONSTRUCTION SPECIFICATIONS DIV. 4 AND STD. MANHOLE DRAWING NO. 408.
2. PROVIDE SPECIAL DETAIL FOR OUTLET FLOW CONTROL EXCEEDING 18" DIA.
3. MAINTAIN 0.2' DROP INLET TO OUTLET INVERT.

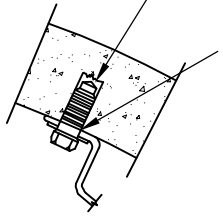


PLAN



SECTION A-A

(SEE CLAMP DETAIL THIS SHEET)



CLAMP DETAIL
N.T.S.

CITY OF ALBANY, OREGON PUBLIC WORKS DEPARTMENT		
PRETREATMENT MANHOLE		
NO SCALE	JULY 2019	NO. 621