

# Cascade Locks Public Works Design Standards

## Section 1 - General Requirements

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### 1. Purpose

- a. These Cascade Locks Public Works (CLPW) Standards are intended to:
  - i. Provide a design guide to the private sector for the design of public improvements within the City.
  - ii. Provide technical engineering criteria for the design of facilities that the City will accept for maintenance.
  - iii. Provide a consistent policy under which public utility design will be implemented.
  - iv. Supplement and complete the requirements of Ordinance No. XXX and other prevailing ordinances as they relate to the physical construction of public works facilities within the City.
  - v. Set forth uniform material and workmanship standards under which all public works facilities shall be constructed within the City.

### 2. General

- a. These CLPW Standards shall cover all public streets, drainage, water, sewer, and appurtenant facilities within the corporate limits of Cascade Locks whether constructed by the City, or constructed privately and turned over to the City for maintenance and operation.
- b. These CLPW Standards relate only to public works construction in the City and should not be confused with building codes, zoning ordinances and other regulations for which procedures and standards have been established. Planning, zoning and related matters should first be satisfied prior to referral of a project to the Public Works Department for review of proposed facilities.
- c. These CLPW Standards may be amended or updated from time to time upon recommendation by the City Administrator and appropriate action to do so by the City Council.
- d. These CLPW Standards include four appendices; one for each of street, storm, water, and sewer design detail drawings. These drawings provide the approved designs for each element of a public works project.

### 3. Definitions

- a. **Applicant**-That individual or individuals, partnership, business, firm, company or corporation named in the permit or agreement and/or the agents, employees, representative, or contractors thereof, who

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- undertakes construction of a public works facility within the corporate limits of the City.
- b. **As-Built Drawings**-Drawings prepared by the design engineer, signed and dated by the city representative indicating the drawings have been reviewed and revised, if necessary, to accurately show all as-built conditions and construction details.
  - c. **City**-The City of Cascade Locks, Oregon.
  - d. **City Engineer**-A registered professional engineer or consulting engineering firm employed by the City. In the case of projects undertaken by the City with no outside engineering involvement, the term City Engineer may appear in the standards in the abbreviated form of "Engineer."
  - e. **City Representative**-A representative of the City including but not be limited to: The City Administrator; The City Engineer; The Public Works Director; or other person authorized to act in the best interest of the City.
  - f. **Construction Drawings**-Drawings prepared by a registered professional engineer, including site plans, plan & profile views of utilities, detailed drawings, etc., or other reproductions thereof, approved by the City Engineer, which show the location, character, dimensions and details for the work to be done.
  - g. **Council**-The City Council of the City of Cascade Locks, Oregon.
  - h. **Commission**-The Planning Commission of the City of Cascade Locks, Oregon.
  - i. **Design Engineer**-An engineer licensed by the State of Oregon as a civil engineer under whose direction plans, profiles and details for work are prepared and submitted to the City for review and approval.
  - j. **Developer**-Same as Applicant.
  - k. **Owner**-Any individual, partnership, firm or corporation by whom the Design Engineer has been retained, or who as a property owner, is making arrangements with the City.
  - l. **Plans**-See Construction Drawings.
  - m. **Preliminary Review**-Review of the construction drawings by the City as outlined in these standards. All City comments and provisions of these design standards must be addressed prior to final review and approval for

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construction.

- n. **Public Works Facility**-Any facility constructed upon public right-of-way or public easement which is immediately or eventually to be taken over by the City for maintenance and operation. These facilities include, but are not limited to, streets, sidewalks, curbs, parking lots, driveways, drainage facilities, water system works, and sanitary sewer systems.
- o. **Standards** -Shall mean these Cascade Locks Public Works Design Standards as adopted for use in the City of Cascade Locks, Oregon.

### 4. Availability and Use of the CLPW Standards

- a. Copies of the CLPW Standards or any subsection thereof, are available at City Hall upon reasonable notice and payment of the required fee as set by resolution.
- b. An engineer may, at his or her sole discretion, utilize the Standards by direct reference thereto in the contract documents prepared for construction of street, drainage, water and sewer facilities within the City. If such election is made by the engineer, contract documents shall contain the following statement: "Materials and workmanship shall be in strict accordance with the Cascade Locks Public Works Standards. No changes from the approved project plans and specifications shall be made without prior written approval from the City."
- c. The CLPW Standards are in outline form only, and shall not operate to relieve an engineer from his or her professional responsibilities during project design and construction.

### 5. Providing for Future Development

- a. All public works improvements shall be designed as a logical part of the development of the surrounding area. The City may require the over sizing of utility lines to accommodate future growth of the City.
- b. Utilities and street improvements shall be extended to the boundaries of the development to provide for future extensions to the adjoining areas and prevent adjoining properties from being landlocked.
- c. Where existing City utility lines do not extend to the proposed development, or the capacity of the existing lines is inadequate, the Developer will be required to extend new utility lines to the development as necessary.
- d. Where existing roadway improvements do not extend to the proposed

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development, or the existing roadways to serve the proposed development are inadequate, the Developer may be required to improve the roadways to the development.

### 6. Control Of Public Works Projects

- a. All public works facilities or facilities to become public shall be designed and inspected under the direction of a professional engineer registered in the State of Oregon.
- b. At the completion of the construction, this or her engineer shall submit a completion certificate to the City stating that all work has been completed in accordance with the approved project plans and specifications.
- c. All surveys for public works facilities shall be performed under the direction of a professional engineer or professional land surveyor registered in the State of Oregon. All elevations shall be referenced to USGS datum that has been established city-wide by the City of Cascade Locks. This or her information is available at City Hall. The reference benchmark number and elevation used by the Design Engineer shall be shown on the construction drawings.
- d. Materials and workmanship shall meet or exceed these adopted CLPW Standards, and at all times, they shall be subject to the approval of a City Representative.
- e. Approval by the City of plans and specifications for water and sewerage facilities is contingent upon approvals for same being attained from the State Health Division and the Department of Environmental Quality.
- f. Prior to acceptance of a public works project by the City for operation and maintenance, a one-year maintenance bond on all materials and workmanship shall be provided to the City.

### 7. Procedures for Construction of Public Works

- a. Type A Construction Permit
  - i. Anyone wishing to construct a Public Works Facility as hereinbefore defined to serve a single lot less than one half acre in size, residence or business, shall apply for a Type A Construction Permit from City Hall. A sample Type A Form is shown in Appendix C of these CLPW Standards. Type A permits will normally be processed coincidental with building permits, with the permit fee as set by resolution.

1. By his or her signature on a Type A permit, the permit holder

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agrees as follows:

2. To construct the improvement in accordance with the City Standards.
  3. To guarantee all materials and workmanship incorporated into the work for a period of one year following final inspection and acceptance of the improvement by the City.
  4. To indemnify and hold harmless the City, its officers, representatives and employees from liability of every nature and kind as may result from the operations of negligent acts of the Applicant in performing the work described therein.
- ii. Upon completion of all work, the Applicant shall notify the City Representative who shall promptly make a final inspection of the project. If the work meets requirements, the improvement will be accepted by the City and a date then established for the one-year guarantee period.
- b. Type B Construction Permit
- i. Anyone wishing to construct a Public Works Facility as hereinbefore defined to serve more than one lot, residence or business, (partitions, subdivisions) etc. shall apply for a Type B Construction Permit from City Hall. A sample Type B Form is shown in Appendix C of these CLPW Standards. The permit fee will be as set by resolution.
  - ii. Requirements for issuance of a Type B Permit include:
    1. At the discretion of the City Representative, a pre-construction conference will be held with representatives from the project engineering firm, contractor, city and utility companies. The purpose for the pre-construction conference is to familiarize the aforementioned representatives with city public works procedures and to establish tentative schedules for construction and inspection.
    2. Prior satisfaction of planning, zoning, and building code requirements.
    3. Submission and approval of detailed construction plans and specifications as prepared by a registered professional engineer. Four sets of plans shall then be submitted. If acceptable, one set of plans and specifications shall be

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marked "approved" and will be returned to the Applicant. If not acceptable, any deficiencies shall be noted when these documents are returned to the Applicant. The Applicant shall then make the necessary corrections and resubmit the documents for approval.

4. Submission of a copy of a construction performance bond or other written guarantee acceptable to the City in the full amount of the construction cost. This or her bond shall guarantee materials and workmanship for a period of one year following acceptance of the improvements by the City, and it shall ensure the satisfactory repair or replacement of any public facility damaged during construction.
  5. Submission of a copy of a certificate indicating that the Applicant or each of his or her contractors is covered by public liability and property damage insurance in amounts of not less than \$100,000/\$200,000 liability and \$50,000 property damage.
  6. Submission of letters from applicable federal, state, county or local agencies approving the plans and specifications.
  7. Payment of permit fee to defray the City's costs of inspection and administration. The permit fee shall be based on a rate of NOT LESS than 1.5 percent of total construction cost, but not greater than .5 percent of total construction costs (see Permit Fees Type B).
- c. Periodic inspection of construction by City Representatives is required. No concrete shall be poured or pipe backfilled without said inspections being made. A tentative schedule for inspection will be established when the permit is issued. The Applicant will give the City a minimum of 24 hours advance notice before inspections fall due. It is the Applicant's responsibility to obtain City inspections and approvals before installing the work.
- d. The City will provide the Applicant with a letter formally accepting the improvements for City ownership, operation and maintenance subject to the usual exception as to the one-year guarantee on materials and workmanship, when the following conditions are met:
- i. Construction is complete.
  - ii. The City Representative has inspected the finished work and found it acceptable.

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- iii. The Applicant's engineer submits a certificate of completion and reproducible "as-built" plans to the City as required under Section 1.20.
- iv. The Applicant furnishes the City with a copy of a non-lien affidavit certifying that all bills in connection with the work have been paid in full.
- v. Satisfactory provisions have been made in the form of recorded plats or easements to ensure the City's access to the Public Works Facility for purposes of operation and maintenance.
- vi. Follow all guidelines set forth in the acceptance policies for water, sanitary sewer, streets, and storm drainage.

### 8. Compliance With Laws and Regulations

- a. The required provisions of all applicable laws, regulations, and codes shall be deemed inserted in all public works construction documents and they shall have equal force and effect as though written out fully therein.

### 9. Work in City Right-Of-Ways

- a. Work on City right-of-ways requires the following:
  - i. Compliance with City approved construction documents.
  - ii. Furnishing the City with a copy of the construction performance bond or other written guarantee acceptable to the City to insure satisfactory restoration or replacement of any damaged facility existing on City right-of-way.
  - iii. Erection and maintenance of suitable warning. Signs, barricades, danger lights and flaggers as necessary for the convenience and safety of the traveling public. Follow ODOT standards for work zone traffic control.
  - iv. The minimum possible interruption to pedestrian and vehicular traffic flow.
  - v. Protection of Existing Facilities
  - vi. The approximate locations of underground City water, sewer and drainage facilities are available at City Hall. The approximate locations of underground power, gas, telephone and cable facilities are available from the serving utility companies. The locations of existing facilities shall be shown on the construction drawings for

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public works projects.

- vii. The exact locations of underground facilities shall be verified in advance of public works construction, in cooperation with the public or private utilities involved.
- viii. All existing underground and surface facilities shall be protected from damage during construction of public works projects.
- ix. Any existing facilities not specifically designed for alteration or removal which are damaged during construction shall be restored or replaced to original or better construction at the expense of the constructor. Suitable notice shall be given to all public and private utility companies in advance of construction for the purpose of protecting or relocating existing facilities.

#### **10. City Ordinances Affecting Public Works Construction**

- a. New subdivisions and land partitions within the City of Cascade Locks shall comply with the requirements of the Cascade Locks Development Ordinance, or as it may be hereafter amended or superseded.
- b. Improvements to existing City streets shall comply with applicable ordinances in force at the time said improvements are made.
- c. The physical requirements for all public works construction within the City shall comply with these Standards.
- d. Sections of these Standards are prefaced with the standards to be used in the design of public works facilities in the City. Variances to these design standards will be considered by the City Engineer upon adequate showing that a special case exists.

#### **11. Improvement Agreement**

- a. Where a Applicant desires to defer construction of a portion of the Public Works Facilities to be constructed under Type B permit, and where such deferral is determined to have no adverse effect on the City's interests, the Applicant shall enter into an improvement agreement with the City on the form included in Appendix C. Said improvement agreement shall set forth completion dates for the times of work to be deferred, and it shall constitute assurance that all improvements will be made in a timely manner.

#### **12. Review Procedure**

- a. Pre-Design Meeting: The Applicant is encouraged to meet with the City

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Engineer and Public Works Superintendent prior to the final design of the proposed improvements. At least five days prior to the meeting, the Applicant shall provide the City Engineer with sufficient maps and drawings showing the existing utilities and planned improvements.

- b. Four sets of complete construction plans shall be submitted to the City for preliminary review. They shall also include a unit price engineer's cost estimate acceptable to the City Engineer, along with the required review fees. Incomplete submittal will be returned without review.
- c. Upon completion of the preliminary review, the City will return one set of reviewed drawings with comments and required revisions. All comments must be responded to by the Applicant's engineer.
- d. Upon completion of the preliminary review and revisions have been made, the Applicant shall provide the drawings-for review and approval-to all involved utility service companies within the City and to other affected regulatory agencies, such as, but limited to: Hood River County Public Works, Oregon Health Department, Department of Environmental Quality.
- e. Prior to final approval of the submitted plans, copies of required approvals from the affected regulatory agencies and utilities must be received by the City and approved. The Applicant shall be responsible for the coordination with the various utilities and agencies during design and construction.
- f. Upon final approval of the plans, the Applicant shall submit six copies of the revised plans to the City to be approved for construction.
- g. Prior to the issuing of a construction permit, the Applicant shall provide the City with:
  - i. Copy of an approved Development Permit
  - ii. Payment of all required fees
  - iii. Recorded copies of all off-site easements and executed copies of easements for all utilities that are constructed prior to the recording of the final plat.
  - iv. Certificates of insurance with the City of Cascade Locks and City Engineer named as additional insured.
  - v. Certificate of Workman's Insurance coverage
  - vi. Any required Waiver of Remonstrance agreements and other submittals specific to this or her project.

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### 13. General Drawing Requirements

- a. Construction plans and specifications shall be prepared by a professional civil engineer licensed in the State of Oregon in accordance with the following requirements: of approved plans and pre-construction meeting is held and a construction schedule is submitted.
- b. Construction plans shall be drawn clearly and legibly on engineering tracing paper. Plans from the applicant for construction permit projects shall be submitted on black line or blue-line drawings 24 inch by 36 inch with a one and one-half inch clear margin on the left edge and one half inch margins on all other edges.
- c. Each sheet shall have a title block. It shall be located in either; the lower right hand corner; across the bottom edge; or along the right hand edge of each sheet. The title block shall contain the following information: name of the project, sheet title and number, name of engineering firm, engineers stamp, and date and revision blocks.
- d. Drawings shall be oriented so that North will be at the top of the sheet. However, when the preceding requirement proves to be impractical, then North shall be oriented to the right side of the page.
- e. The cover sheet (first sheet) of all drawing sets shall have-at a minimum-the following:
  - i. Project Name
  - ii. Design Engineer's name, address, telephone and fax number
  - iii. Applicant's name, address, telephone number
  - iv. Vicinity Map showing the location of the project in respect to the nearest major street intersection and a minimum of 800 feet around the site.
  - v. A legend including all symbols and line types used on the drawings.
  - vi. General construction notes.
  - vii. Sheet index located near the lower right corner.
- f. Construction drawings shall be drawn at the following scale: Sanitary Sewer, Storm Sewer and Water 1"=50' H, 1"= 5' V; Streets 1"=20' H, 1"= 2' V. The scale of corresponding plan views and profiles shall be the same.

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- g. Plans and profiles are necessary for all new construction, reconstruction or alteration of required streets, sanitary and storm sewers, etc. Streets and storm water systems shall be shown on the same set of drawings: provide plans and profiles of improvements. Sanitary sewers and water systems shall be shown on the same set of drawings. Provide plans and profiles of improvements.
- h. Plans for improvements within County right-of-ways must be submitted to the County for review to eliminate any conflicts with their existing or future improvements. Plans must be stamped and signed by the County indicating their review prior to submittal to the City for approval.
- i. Plans for improvements within ODOT right-of-ways must be submitted to ODOT for review to eliminate any conflicts with their existing or future improvements. Plans must be stamped and signed by ODOT indicating their review prior to submittal to the City for approval
- j. The City will return two sets of approved plans to the design engineer (or other party submitting plans) upon design compliance, payment of fees and acceptance of any required dedications and/or easements. Project construction shall not proceed until receipt of the approved plans.

### 14. Survey Requirements

- a. All designs shall be based off a complete topographic survey of the complete area involved in the project. The topographic survey shall include-at a minimum-surface features, existing utilities, property lines, right-of-way lines and monuments.
- b. The elevations used shall be based on USGS Datum and obtained from one of the city established bench marks located throughout the city. The location and elevation of these established bench marks may be obtained from City Hall.

### 15. Submittal Requirements

- a. **Drawing Submittal**-Drawings shall be submitted on 24" x 36" blueline or black line sheets unless approved otherwise by the City Engineer. The drawing submittal shall include the following requirements-at a minimum:
  - i. Cover Sheet.
  - ii. Overall drainage, utility and street lighting plan.
  - iii. Site grading plan where applicable.
  - iv. Plan and Profile for: Streets, Sanitary Sewer, Storm Drains, and

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- Water as specified.
  - v. Storm Drainage Calculations.
  - vi. Erosion Control Plan.
  - vii. Standard Details (to be included on construction drawings).
  - viii. Engineer's unit price construction cost estimate acceptable to the City Engineer or, a copy of bid results.
  - ix. A copy of any required studies for approval of the project.
- b. Time Limits from Drawing Approval to Construction
  - c. The Developer shall obtain a construction permit and begin construction within six months from the time the construction drawings are approved by the City Engineer. If construction does not begin within the period of time, the approvals of the construction drawings shall be null and void.
  - d. Renewal of approval for the construction drawings may result in additional conditions to meet new standards, changed conditions or new information brought forward since the original approval.

#### 16. Construction Inspection

- a. It is the City policy not to provide full inspection services for non-public funded public improvements. It shall be the Developer's responsibility to provide an engineer to perform these services. However, the City shall be notified a minimum of 24 business hours prior to the following tests and inspections so that a City Representative may be present to witness them:
  - i. Forms
  - ii. Concrete Pours
  - iii. Asphalt testing
  - iv. Seals and Joints
  - v. Pressure testing
  - vi. Any other as directed by the City Representative

#### 17. As-Built Drawings

- a. Upon completion of projects that will become a public works facility, the

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Applicant or his or her engineer shall first submit one complete set of black line "as-built" drawings for review and approval by the City Engineer. Such drawings shall show any deviations from the original construction drawings and shall include sufficient information to accurately locate water and sewer service extensions.

- b. As-built drawings shall be prepared by the design engineer and shall describe all revisions to the previously approved construction drawings. Inverts for sanitary sewer and storm drains shall be based off an as-built survey conducted by a State of Oregon registered land surveyor.
- c. The location of sanitary sewer and storm sewer utility stubs shall be shown on the as-builts and based on distance ties from two permanent points such as property pins, street monuments or center of manholes.
- d. Upon approval of the as-builts from the City Engineer, the Applicant shall then submit three complete sets of black line "as-built" drawings to the City. This or her submittal shall also include copies of reports of tests on water and sewer line leakage, etc.
- e. The Applicant shall also submit on a CD-ROM one complete set of approved "as-built" drawings in AutoCAD .DWG format along with electronic copies of all reports, specifications, and other relevant project document.



# Cascade Locks Public Works Design Standards

## Section 2 - Streets

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### 1. General:

- a. The purpose of these standards is to:
  - i. Provide a guide for the design, construction and upgrading of public and private streets, including street related structures, within the City of Cascade Locks and its jurisdictional area.
  - ii. Establish right-of-way widths and improvement requirements within that right-of-way, depending upon street classification.
  - iii. Establish the requirements for design and material standards in order to provide streets with a practical design life of 25 years.
  - iv. Outline the minimum requirements for the construction of street related structures and facilities. Any substitutions or alternative materials will be considered by the City Engineer on a case-by-case basis.
- b. These standards cannot address all situations. They are intended to assist-but not take the place-for competent work by professional design engineers.

### 2. Construction Drawings

- a. Construction drawings shall conform to the requirements of Section 1 of these CLPW Standards.

### 3. Standard Details

- a. Standard details for street related construction are included in the Appendix of the CLPW Standards.
- b. As required under Section 1 of these CLPW Standards, all applicable standard details shall be included on the construction drawings.

### 4. Specialized Work

- a. The designs of the following are considered "Specialized Work" and are not covered in detail in these CLPW Standards
  - i. Bridges or Culverts at stream crossings
  - ii. Commercial Industrial Entrances
  - iii. Intersections with State Highways

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- iv. Intersections with Railroads and Railroad Crossings
- v. Signalized Intersections
- b. Review and approval of specialized work by the City Engineer shall be required. When requested by the city, design calculations shall be submitted for review prior to approval.

### 5. Other Jurisdictions

- a. Two other agencies have jurisdiction over several streets and roads within the City limits of Cascade Locks:
  - i. Hood River County has jurisdiction over Forest Lane.
  - ii. The Oregon Department of Transportation has jurisdiction over WaNaPa.
- b. In all cases, the CLPW Standards shall be considered the minimum for any streets within the City Limits. However, ODOT and Hood River County may have additional or more stringent requirements. Therefore, approval from the relevant agency will be required prior to construction activities on any street or road under their jurisdiction.

### 6. Definitions and Terms

- a. **Alley**-a public easement or right-of-way of not more than 20 feet and not less than ten feet in width, which intersects with a public street.
- b. **Arterial Street**- a street that is a major facility used for moving large volumes of traffic to and from highways and major areas of the city.
- c. **Bike Lanes**-designated travel way for bicyclists which are within the travel way adjacent to the outside vehicular lane or on the shoulder.
- d. **Bike Path**-designated travel way for bicyclists which are completely separated from the vehicular travel lanes and are within independent right-of-ways.
- e. **Bike Route**-a designated travel-way for bicyclists which is shared with vehicular traffic. The roadway is designated with signs for bicycling (no pavement marking for the bike route or delineation of parking spaces is used).
- f. **Clear Vision Area**-a triangular area on a lot at the intersection of two streets or a street and a railroad, the sides of which are lines measured

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from the corner intersection of the right-of-way lines. The third side of the triangle is a line across the corner of the lot joining the ends of the other two sides. Where the lines at the intersections have rounded corners, the right-of-way lines will be extended in a straight line to the point of intersection.

- g. **Collector Street**- a street that allows traffic to move from a local street to an arterial.
- h. **Cul-de-sac**-a dead end street having a turnaround area at the dead end.
- i. **Curb Line**-the line indicating the edge of the vehicular roadway within the overall right-of-way.
- j. **Dead End Street**-a street that terminates without a turnaround area and is intended to continue through at some future date.
- k. **Downstream Intersection**-the nearest intersection from a driveway located in the direction of traffic flow of the nearest lane of the abutting street.
- l. **Expansion Joint**-a joint to control cracking in the pavement structure and filled with preformed expansion joint filler.
- m. **Grade**-the degree of inclination of a road or slope.
- n. **Half-Street**-a 50% portion of the ultimate width of a street, usually along the edge of a subdivision where the remaining portion of the street shall be provided when adjacent property is subdivided.
- o. **Local or Residential Street**-a street not designated as an arterial or collector. It serves primarily as direct access to abutting land and offers the lowest level of traffic mobility.
- p. **Longitudinal Joint**- a joint which follows a course approximately parallel to the centerline of the roadway.
- q. **Natural Grade**- the grade of the land in an undisturbed state.
- r. **One-way Driveway**-a driveway of either ingress or egress, but not both.
- s. **Parking Space**-a designated space in a parking area for the parking of one motor vehicle.
- t. **Sidewalk**- a right of way deeded, dedicated and designated for the use of non-motorized vehicles and pedestrians.

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- u. **Street or Roads**- any public highway, road, street, avenue, alley way, access easement, or right-of-way currently being used or to be used in the future for vehicle movement. Full street improvements to include curb and sidewalk on both sides, storm drainage and fully improved in accordance with these standards.
- v. **Structures**-those structures designated on the standard plans as catch basins, manholes, etc., Detailed drawings of structures or devices commonly used in City work and mentioned in these standards are included in the standard construction specifications.
- w. **Super-elevation**-the vertical distance between heights of the inner and outer edges of a pavement on horizontal curves.
- x. **Transition**-the tapers between some portions of a street with different pavement widths.
- y. **Transverse Joint**-a joint which follows a course approximately perpendicular to the centerline of the roadway.
- z. **Traveled Way**-that portion of the roadway for the movement of vehicles, exclusive of shoulder and auxiliary lanes.
- aa. **Turnaround Area**-a paved area of sufficient size and configuration that emergency vehicles may maneuver around to head in the opposite direction without having to move in reverse more than once.
- bb. **Turnpike Street**-any public street, road or right-of-way which has been paved for vehicular movement and does not have curbs, sidewalks or piped storm drainage facilities.
- cc. **Two-way Driveway**-a driveway functioning as both an exit and entrance.
- dd. **Upstream Intersection**-the nearest intersection from a driveway located in the direction opposite the traffic flow of the nearest lane of the abutting street.

#### 7. Improvement Requirement by Street Classification:

- 8. In certain cases, additional pavement and right-of-way width may be required to accommodate turning lanes, parking and bike lanes. **Table 2-1** summarizes the improvement standards for each road classification.

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Table 2-1

Street Improvement Requirements

Street Classification	Minimum Right-Of Way	Minimum Roadway Width	Sidewalk Width	Bike Lane Width
Arterial*	60'	40'-52'	5'	6'
Collector and Local	60'	40'	5'	
Cul-de-sacs (400' or less)	50'	34'	5'	
Cul-de-sac Bulb	60' radius	45' radius	5'	

Or consistent with County or ODOT Standards

### 9. Minimum Street Pavement Sections

- a. The minimum pavement section for public streets shall conform to **Table 2-2**. These pavement sections are based on subgrade compacted to 95 percent of AASHTO T-180 (Modified Proctor).

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Table 2-2  
Minimum Pavement Sections

Street Classification	AC Pavement Thickness	Baserock Thickness
Arterial	4"	15"
Collector	4"	12"
Local	3"	10"
Cul-de-sacs (400' or less)	3"	10"
Cul-de-sac Bulb	3"	10"

- b. Should the City Engineer have the reason to suspect unsuitable soil conditions, high vehicle and truck traffic conditions, where overlays are proposed or any other conditions that may significantly affect the pavement design, he may require an engineer designed pavement section in lieu of the standard section.

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- c. Pavement designs shall be based on AC pavement conforming to Oregon Department of Transportation (ODOT) Standard Specifications for standard duty mix and compacted to a minimum of 91 percent of maximum density as determined by the Rice Standard Method.

#### 10. Street Pavement Overlays

- a. The minimum overlay thickness shall be two inches. This minimum thickness shall be increased as necessary to provide required street cross slopes, and to provide a smooth transition between variations in cross slopes.
- b. The design of overlays shall be based on an analysis of existing pavement condition. Areas of existing pavement and baserock which exhibit deflection or alligator cracking or have otherwise failed, shall be excavated and replaced with new compacted baserock and AC pavement prior to placement of the overlay. Baserock and AC pavement thickness shall match standard section thickness as set forth in **Table 2-2**.
- c. Overlays shall be feathered to match existing paving, catch basins and other structures that cannot be raised to grade. The minimum thickness at the edge of the feather shall not be less than one quarter inch.
- d. All existing manholes, valve boxes and other structures shall be raised to grade before the overlay work.
- e. Under certain conditions, the City Engineer may require non-woven fabric specifically designed for use with AC pavement. Overlay fabric to be as manufactured by Amoco Fabrics and Fiber Company or approved equal. A tack coat shall be used prior to placement of the overlay fabric.

#### 11. Horizontal Street Alignment

- a. Street design shall follow the criteria from "Geometric Design Guide for Local Roads and Streets" by AASHTO, latest addition.
- b. The normal construction centerline shall be parallel with the right-of-way centerline. Extensions of existing streets shall be in alignment with existing street centerline. In special cases, an offset construction centerline may be approved by the City.
- c. Unless required otherwise to match existing right-of-ways, the center line radius of horizontal curves shall not be less than 300 feet for major arterials; not less than 200 feet for collectors; and 100 feet for other streets; not less than 160 feet for a cul-de-sac; not less than 100 feet for

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alleys and private streets; and shall be to an even ten feet in all cases.

- d. Curb line radius shall be concentric with the right-of-way line, except in cul-de-sacs with a 60' right-of-way line radius, the minimum curb radius shall be 45 feet, unless otherwise approved by the City Engineer. Curb line radius at street intersections shall be as shown in **Figure 2-3**. In some instances however, the implementation of Figure 2-3 radius on existing streets may not be desirable. When this occurs, it shall be dealt with on a case-by-case basis by the City Engineer.

Figure 2-3

Minimum Intersection Curb Radius

Street Classification	Minimum Curb Radius
Residential to Residential:	20'
Residential to Collector	25'
Residential to Arterial	25'
Collector to Collector	30'
Collector to Arterial	30'
Arterial to Arterial	30'

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- e. Staggered or "T" intersections at collectors and arterials shall be avoided within 300 feet of an opposing intersection. Intersections of local streets shall not be staggered less than 200 feet from an opposing intersection as measured from the center lines of such intersections.
- f. Streets intersecting, but not continuing through an arterial or collector street along the same horizontal alignment, shall not be located within 300 feet of another street intersecting the opposite side of the arterial or collector street.

#### 12. Vertical Street Alignment

- a. The minimum street centerline gradient shall be one-half percent along the crown and curb line. The minimum curb gutter grade permitted shall be 0.4 percent.
- b. The maximum street centerline gradient shall not exceed six percent for arterial; ten percent for collectors; twelve percent for all others.
- c. Minor streets with grades in excess of five percent intersecting an arterial street shall be designed to provide a flat stopping area outside of the traveling lanes of the arterial. Stopping area grades shall not exceed five percent.
- d. Street grades shall be designed to allow drainage to the curb areas within the public right-of-way, as well as lot drainage. In general, this requires the top of curb of new streets be set at a minimum of six inches below existing grade.
- e. Streets intersecting with streets not constructed to full City standards shall be designed to match both present and future vertical alignments of the intersected street. The requirements of these CLPW Standards shall be met for both present and future conditions.
- f. Grade changes of more than one percent shall be accomplished with vertical curves. Vertical curve K values shall conform to the values listed in **Figure 2-4**. The vertical curve K value shall be defined as the algebraic difference between the tangent street grades.

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Figure 2-4

Vertical Curves K Value

Design Speed (MPH)	Crest Minimum K Value	Sag Minimum K Value
20	10	20
25	20	25
30	30	35
35	40	45
40	60	55
45	80	70

- g. Street grades and curb corners/intersections shall be designed to not allow storm water to flow across travel lanes.
- h. In some cases, in order to avoid the disturbing of roadway fill slopes, slope easements shall be dedicated for the purposes of grading work outside the right-of-way.

### 13. Street Cross Slopes

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- a. Cross slopes of the street section shall not be less than two percent nor be more than five percent. Unless prevented by cross slope limits, the crown of the street shall be the same elevation as the top of the curbs.
- b. Symmetrical street cross sections with opposite curbs at the same elevation are preferred. Off-set crown cross sections are acceptable only where required due to match existing facilities. If used, off set crowns shall not exceed 12 inches between the high and low curb.
- c. The use of superelevations shall be prohibited unless approved by the City Engineer.

#### 14. Intersections

- a. Streets shall be laid out to intersect at angles as near to 90 degrees as possible, but in no case shall the acute angle be less than 80 degrees. An oblique street shall be curved approaching an intersection to provide at least 100 feet of street at right angles with the intersection. No more than two streets shall intersect at any one point.
- b. An arterial or collector street intersecting with another street shall have a minimum 100 feet of centerline tangent adjacent to the intersection as measured from the curb line of the intersected street. Other streets, except alleys, shall have at least 50 feet of tangent adjacent to the intersection as measured from the curb line of the intersected street.

#### 15. Cul-De-Sacs and Turnarounds

- a. Cul-de -sacs shall be as short as possible and shall have a maximum length of 400 feet and serve no more than 18 dwelling units. No more than five lots shall have access on a cul-de-sac bulb except where conditioned otherwise by the Development Ordinance.
- b. All cul-de-sacs shall terminate with a circular turn-around, except where the Planning Commission finds that a "pear" or "hammerhead" turn-around is more appropriate given topography, natural or built features, and expected use.
- c. The minimum curb radius for transitions into cul-de-sac bulbs shall be 25 feet and the right-of-way radius shall be sufficient to maintain the same right-of-way to curb spacing as in the adjacent portion of the street.
- d. The finished pavement grade from the center point of cul-de-sac turnarounds to the curb shall not be less than two percent negative.

#### 16. Stub Streets and Dead End Streets

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- a. Stub Streets-When it appears necessary to continue with a street into a future subdivision or adjacent acreage, streets shall be platted to the boundary of a subdivision. Stub streets greater than 300 feet in length shall be provided with a paved turn around.
- b. As stub streets allow for future extensions, a reserve strip at the end of the current right-of-way shall be provided by deed to the City. The reserve strip shall be at least one foot in width and extend across the full width of the right-of-way.
- c. Dead-end streets shall have a turn-around with a radius of not less than 45 feet to the property line.

#### 17. Street Transitions

- a. Street width transitions from a narrower width to a wider width shall be designed with a 10:1 taper.
- b. Street transition widths from one width to a narrower width, or lane alignment, shall be designed with the length of transition taper as follows:
  - i.  $L = S \times W$
  - ii. Where: **L** = minimum length of taper (feet)
  - iii. **S** = designated speed (MPH)
  - iv. **W** = EP to EP offset width
- c. Where a tapered transition cannot be provided, a barricade shall be installed at the end of the wider section of the street and a taper shall be as approved by the City Engineer. The barricade shall conform to MUTCD Standards.

#### 18. Curbs and Gutters

- a. All streets shall include curbs on both sides except where half street or three-quarter street improvements are allowed.
- b. The standard curb for City streets shall be Type A curb and gutter for all road classifications. In cases where the curb ends abruptly, the end of curb shall be tapered downward.
- c. A minimum of two curb weep holes, three inches in diameter, shall be provided for each lot. Drain pipe shall be provided-and installed perpendicular-under all sidewalks to connect to all curb weep holes.

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- d. Extruded concrete curbs are not allowed in the public right-of-way unless approved by the City Engineer.

### 19. Sidewalks

- a. Sidewalks shall be provided on both sides of curbed streets for all road classifications. A drain pipe shall be provided and installed perpendicular under all sidewalks to connect to all curb weep holes.
- b. Handicap access ramps meeting current ADA standards shall be provided at all corners of intersections where crossing is permitted, regardless of curb type, and at ends of all sidewalks. Ramps shall be located so as to avoid conflicts with storm drain catch basins.
- c. Sidewalks shall be constructed of concrete and shall be a minimum of four inches thick, except at driveway crossings which shall be a minimum of six inches thick. Sidewalks shall meet the minimum widths as shown on Table 2-5.

Table 2-5

Minimum Sidewalk Widths

Street Classification	Minimum Sidewalk Width from back of Curb
Main/Commercial Street	6'
Arterial Street	5'
Collector Street	5'

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Local Street	5'
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- d. Water meters, utility poles, etc., are not permitted within sidewalks, unless approved by the City Engineer.
- e. Where clustered mailboxes or other objects larger than single mailboxes are within a sidewalk, the sidewalk shall be widened to provide clearance equal to the required sidewalk width. All existing mailboxes shall be set on new posts at the time of sidewalk construction.
- f. Should sidewalks be installed where there is no existing curb, the new sidewalk shall be located within the public right-of-way, two and one half feet from and parallel to the property line.

### 20. Replacement of Existing Sidewalks

- a. Should a property owner replace an existing sidewalk that is not part of a monolithic curb, it shall be replaced in accordance with Section 2.18.
- b. If the property owner feels the curb should also be replaced at the same time, he shall contact the City Engineer. The City Engineer shall then visit the site and determine if the City should replace the existing curb before the new sidewalk is placed.
- c. Should a property owner replace an existing sidewalk that is part of a monolithic curb and the length of the replaced sidewalk section is ten feet or less, it shall be replaced as monolithic curb and sidewalk, with the new sidewalk being five feet wide as measured from the back of curb.
- d. Should a property owner replace an existing sidewalk that is part of a monolithic curb and the length of the replaced sidewalk section is greater than ten feet, it shall be replaced as separate curb and sidewalk. In this instance, the City will participate by saw-cutting the pavement two feet in front of the curb section to be removed, and then the property owner shall remove the pavement, monolithic curb and sidewalk from the site. The City will then install a new curb, or curb and gutter, and replace the pavement. The property owner shall then replace the sidewalk section in accordance with Section 2.18, at their expense.
- e. The ability of the City to participate in the curb replacement program will depend upon the amount of money budgeted for this work.
- f. In all the above cases, the property owner shall apply for a permit at City Hall for such work, and shall not under take any work until such permit has been issued by the City.

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### 21. Driveway Widths and Spacing

- a. A driveway-as referred to in these CLPW Standards-means the area between the property line and street parking area.
- b. Minimum and Maximum driveway widths to be as shown in **Figure 2-6**.

Figure 2-6

Residential Driveway Widths

Driveway	Minimum Driveway Width	Maximum Driveway Width
One Parking Space	10 feet	15 feet
Two Parking Spaces	16 feet	24 feet
Three or more Parking Spaces	22 feet	36 feet
Second Driveway/RV Parking	10 feet	15 feet

- c. No more than two driveways per property shall be permitted in residential zones except for duplexes. In no cases, shall the total driveway width along a property exceed 39 feet unless approved otherwise by the City Engineer.
- d. Where possible, driveways for corner properties shall be located on the lowest classification street and as far from the intersection as possible.
- e. Residential driveways of adjoining properties shall have a minimum of 15

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feet clear between the edges of the driveways.

- f. Maximum driveway ramp slope shall not exceed 15 percent (15%).

### 22. Driveways and Driveway Approaches

- a. Driveway approaches on curbed streets shall be constructed of concrete, a minimum of 6 inches thick.
- b. All driveways shall have a minimum ten foot paved approach from the back of sidewalk location. Multiple use driveways shall be completely paved.
- c. Common driveways serving multiple lots and flag lot driveways over 150 feet in length shall be provided with an emergency turnaround meeting the requirements of the City Engineer.

### 23. Private Streets-Common Driveways and Flag Lots

- a. Private streets serving four or more residences shall be constructed to public street standards.
- b. All private driveways and private drives shall be paved with asphalt or concrete. Pavement widths and thickness for private streets, common driveways or flag lot drives shall conform to **Figure 2-7**.

Figure 2-7

Pavement Widths and Thickness

Type	Minimum Easement Width	Minimum Paved Width	Pave ment Thic knes s	Base rock Thic knes s
Private Driveways (serving 2 or 3	30 feet	20 feet	2-1/2" AC	8"

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residences)			6" PCC	2"
Flag Lot Driveway		12 feet	2- 1/2" AC	6"
			6" PCC	2"

### 24. Barricades

- a. Barricade installation shall be based on the "Manual of Uniform Traffic Control Devices" latest edition.
- b. Basically to be as follows:
  - i. Red and white reflectorized Type III barricades shall be used at the end of a street.
  - ii. White and black reflectorized Type III barricades shall be used at the end of a street widening which does not taper back to existing pavement width.
  - iii. White and black reflectorized Type II barricades shall be used at the end of the sidewalk or pedestrian/bike path.

### 25. Bikeways

- a. Bikeway locations shall be determined by the City. Bikeway facilities shall meet the requirements of these CLPW Standards and the American Association of State Highway and Transportation Officials publication, Guide for Development of New Bicycle Facilities (ODOT).
- b. A bikeway may be constructed adjacent to the curb within the pavement area. Structural sections of bikeway facilities on streets shall conform to that of the street or be integral with the curb. When bikeways are integrated with a curb, all inlet grates shall be designed to protect the

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bicyclist from the grate or opening.

c. Bikeways not within the street shall be constructed upon compacted subgrade that has been sterilized if an asphaltic concrete bikeway, to one of the following pavement section designs:

i. 4" of AC over 2" of compacted baserock

ii. 2-1/2" of AC over 4" of compacted baserock

### 26. Parking Lots

a. Access routes through parking lots which are to be used by delivery trucks, service vehicles or automobiles in excess of 500 vehicles per day shall conform to the minimum access route section shown in **Table 2-8**.

Table 2-8

Parking Lot Pavement Sections

Classification	Pavement Thickness	Baserock Thickness
Parking Lot	2-1/2" AC	7"
Parking Lot Access Route	3" AC	10"
Light Industrial	3" AC	12"
Heavy Industrial	3" AC	14"

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- b. Parking lots and associated driveways shall maintain adequate drainage facilities to prevent water ponding. This requires a minimum cross slope of two percent. In no case, shall the cross slopes be less than one percent at any point.
- c. Curves and corners within the parking lot shall have a minimum radius of 15 feet except for emergency access lanes, where a minimum radius of 25 feet shall be required.
- d. Bumper guards or wheel barriers shall be installed so that no portion of a vehicle projects into the right-of-way or over the adjoining property. The area between the wheel barriers or bumper guards shall be paved.
- e. Permanent drainage facilities shall be provided for parking lots in all, commercial, industrial and multifamily developments creating new imperious surfaces.

#### 27. Street Lights

- a. Street lighting shall be provided as part of the street design process and shall be installed after all public utility installations are completed and after rough grading work is completed in order to avoid damage to the poles.
- b. Design illumination levels shall be in accordance with the recommendations of the Illuminating Engineering Society. The street lighting system shall use high pressure sodium vapor luminaries and two-piece fiberglass poles.
- c. Spacing and location of street lighting shall be approved by the City based on a photometric design. The design shall be provided by and paid for by the Developer.
- d. Street lights shall be located as near as possible to lot line extensions-not in the middle of lots. Spacing shall not exceed 200 feet or three lot widths, whichever is less. Lesser spacing must be used when required by the photometric design.
- e. Street light poles shall be set to the depth as specified by the manufacturer, but not less than five feet. Poles shall be installed within one degree of plumb shall be installed a minimum of one foot behind curb line sidewalks.
- f. Street lights may be installed between the curb and property line sidewalks provided the street light is a minimum of three feet behind the

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face of curb and one foot from the sidewalk.

#### 28. Private Utilities

- a. Unless otherwise approved by the jurisdiction having authority, all new private utilities (power, cable TV, telephone & gas) shall be installed underground.
- b. Installation of private utilities in a common trench with or within three feet horizontally of paralleling water, sanitary sewer or storm drains is prohibited.
- c. Contractor shall coordinate with utility companies for size and type of conduit prior to construction, as well as confirm the location of vaults, pedestals, etc. All above grade facilities shall be located outside the proposed sidewalk location.
- d. Power, telephone and TV trenching and conduits shall be installed per utility company requirements with pull wire. Changes in direction of utility conduit runs shall have long radius steel bends.
- e. Contractor shall notify and coordinate with private utilities for relocation of power poles, vaults, etc.

## Cascade Locks Public Works Design Standards

### Section 3 - Storm Water & Drainage

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#### 1. General:

- a. These standards shall govern all new construction and upgrading of public storm drainage facilities in the City of Cascade Locks and all work within its service area. The purpose of these standards is to:
- b. Establish the requirements for design and material standards in order to provide streets with a practical design life of 25 years.
- c. Be of adequate design to safely manage all volumes of water generated upstream and on the site to an approved point of disposal.
- d. Maximize the use of the City's existing and natural drainage systems.
- e. Prevent the capacity of downstream storm drainage facilities from being exceeded.
- f. Provide points of disposal for storm water generated by future upstream developments.
- g. Provide sufficient structural strength to resist erosion and all external loads that may be imposed.
- h. These standards cannot address all situations. They are intended to assist, but not take the place, of competent work by professional design engineers.

#### 2. Construction Drawings

- a. Construction drawings shall conform to the requirements of Section 1 of these CLPW Standards.

#### 3. Standard Details

- a. Standard details for storm drain related construction are included in the Appendix A of this section of the CLPW Standards and show the City's minimum requirements for the construction of storm water related structures and facilities.
- b. As required under Section 1 of these CLPW Standards, all applicable standard details shall be included on the construction drawings.
- c. In the case of conflicts between the text of these CLPW Standards and the standard details, the more stringent shall apply as determined by the City Engineer.

## Cascade Locks Public Works Design Standards

### Section 3 - Storm Water & Drainage

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#### 4. Specialized Work

- a. The design of the following are considered "Specialized Work" and are not covered in detail under the CLPW Standards:
  - i. Bridges or Culverts at stream crossings
  - ii. Storm water Pumping Stations and Force Mains
- b. Review and approval of specialized work by the City Engineer shall be required. When requested by the city, design calculations shall be submitted for review prior to approval.

#### 5. Other Jurisdictions

- a. Two other agencies have jurisdiction over storm drainage facilities within the City limits of Cascade Locks:
  - i. Hood River County has jurisdiction over Forest Lane.
  - ii. The Oregon Department of Transportation has jurisdiction over WaNaPa.
- b. In all cases, the CLPW Standards shall be considered the minimum for any storm drainage improvements within the City Limits. However, ODOT and Hood River County may have additional or more stringent requirements. Therefore, approval from the relevant agency will be required prior to construction activities on any street or road under their jurisdiction.

#### 6. Definitions and Terms

- a. **Abbreviations-** Acceptable abbreviations for showing types of new and existing pipe materials on the plans are as follows:
  - i. CAP - Corrugated Aluminum Pipe
  - ii. CI - Cast Iron
  - iii. CHDPE - Corrugated High Density Polyethylene
  - iv. CMP - Corrugated Metal Pipe
  - v. CP - Non-reinforced Concrete Pipe
  - vi. DI - Ductile Iron

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- vii. HDPE - High Density Polyethylene
- viii. PVC - Polyvinyl Chloride
- ix. RCP - Reinforced Concrete Pipe
- b. **Building Drain-** the building drain is the lowest part of the drainage system which receives the discharge from storm water drainage pipes installed inside, or within five feet of the outside walls of the building, and conveys it to the building sewer. The building sewer begins five feet outside the building wall or foundation.
- c. **Building Storm Drain-** that part of the piping of a storm water drainage system which begins at the connection to the building drain and conveys storm water to an approved point of disposal.
- d. **Catch Basin-** an approved receptacle designed to receive surface drainage and direct it to a storm water collection system.
- e. **Creek-** any and all surface water generally consisting of a channel having a bed, banks and/or sides in which surface waters flow to drain higher land to lower land, both perennial and intermittent, excluding flows which do not persist more than 24-hours after the cessation of one half inch of rainfall in a 24-hour period from October to March. Mill Creek and Beaver Creek are the two such bodies within the City of Cascade Locks.
- f. **Detention-** the holding of runoff for a short period of time and then releasing it to the downstream drainage system at a controlled rate.
- g. **Drainage Facilities-** pipes, ditches, detention basins, creeks, culverts, etc., used singularly or in combination with each other for the purpose of conveying or storing storm water runoff.
- h. **Impervious Surface-** hard surfaced areas located upon real property which either prevent saturation of water into the land surface or reduce the saturation rate which existed under natural conditions prior to development. Impervious surfaces are also surfaces which cause water to run off the land surface in greater quantities, or at an increased flow rate, than under natural conditions which existed prior to development. Common impervious surfaces include but are not limited to rooftops, paved driveways, parking lots, storage areas, sidewalks, patios, etc.
- i. **Natural Location-** the location of those channels, swales and other non-man made drainage conveyance systems as defined by the first documented contours existing for the subject property either from maps or

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### Section 3 - Storm Water & Drainage

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- photographs.
- j. **On-Site Detention-** the storage of excess runoff on the development site and gradual release of the stored runoff into a public storm drain system after the peak of the runoff has passed.
- k. **Peak discharge-** the maximum water runoff rate determined for the design storm.
- l. **Private Storm Drain-** a storm drain located on private property serving parking lot catch basins or more than one structure on the same premises, and not operated or maintained by the City.
- m. **Public Storm Drain-** any storm drain in a public right-of-way or easement operated or maintained by the City.
- n. **Receiving Body of Water-** creeks, streams, lakes or other bodies of water into which runoff is naturally or artificially directed.
- o. **Release Rate-** the controlled rate of release of storm drainage and runoff water from property, storage ponds, detention basins, or other facilities during and following a storm event.
- p. **Retention Facility-** facilities which hold water for a considerable length of time and then consume it by evaporation, plant transpiration, or infiltration into the soil.
- q. **Sedimentation-** the deposition of erosion debris and soil sediment displaced by erosion and transported by water from a higher elevation to an area of lower gradient where sediments are deposited as a result of slack water.
- r. **Wetlands-** as defined by the division of State Lands and the US Army Corps of Engineers.

#### 7. Approved Point of Disposal

- a. Surface or subsurface drainage caused or affected by the changing of the natural grade or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume or location materially different from that which existed before development occurred, but shall be collected and conveyed in an approved manner to an approved point of disposal.
- b. The approved point of disposal for all storm water may be a storm drain,

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### Section 3 - Storm Water & Drainage

existing open channel, and detention or retention pond, as approved by the City Engineer.

- c. Acceptance of the point of disposal will also depend upon the condition and capacity of existing downstream facilities, and feasibility of an alternate disposal method.
- d. Storm drain lines shall enter a creek or drainage channel at 90 degrees or less to the direction of flow. The outlet shall have a head wall and scour pad or riprap to prevent erosion of the existing bank or channel bottom. The size of pipe or channel being entered will govern which protective measures are required.

#### 8. Pipe Type By Cover Depth

- a. Unless otherwise approved by the City Engineer, storm drain pipe materials shall conform to **Table 3-1** and **Table 3-2**. Uniform pipe material shall be used on each pipe running between structures.

Table 3-1

Allowable Storm Drainage Pipe Based on Cover Depth

Cover Depth From Finished Grade	8" thru 18" Diameter
Less than 1-1/2' Cover	CL52 Ductile iron pipe with bell & spigot joints and rubber gaskets
1-1/2' to 2-1/2' Cover	Pipe specified for lessor depths <b>OR</b> Class 3, ASTM C-14 non-reinforced concrete pipe with bell and spigot joints and rubber gaskets
	Pipe specified for lessor depths <b>OR</b> PVC pipe conforming to ASTM D-3034, SDR 35 (4" to 15") or ASTM F-679 (18") with bell and spigot joints and

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2-1/2" to 15' Cover	rubber gaskets  <b>OR</b>  HDPE (High Density Polyethylene) pipe conforming to AASHTO M-252 (4" to 10"), or ASHTO M-294 (12" to 18"). HDPE pipe shall meet the requirements of AASHTO M-294 Type S, with water-tight pressure testable fittings and O-ring gaskets conforming to ASTM F-1336 and ASTM F-477 respectively.
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- b. Residential Driveway Culverts- pipe type to be based on cover depth, minimum size 12 inch diameter or adjacent street crossing or storm drain size, whichever is greater.

#### 9. Materials

- a. Unless otherwise approved by the City Engineer, materials shall conform to the minimum requirements outlined in the CLPW Standards and as shown on the Standard Details in Appendix A.
- b. General Storm Water Runoff Design Considerations
  - i. Whenever possible, all public storm drains shall be designed to flow by gravity from the point of origin to the point of disposal.
  - ii. Storm drainage design within a development area must include provisions to adequately control runoff from all public and private streets and the roof, footing and area drains of residential, multifamily, commercial and industrial buildings. Design shall also insure extension of the drainage system to adequately serve the entire drainage basin.
  - iii. The design storm peak discharge rate from the subject property may not be increased from conditions existing prior to the proposed development, except where it can be satisfactorily shown by the applicant that there is no adverse impact.
- c. Retention/detention facilities must be provided in order to maintain surface water discharge rates at or below the existing design storm peak discharge. Retention/detention facilities will be required so that release rates downstream of the development do not exceed the ten-year frequency design storm flows for existing land use conditions. These

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release rates cannot increase the flooding conditions downstream. The detention basin may be either off-line as a separate basin or in-line and designed as part of a swale system.

- d. Drainage from roofs, footings and down spouts may drain directly to a street through the curb provided:
- e. The building pad ground elevation is high enough above the street grade to provide a minimum grade of at least one percent of pipe slope from building to curb gutter, and
- f. The existing street is not a shed roof or tilt section that will permit runoff to flow across the street. This requirement will be waived if Type A curb and gutter is existing or installed.
- g. Vegetation shall be established on areas disturbed by construction as necessary to minimize erosion.

#### 10. Storm Drains in Streets or Easements

- a. Under normal conditions, storm drains shall be located in the street right-of-way within five feet of the curblines. Public storm drains within easements will be permitted only when it can be shown that drainage cannot be provided within a right-of-way.
- b. When storm drains in easements are approved by the City, the storm drain line shall be offset a minimum of five feet from any property line or easement boundary, or 1/3 the required easement width, whichever is greater.
- c. When private property is crossed in order to reach an approved point of disposal, it shall be the developer's responsibility to acquire a recorded drainage easement from the private property owner meeting the approval of the City Engineer. The drainage system installed must be in a closed, piped system.
- d. Easement locations for public storm drains serving a PUD, apartment complex or commercial/industrial development shall be located in parking lots, private drives or similar open areas which will permit an unobstructed vehicle access for maintenance by City forces.
- e. Unless specified or authorized by the City, minimum easement widths for storm drain lines 15 inches or less in diameter shall have a minimum width of ten feet plus two feet for each foot deeper than six feet to invert. Pipe lines 15 to 24 inches in diameter shall have a minimum width of 16

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feet plus two feet for each foot deeper than six feet to invert. All pipe lines greater than twenty four inches in diameter shall have a minimum width of 20 feet plus two feet for each foot deeper than six feet to invert.

- f. Easement widths shall remain a constant width between manholes or other in-line structures and easement width shall be based on the deepest portion of the line between structures.
- g. Open Channels shall have easements sufficient in width to cover the 100-year floodplain line when a 100-year design storm is required or 15 feet from the waterway centerline or 10 feet from the top of the recognized bank, whichever is greater. A 15 foot wide access easement shall be provided on both sides of the channel for channel widths greater than 14 at the top of the recognized bank.
- h. Easement conditions shall be such that the easement shall not be used for any purpose which would interfere with the unrestricted use for storm drain purposes.
- i. Under no circumstances shall a building or structure, tree or fence be placed over a storm drain pipe or easement. This includes overhanging structures with footings located outside the easement.
- j. All easements must be furnished to the city for review and approval prior to recording.

#### 11. Providing For Future Development

- a. All developments will be required to provide public storm drainage systems adequate to serve adjacent upstream parcels in order to provide for the orderly development of the drainage area.
- b. This shall include the extension of storm drain lines in easements across property to adjoining properties, and across the street frontage of the property to adjoining properties when the storm drain system is located in the street right-of-way.
- c. This shall include storm drains which are over-sized to provide capacity for upstream development.

#### 12. Design Factors

- a. The following criteria shall be addressed in the design of storm drainage systems and determination of design flows:
- b. Size and topography of drainage area to be served

## Cascade Locks Public Works Design Standards

### Section 3 - Storm Water & Drainage

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- c. Land use and projected population of the area to be served when fully developed
- d. Flows from commercial and industrial
- e. Condition and size of existing storms drains, location of an approved disposal point
- f. Maintenance and accessibility requirements for cleaning, inspection and repair work.

#### 13. Design Calculations and Capacity

- a. Design calculations shall be submitted for all storm drainage facilities and shall be included on the site plan drawings and stamped by a professional engineer licensed in the State of Oregon.
- b. Peak design discharges shall be calculated using the rational formula  $Q=CiA$ .

#### 14. Design Storm

- a. The intensity-duration design frequency is based on the use and size of the area the storm drain facility passes through. The design storm frequency is shown on **Table 3.3**. The rainfall intensity-duration frequency curve for use in the City of Cascade Locks is the curve for Hood River County enclosed herein.
- b. The recommended run-off coefficients "C" are listed in **Table 3-4**.
- c. For land in a pre-development condition (natural vegetation, natural soil), the minimum time of concentration from the most remote point in the basin to the first defined channel (e.g. gutter, ditch or pipe) shall be ten minutes.
- d. For developed residential and commercial/industrial property, the maximum time of concentration from the most remote point in the development to the closest inlet shall be 10 minutes, unless calculations by an acceptable method show the time to be longer.

Table 3-3

Design Storm Frequency

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# Cascade Locks Public Works Design Standards

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Area	Frequency
Residential Area	10-Year Storm
Commercial Districts	10-Year Storm
Trunk Lines (18" pipe and larger)	25-Year Storm
Minor Creeks and Drainage Ways (not shown on FIRM Map)	50-Year Storm
Major Creeks (Shown as a flood plain on FIRM Map)	100-Year Storm

Table 3-4

### Runoff Coefficients

Type of Cover	Flat Terrain $S < 2\%$	Rolling Terrain $2\% < S < 10\%$
Lawns, Meadows and Pasture Land	0.20	0.25

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Cultivated Land	0.30	0.35
Single Family Residential in Urban Areas except corner lots with duplex potential	0.40	0.45
Gravel Parking Lots	0.50	0.55
Mobile Home Parks	0.60	0.65
Multi-Family Residential, Duplex Lots in Single Family Residential	0.70	0.75
Roofs and Paved Areas	0.90	0.90

#### 15. Open Channels

- a. Generally, creation of new, open drainage channels within the UGB will not be allowed.
- b. Should the City allow an open drainage ditch, the side slopes shall be 3H:1V and the minimum design velocity shall be two feet per second. Maximum allowable design velocity shall be five feet per second. Ditch to be located along or adjacent to lot lines.

#### 16. Horizontal Alignment and Vertical Location

- a. Generally, storm drains shall be laid in a straight alignment between catch basins and between manholes. However, lines 15 inches in diameter and smaller may be laid on horizontal curves conforming to street curvature,

## Cascade Locks Public Works Design Standards

### Section 3 - Storm Water & Drainage

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but not less than a radius of 200 feet.

- b. Where storm drains are being designed for installation parallel to other utility pipe or conduit lines, the vertical location shall be in such a manner that will permit future side connections of main or lateral storm drains, and avoid conflicts with parallel utilities without abrupt changes in the vertical grade of main or lateral storm drains.
- c. Public storm drainage lines shall be separated from all other parallel public utilities by a minimum of five feet. Installation of private utilities in a common trench with storm drain lines shall be prohibited.
- d. Public storm drainage lines shall generally be located in the street right-of-way within six feet of the curb face. Where no curb is present, the storm drain lines shall generally be located 16 feet from the property line of a 60 foot right-of-way. Approval must be obtained from the City Engineer for any deviations from these requirements, or other special situations.

#### 17. Minimum Cover

- a. All storm drains shall be laid at a depth sufficient to protect against damage by traffic and to drain building footings where practical. Sufficient depth shall mean the minimum cover from the top of pipe to finish grade at the storm drain alignment.
- b. Under normal conditions minimum cover shall be 24 inches above the top of pipe in paved areas and 30 inches at all other locations.
- c. It must be shown that sufficient depth is provided at the boundary of the development to properly drain the remainder of the upstream basin area tributary to the site.

#### 18. Minimum Grade

- a. The minimum accepted slopes for various pipe sizes and types are listed in **Table 3-4**

Table 3-4

Minimum Pipe Grade

(for 2.5 feet per second)

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## Cascade Locks Public Works Design Standards

### Section 3 - Storm Water & Drainage

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Inside Pipe Diameter (inches)	Slope (feet per 100 feet)  smooth wall (n = 0.013)
8	0.52
10	0.39
12	0.30
15	0.23
18	0.18
21	0.14
24	0.12
27 and larger	0.10

- b. Storm drain piping shall be laid with uniform slope between structures.
- c. All storm drains shall be laid on a grade which will produce a mean velocity (when flowing full) of at least two and one half feet per second, based upon Manning's pipe friction formula using a roughness coefficient of not less than 0.013 for smooth wall pipe and 0.024 for corrugated wall

## Cascade Locks Public Works Design Standards

### Section 3 - Storm Water & Drainage

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pipe, or the pipe manufacturer's recommendations, whichever is greater.

- d. The minimum grade may be reduced from **Table 3-4** to produce an absolute minimum velocity of two feet per second upon approval of the City Engineer.

#### 19. Manholes, Catch Basins and Junction Boxes

- a. All junctions between storm drain pipes shall be made at manholes, catch basins or detention basins.
- b. Manholes or junction boxes shall be required at:
  - i. All changes in horizontal or vertical alignment. Minor horizontal curvature in pipe less than 15 degrees may be allowed depending on pipe size, street alignment and reason. Maximum joint deflection shall be per manufacturer's recommendation.
  - ii. All changes in pipe size
  - iii. At a spacing of no greater than 500 feet.
  - iv. At all pipe junctions where the depth from rim to invert exceeds four feet; or where the pipe is 18 inches in diameter or greater.
- c. For new mainline and lateral construction, catch basin laterals of 30 feet or less and eight inches in diameter, may tie into the main line with a shop fabricated 90 degree "T" provided the connection is located not more than 100 feet from a manhole or clean out and the main line is 15 inches or larger in diameter.
- d. Catch basins may be used for the junction of pipes 15 inches or less in diameter, and where the depth from rim to invert is less than four feet. Pipe lines 18 inches in diameter may be connected to the larger dimension of the catch basin/junction box when the structure is formed and poured around the pipe during new construction.
- e. Catch basins shall be designed to catch the five year design storm gutter flow.
- f. The maximum length of curb and gutter which may be drained by a catch basin is 500 hundred feet. The maximum impervious area which may be drained by a catch basin is 20,000 square feet.
- g. Catch basins at corners shall not be located in front of handicap access ramps.

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### Section 3 - Storm Water & Drainage

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- h. Catch basins shall be installed where the improvement ends on all streets terminating on a descending grade and piped to an approved point of disposal.
- i. Catch basins shall be installed at all low spots, whether on public or private property and shall be connected to a storm drainage facility.



# Cascade Locks Public Works Design Standards

## Section 4 - Water Distribution

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### 1. General:

- a. These standards shall govern all new construction and upgrading of public water distribution facilities in the City of Cascade Locks and all work within its service area. The purpose of these CLPW Standards is to:
  - i. Be of adequate design to meet all expected domestic, commercial and industrial demands-including fire flows-within the anticipated design life of the system;
  - ii. Be of materials strong enough to resist all expected loads-both internal and external-and be able to preserve the potability of the water;
  - iii. Be economical and safe to build and maintain;
  - iv. Meet all design requirements of the Oregon Health Division (OHD);
- b. Any substitutions or alternative materials will be considered by the City Engineer on a case-by-case basis;
- c. These standards cannot address all situations. They are intended to assist-but not take the place-for competent work by professional design engineers.

### 2. Construction Drawings

- a. Construction drawings shall conform to the requirements of Section 1 of these CLPW Standards

### 3. Standard Details

- a. Standard details for water distribution related construction are included in the Appendix of this section of the Design Standards and show the City's minimum requirements for the construction of water distribution related structures and facilities.
- b. As required under Section 1 of these CLPW Standards, all applicable standard details shall be included on the construction drawings.

### 4. Specialized Work

- a. The design of the following are considered "Specialized Work" and are not covered in these CLPW Standards:
  - i. Water Distribution Pump Stations

## Cascade Locks Public Works Design Standards

### Section 4 - Water Distribution

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- ii. Reservoirs
  - iii. Wells
  - iv. Pressure Regulating Devices
  - v. Flow Measurement Devices
  - vi. Bridge, Stream or Creek Crossings
- b. Review and approval of specialized work by the City Engineer shall be required. When requested by the city, design calculations shall be submitted for review prior to approval.

#### 5. Other Jurisdictions

- a. All major water system improvements must have the approval of the Oregon Health Division. Plans for individual subdivisions or other developments involving major water system improvements, shall be submitted by the Developer to the OHD-along with the required review fees-for approval. Such approval must be received and submitted to the City before any permits will be issued.

#### 6. Definitions and Terms

- a. **Abbreviations** - acceptable abbreviations for showing the types of existing and new pipe materials on the plans are:
- i. **CI**--Cast Iron
  - ii. **DI**--Ductile Iron
  - iii. **PVC**--Polyvinyl Chloride
  - iv. **STL**--Steel
  - v. **AC**--Asbestos Cement
- b. **Air Gap Separation**- a physical, vertical separation between the free-flowing discharge end of a water supply pipeline and the rim of an open, non-pressurized receiving vessel.
- c. **Approved Back Flow Prevention Assembly**- an assembly that has been investigated and approved by the Oregon Health Division for preventing back flow.

## Cascade Locks Public Works Design Standards

### Section 4 - Water Distribution

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- d. **Back Flow-** the flow of water in a direction opposite to the normal flow. (See Back-Siphonage.)
- e. **Back-Siphonage-** the flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a potable water supply pipe due to a negative or reduced pressure in such pipe.
- f. **Building Supply-** the pipe carrying potable water from the water meter-or other source of water supply-to a building or other point of use or distribution on the lot. Building supply shall also mean a customer line.
- g. **Cross Connection-** a any connection or arrangement-physical or otherwise- between a potable water supply system and any plumbing fixture or any tank, receptacle, equipment or device, through which it may be possible for non-potable, used, unclean, polluted or contaminated water or other substances, to enter into any part of such potable water system under any condition.
- h. **Distribution System-** the distribution main pipelines, pumping stations, valves and hydrants and ancillary equipment used to transmit water from the supply source to the service line.
- i. **Double Check Valve Assembly-** an assembly composed of two single, independently acting check valves, including tightly closing shut-off valves located at each end of the assembly and fitted with properly located test ports.
- j. **Double Detector Check Valve Assembly-** a line-sized approved double check valve assembly with a parallel meter and meter-sized approved double check valve assembly. The purpose of this assembly is to provide double check valve protection for the distribution system and at the same time provide partial metering of the fire system showing any system leakage or unauthorized use of water up to 3.0 G.P.M. flow.
- k. **Fire Hydrant Assembly-** to include the fire hydrant, hydrant lead, mainline hydrant valve, mainline tee and thrust restraint at the hydrant and mainline tee.
- l. **Fire Protection Service-** a connection to the public water main intended only for the extinguishment of fires and flushing necessary for its proper maintenance. All fire services shall have a double detector check assembly.
- m. **Fixture Unit Equivalent-** the unit flow or demand equivalent of plumbing fixture as tabulated in the uniform plumbing code.

## Cascade Locks Public Works Design Standards

### Section 4 - Water Distribution

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- n. **Hydrant Lead**- the line connecting the fire hydrant assembly to the City main or private fire line with an auxiliary valve.
- o. **Irrigation Service**- a metered connection intended for seasonal use and delivering water which is not discharged to the sanitary sewer.
- p. **ISO**- Insurance Services Office.
- q. **Potable Water**- water which is satisfactory for drinking, culinary and domestic purposes and meets the requirements of the health authority having jurisdiction.
- r. **Service Line**- the line or pipe extending from the City water main to the water meter, Back Flow prevention device or private water system double check valve assembly.
- s. **Uniform Plumbing Code**- The Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, current edition as revised by the State of Oregon, called the "Oregon State Plumbing Specialty Code".
- t. **Water Main**- a water supply for public or community use.
- u. **Water Supply System**- consists of the building supply pipe, the water-distributing pipes, and the necessary connecting pipes, fittings, control valves, and all appurtenances carrying or supplying potable water in or adjacent to the building premises.

#### 7. General Design Considerations:

- a. In general, water distribution systems should be designed to care for maximum development of the service area with the recognition of possible urban and industrial expansion.
- b. As a condition of water service, all developments will be required to provide public water mains of sufficient size for fire protection to adjacent parcels. This shall include the extension of water mains in easements across the property to adjoining properties, and across the street frontage of the property to adjoining properties when the main is located in the street right-of-way.
- c. The system shall have sufficient capacity to maintain 40 PSI at the building entrance for one and two family dwellings. For other development, provide minimum pressure of 35 PSI at the building side of the meter during periods of maximum use, and to provide sufficient

# Cascade Locks Public Works Design Standards

## Section 4 - Water Distribution

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volumes of water at adequate pressures to satisfy the expected daily consumption plus fire flows.

- d. Normal working pressure in the distribution system is approximately 60 PSI with a range of 40 PSI to 70 PSI. A 20 PSI residual pressure under fire flow conditions shall be maintained at all points in the distribution system under new system design. Velocities in mains shall normally range from three to six feet per second for average demand to a maximum velocity of ten feet per second for combined average demand plus fire flow.
- e. Head loss shall be determined by the Hazen-Williams equation as shown on Table 4-1.

Table 4-1

Hazen-Williams Coefficients

Pipe Diameter	C Value
8 Inches and Less	100
10 Inches to 12 Inches	110
Greater than 12 Inches	120

### 8. Water System Capacity

- a. Design capacities shall be determined by consideration of the following factors and assumptions:
  - i. Area to be served, both immediate and adjacent
  - ii. Current and projected population within the area to be served

# Cascade Locks Public Works Design Standards

## Section 4 - Water Distribution

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- iii. Current and projected land use within the area to be served
  - iv. Commercial, industrial or institutional users to be served
  - v. Changes in any of the above which are likely to occur within a foreseeable time period
- b. In the absence of consumption data or other reliable information, the following factors are to be used for assumed peak hour demands:
- i. 0.75 g.p.m. per person for single family residential
  - ii. 0.25 g.p.m. per person for multiple family residential
  - iii. 5,000 gal/ac/day for commercial development
  - iv. 10,000 gal/ac/day for industrial development
- c. Fire flows are to be as shown in **Table 4-2**:

Table 4-2  
Fire Flow Requirements

Land Use	Fire Flows (G.P.M.)	Duration (Hr.)
Industrial	4,500	4
Downtown	4,000	4
Commercial	3,500	3
Multiple Family	3,000	2

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## Section 4 - Water Distribution

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Residential R-1	1,000	2
R-2	1,500	2
R-3	2,000	2
All Others	1000	2

- d. Demand for unique commercial installations, industrial users, PUD's, multiple, and institutional concerns will be calculated on an individual basis.
- e. In all cases, all new fire hydrants shall be capable of delivering a minimum of 1,000 G.P.M. at 20 PSI residential system pressure.

### 9. Looping

- a. The distribution system mains shall be looped at all possible locations. All water lines shall be looped and valved such that the removal of any single line segment from service will not result in more than one fire hydrant being taken out of service.
- b. The installation of permanent dead-end mains upon which fire protection depends and areas of large demands on single mains will not be permitted.

### 10. Blow Offs

- a. All dead end mains shall terminate with a blow off assembly or a fire hydrant.
- b. Blow offs shall be sized to ensure that the water mains can be flushed at a minimum velocity of two and one half feet per second in accordance with AWWA C-650. **Figure 4-3** shall be used as a minimum size guideline assuming 40 PSI minimum residual system pressure under flushing conditions.

Figure 4-3

## Cascade Locks Public Works (CLPW) Standards

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#### Minimum Mainline Blow Off Sizes

Water Main Diameter	Minimum Blow Off Diameter
6 and 8 Inch:	2 inch
10 and 12 Inch	4 inch
Larger than 12 inch	As Required

- c. Permanent dead ends shall have a permanent blow off assembly and thrust restraint system. A blow off in a cul-de-sac shall be located in front of the curb and within five feet from the curb face.
- d. Mains which can conceivably be extended at some later date shall have a mainline valve in front of the blow off assembly, and a thrust restraint system which allows the mainline valve to be connected to without taking the line out of service.
- e. Temporary blow offs where required for cleaning new water mains, shall be located at the lower end of the line to be flushed whenever possible. Temporary blow offs larger than two inches in diameter shall have a valve conforming to the requirements contained herein for mainline valves.

#### 11. Minimum Cover Depth

- a. The minimum cover depth over buried water mains within the street right-of-way or easements shall be 36 inches from the finished grade, except that a minimum of 40 inches cover shall be required for waterlines in fill slopes.
- b. Finished grade shall normally be determined as shown in Figure 4-4:

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Figure 4-4

Finished Grade

Mainline Location	Finished Grade
Water line under sidewalk in right-of-way	Top of Curb
Water line within paved area of right-of-way	Top of Curb
Water line in cut slope behind sidewalk	Top of Curb
Fill slopes	Perpendicular from pipe to surface
Easement	Finished grade at pipe centerline

### 12. Water Line Locations

- a. Waterlines located in the public right-of-way shall be parallel to the public right-of-way and preferably on the south and west sides of the public right-of-way street. Exceptions to these requirements may be made in order to avoid conflicts with other existing underground facilities, and to permit sanitary sewers to be installed on the low sides of the streets.
- b. Standard location for water mains within public right-of-way shall be
- c. Water mains shall be separated from other parallel utilities by a minimum

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of five feet and from parallel sewer main lines by a minimum of ten feet.

- d. Water mains shall not be installed in alleys or the back of lots. As nearly as practical, mains shall be installed with the same distance-as practical-from the curb line (or property lines where no curbs exist) of the street. On curved streets, mains may be laid on a curve concentric with the street centerline, with deflections no greater than the manufacturer's specifications. Mains may be laid in straight lines along the tangent between selected angle points to avoid conflicts with other utilities. The angle point/tangent section shall not be less than three feet in front of curb face.
- e. Where a water main crosses below or within 18 inches of vertical separation above a sanitary sewer main or lateral, one full length of ductile iron or C-900 shall be centered on the point of crossing.

#### 13. Main Line Sizing

- a. Minimum sizes for water mains shall be as shown in **Figure 4-5** :

Figure 4-5

Mainline Size Requirements

Minimum Diameter	Type of Mainline
6 inch	Private fire line supplying a single fire hydrant or a building fire suppression system. Looping of private fire lines which supply hydrants will be required.
8 inch	Minimum size water main for the public water system. Looping back into the distribution grid shall be at intervals as required by the City, but shall generally not exceed 600 feet.
8 inch	Public water distribution mains and permanently dead-end mains supplying fire hydrants with a required fire flow of

## Cascade Locks Public Works (CLPW) Standards

### Section 4 - Water Distribution

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	1,500 G.P.M. or less.
10 inch and larger	As required for transmission mains, distribution mains in industrial subdivisions and fire lines supplying more than 1,500 G.P.M.

#### 14. Water Mains Within Easements

- a. The installation of mains within easements across privately owned property is to be done only when absolutely necessary, such as the avoidance of dead-end conditions. Conditions of the easement shall be such that the easement shall not be used for any purpose which would interfere with the unrestricted use for water main purposes.
- b. Under no circumstances shall a building or structure be placed over a water main or water main easement. This includes overhanging structures with footings located outside the easement.
- c. Easement locations for public mains serving a PUD, apartment complex or commercial or industrial development shall be in parking lots, private drives or similar open areas which will permit an unobstructed vehicle access for maintenance by City Forces.
- d. Easements, when required, shall be exclusive and be a minimum of ten feet in width except that the minimum width shall be 15 feet or more for transmission water mains ten inch and larger. Easement widths shall vary from the ten foot minimum by five foot increments.
- e. Mains laid in easements along a property line or with the easement centered on a property line, shall be offset 18 inches from the property line.
- f. Easements must be obtained from the property owner to the City of Cascade Locks prior to construction. Such easements shall be the responsibility of the developer to obtain and record, and shall be submitted to the City for review and approval prior to recording.
- g. Common placement of water, sewer and storm drain in an easement may be allowed under certain conditions. However, separation of utilities must meet OHD requirements as set forth in OAR 333. Common easements will be reviewed on a case-by-case basis.

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#### 15. Surface Water and Stream Crossings

- a. Surface water crossings of mains shall be in accordance with OAR 333.
- b. Mains crossing streams or drainage channels shall be designed to cross as nearly perpendicular to the channel as possible. The minimum cover from the bottom of the stream bed or drainage channel to the top of pipe shall be 36 inches.
- c. Mains crossing streams or drainage channels for pipes of 12 inches or larger, and crossings requiring special approval from the Department of State Lands, shall be treated on a case-by-case basis.
- d. A scour pad centered on the water line will be required for mains less than 12 inches when the cover from the top of pipe to the bottom of the stream bed or channel is 30 inches or less. The size and design of scour pads will be reviewed on a case-by-case basis by the City Engineer.

#### 16. Water Valves

- a. In general, valves shall be the same size as the mains in which they are installed. Valve types and materials shall conform to the Standard Construction Specifications. Reducers for re-connection to existing water lines less than eight inches in diameter shall be placed between the new valve and the existing line.
- b. Distribution system valves shall be located at the tee or cross fitting as nearly as possible. There shall be a sufficient number of valves so located that not more than four and preferably three valves must be operated to affect any one particular shutdown. The spacing of valves shall be such that the length of any one shut down shall not exceed 500 feet.
- c. Hazardous crossings, such as creek, railroad and freeway crossings, shall be valved on each side of the crossing.
- d. All developments will be required to extend mains across existing or proposed streets for future extensions by the City or other developments. All terminations shall be planned and located such that new or existing pavement will not have to be cut in the future when the main is extended.

#### 17. Fire Hydrants

- a. Coverage: Preferred coverage shall result in maximum hydrant spacing of 500 feet in residential areas, 300 feet in high value districts and no further than 250 feet from the furthest point of any dwelling, building, garage, or building. Hydrant stubs will be required for installation in areas of

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currently minimum development.

- b. No fire hydrant shall be installed on a main of less than eight inch inside diameter unless it is in a looped system of six inch mains. The hydrant lead shall be a minimum of six inch inside diameter.
- c. No hydrant shall be installed less than five feet from an existing utility pole or guy wire nor shall a utility pole or guy wire be placed less than five feet from and existing hydrant...
- d. Each hydrant shall have a hydrant valve and valve box at the main line tee. The hydrant valve shall have mechanical joint-flange joint ends. The valve shall be connected to the water main using a mechanical joint or flange joint tee.
- e. Hydrant bury shall be sufficient to provide a minimum of 36" of cover over the hydrant lead.
- f. The hydrant shall be set such that the center of the pumper port is a minimum of 16" or a maximum of 24" above the surrounding grade.

#### 18. Service Lines

- a. Each legal lot of record shall be connected by a separate water service line connected to the public or approved private water main. Combined water service lines will be permitted only when the property cannot legally be further divided; IE: a residential lot with a house and unattached garage or shop with plumbing fixtures.
- b. Additional water service lines must be stubbed into the property lines sufficient to serve all residential parcels which can be further partitioned in the future where such future partition would require that the streets be cut to install such services.
- c. Service lines one inch thru two inches shall be tapped to the mainline by the use of a tapping service saddle. Service lines larger than two inches shall use a mainline tee with a threaded or flanged valve.

#### 19. Service Line Sizes

- a. Only one metered service line per property will be allowed. It will be the property owner's responsibility to provide and read the additional installed meters if so desired by the developer in the case of multi-housing units.
- b. Should more than one commercial water user be located on a property owned by one person, the City may allow an exception to the one service

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line per property requirement.

- c. Standard service line sizes which may be used are 1", 1-1/2", 2", 4", 6" and 8". Service lines will be reviewed for effects on the distribution system and shall not be greater in size than the distribution system.
- d. Service piping shall be equal to or greater than the meter size, however three inch meters require a four inch tap and four inch minimum piping fittings.
- e. Single Residential Service--1"; Duplex Residential Service--1"; Triplex Residential Service--1-1/2"; Commercial Service--1" minimum. The next larger service size may be required for residential lots large enough to be partitioned into additional lots without a water main extension.
- f. For three inch and larger services, design drawings shall be submitted showing the vault and fitting requirements, including a lock-able bypass line, with the expected flow requirements and proposed usage.

#### 20. Service Line and Meter Location

- a. Meters shall be located at the termination of the City service line. One inch through two inch meters shall be located in the right-of-way in a location that allows for easy reading and maintenance, preferably to a point 6" behind the back of the sidewalk.
- b. The meter stop and meter box shall be located such that the front of the meter box is 3 inches behind the sidewalk.
- c. In general, individual service connections shall terminate in front of the property to be served and shall be located two feet each side of a common side property line.
- d. The domestic service shall not be connected to a fire protection service.
- e. A public utility and access easement (five foot clear around all sides) shall be provided to and around all meter boxes/vaults set on private property.
- f. A backflow prevention assembly shall be placed on domestic service lines as required by Section 4.23.

#### 21. Water Meters

- a. All water meters scheduled for services inside the City of Cascade Locks will be furnished and installed by City forces at the request and expense of the customer. The service line, meter box and all piping within the

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meter box must be installed by the developer.

- b. All meters shall read in gallons.
- c. Water Meter Boxes and Vaults
- d. Unless otherwise approved, all meter boxes shall be as shown in Table 4.6.

Table 4-6

Meter Box Size

Service Size	Meter Box
1"	Brooks Style #38
1-1/2"	Brooks Style #66
2"	Brooks Style #66
3" & larger	Vault to Conform to COS Standard Drawing #506

- e. Three inch and larger meters shall be located on private property adjacent to the right-of-way to allow for reading and maintenance. It must be accessible for a crane truck to within ten feet of the installation with a ten foot vertical clearance.
- f. The meter, vault and piping are to be protected from freezing, vandals and vehicles. The surrounding area must be graded such to prevent storm water from running over and into the vault.
- g. All three inch and larger meters shall be provided with a remote readout

## Cascade Locks Public Works (CLPW) Standards

### Section 4 - Water Distribution

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head located such that it can be read without entering the meter vault.

- h. The meter may be located in the same vault as the back flow preventor- with the approval of the City- provided a completed dimensioned design is submitted with the request.

#### 22. Back Flow Prevention-General

- a. The BFP assembly must meet the requirements as set forth from the current OHD approved list of assemblies.
- b. An approved Back Flow prevention assembly with an approved metering system shall be required for use in each of the following instances:
  - i. When a private line is looped between two or more City mains in order to obtain the required flow and the resultant loop will not benefit the City water line grid system.
  - ii. On all private fire lines attached to the City's distribution system.
  - iii. When an auxiliary water supply exists on the property being served.
- c. Back Flow Prevention-Location
  - i. The approved Back Flow prevention assembly shall be installed on the property being served in a place accessible for City inspection.
  - ii. The Back Flow preventor shall be located before any branch, immediately downstream of the meter that would feed a non-potable system extension; or
  - iii. If no meter, at the property line; or
  - iv. If in a building, before the first branch or hazard being controlled or as determined by the City Cross-connection Control Inspector; or
  - v. If installed outside a building being served, it shall be placed at the property line in an approved vault or structure. Double check assemblies up to two inches may be installed in standard meter boxes, Brook #66 or equal.

# City of Cascade Locks

## Public Works Design Standards

### APPENDIX

- Construction Permit Forms
- Standard Detail Drawings

CITY OF CASCADE LOCKS  
TYPE A CONSTRUCTION PERMIT

Construction involving/serving less than 1/2 acre of property or a single residential or business parcel.

Permit No. \_\_\_\_\_ Date \_\_\_\_\_

Applicant \_\_\_\_\_

Mailing Address \_\_\_\_\_

Application is made to: Construct \_\_\_\_\_ Alter \_\_\_\_\_

\_\_\_\_\_ Curb/Gutter \_\_\_\_\_ Roof/Storm Drain \_\_\_\_\_ Driveway \_\_\_\_\_ Apron

\_\_\_\_\_ Parking Lot \_\_\_\_\_ Sidewalk \_\_\_\_\_ Other

Description of work: \_\_\_\_\_

Total Estimated Construction Cost for items listed above: \_\_\_\_\_

Location of Construction Work:

Assessors' Map and Tax Lot \_\_\_\_\_ Physical Address \_\_\_\_\_

Easements Required? Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, obtained? Yes \_\_\_\_\_ No \_\_\_\_\_

Engineer: \_\_\_\_\_ Email: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Contractor: \_\_\_\_\_ Email: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Approval from outside agency(s) Yes \_\_\_\_\_ No \_\_\_\_\_

Agency: \_\_\_\_\_ Date Approved: \_\_\_\_\_

Proposed Work Schedule: Begin \_\_\_\_\_ Complete \_\_\_\_\_

Plans cleared by local, public and private utilities

Two sets of plans attached

For construction involving any excavation work, Oregon Law requires the permittee to locate all underground facilities before start of excavation and take measures to protect the facilities during construction. The telephone number for the Oregon Notification Center is 1-800-332-2344 or 811.

Applicant agrees to comply with the above description of work, attached plans and the regulations of the Cascade Locks Public Works Design and Construction Standards.

Applicant agrees to schedule inspections with authorized personnel by calling City Hall after forming, after base rock, and depth of concrete or asphalt.

Applicant agrees to guarantee all materials and workmanship covered by this permit for a period of one year following acceptance of the improvements by the City.

Applicant agrees to indemnify and hold harmless the City, its officials, representatives and employees from any and all liability resulting from the Applicant's negligent acts for performance of work under this permit.

I have read and agree to the permit conditions as listed above.

Applicant Signature: \_\_\_\_\_

-----OFFICE USE ONLY-----

Date Application Received: \_\_\_\_\_, 20\_\_\_\_

Plans checked by: \_\_\_\_\_ Date: \_\_\_\_\_

Approved

Not Approved

Permit Issued: \_\_\_\_\_, 20\_\_\_\_ by: \_\_\_\_\_

Date Construction Completed: \_\_\_\_\_, 20\_\_\_\_

Date Work Accepted by Public Works or City Engineer \_\_\_\_\_, 20\_\_\_\_

Applicant must also sign a Development Agreement.

CITY OF CASCADE LOCKS  
TYPE B CONSTRUCTION PERMIT

Construction involving/serving more than 1/2 acre of property or multiple residential or business parcels.

Permit No. \_\_\_\_\_ Date \_\_\_\_\_

Applicant \_\_\_\_\_

Mailing Address \_\_\_\_\_

Application is made to: Construct \_\_\_\_\_ Alter \_\_\_\_\_

\_\_\_\_\_ Curb/Gutter \_\_\_\_\_ Roof/Storm Drain \_\_\_\_\_ Driveway \_\_\_\_\_ Apron

\_\_\_\_\_ Parking Lot \_\_\_\_\_ Sidewalk \_\_\_\_\_ Sewer \_\_\_\_\_ Water Main

\_\_\_\_\_ Other

Description of work: \_\_\_\_\_

Total Estimated Construction Cost for items listed above: \_\_\_\_\_

Location of Construction Work:

Assessors' Map and Tax Lot \_\_\_\_\_ Physical Address \_\_\_\_\_

Easements Required? Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, obtained? Yes \_\_\_\_\_ No \_\_\_\_\_

Engineer: \_\_\_\_\_ Email: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Contractor: \_\_\_\_\_ Email: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Approval from outside agency(s) Yes \_\_\_\_\_ No \_\_\_\_\_

Agency: \_\_\_\_\_ Date Approved: \_\_\_\_\_

Proposed Work Schedule: Begin \_\_\_\_\_ Complete \_\_\_\_\_

Plans cleared by local, public and private utilities

Two sets of plans attached

Attach 100% Performance and Payment Bond & Certificate of Insurance: Public Liability Coverages \$ \_\_\_\_\_

For construction involving any excavation work, Oregon Law requires the permittee to locate all underground facilities before start of excavation and take measures to protect the facilities during construction. The telephone number for the Oregon Notification Center is 1-800-332-2344 or 811.

Applicant agrees to comply with the above description of work, attached plans and the regulations of the Cascade Locks Public Works Design and Construction Standards.

Applicant agrees to schedule inspections with authorized personnel by calling City Hall after forming, after base rock, and depth of concrete or asphalt.

Applicant agrees to guarantee all materials and workmanship covered by this permit for a period of one year following acceptance of the improvements by the City.

Applicant agrees to indemnify and hold harmless the City, its officials, representatives and employees from any and all liability resulting from the Applicant's negligent acts for performance of work under this permit.

I have read and agree to the permit conditions as listed above.

Applicant Signature: \_\_\_\_\_

-----OFFICE USE ONLY-----

Date Application Received: \_\_\_\_\_, 20\_\_\_\_

Plans checked by: \_\_\_\_\_ Date: \_\_\_\_\_

Approved

Not Approved

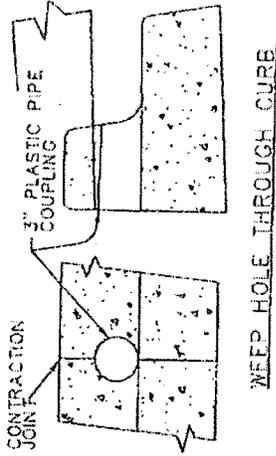
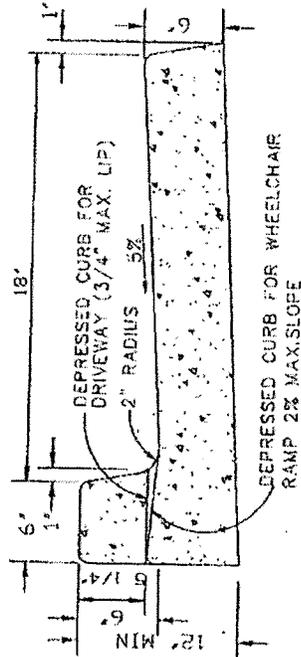
Permit Issued: \_\_\_\_\_, 20\_\_\_\_ by: \_\_\_\_\_

Date Construction Completed: \_\_\_\_\_, 20\_\_\_\_

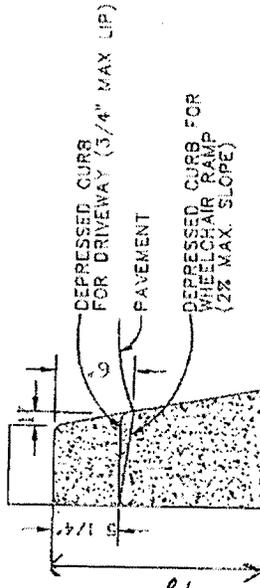
Date Work Accepted by Public Works or City Engineer \_\_\_\_\_, 20\_\_\_\_

Applicant must also sign a Development Agreement.

# STANDARD CURB



## O.D.O.T. TYPE "C" CURB



- NOTES:**
1. ALL RADII SHALL BE 3/4" EXCEPT AS OTHERWISE SHOWN.
  2. ISOLATION JOINTS SHALL BE PLACED ONLY AS SPECIFIED.
  3. CONTRACTION JOINTS SHALL BE PLACED AT 15' INTERVALS AND SHALL EXTEND AT LEAST 50% THROUGH THE CURB OR CURB AND GUTTER.
  4. A CONTRACTION JOINT SHALL BE PLACED ALONG AND OVER WEEP HOLE THROUGH THE CURB AND THROUGH THE SIDEWALK.
  5. WHEN SIDEWALKS ARE CONSTRUCTED, EXTEND 3" PIPE TO BACK OF SIDEWALK AND INSTALL COUPLING.

USED ONLY WITHIN STATE HIGHWAY RIGHT OF WAY

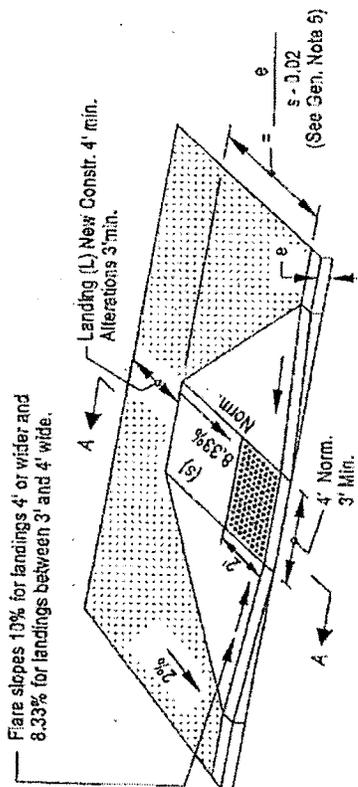
NOTE: All methods and accessories shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
STANDARD CURB DETAIL

DATE	REVISION
12-05	2002
	DESCRIPTION
	REGISTERED PROFESSIONAL ENGINEER

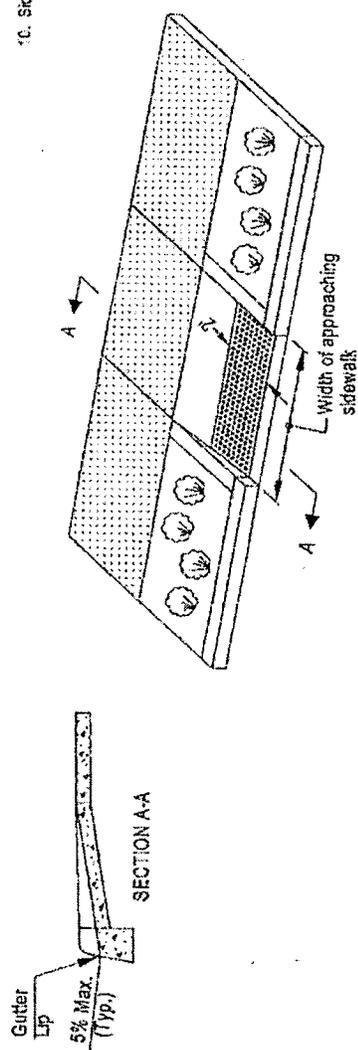
**GENERAL NOTES:**

1. Place truncated dome detectable warning texture in the lower 2' of throat of ramp only. Arrange domes using in-line pattern as shown in detail below. Color of texture to be safety yellow. For constr. of sidewalk ramps outside of public right-of-way, check State Building Codes requirements.
2. Sidewalk curb ramp slopes shown are relative to the true level horizon (zero bubble).
3. In alterations curb ramp slope(s) may be 10% for a max. rise of 8" or 12.5% for a max. rise of 3". Curb ramps, in alterations, need not exceed 6' in length.
4. Side flares that are not part of the path of travel may be any slope.
5. Ramps for paths intersecting a roadway should be full width of path. When a ramp is used to provide bicycle access from a roadway to a sidewalk, the ramp should be 6' wide with no texturing.
6. Sidewalk ramp details are based on CRS 447.310 and the proposed ADAAG Section 14, June 20, 1994.
7. When 2 curb ramps are immediately adjacent, the curb exposure (e) between the adjacent side flares may range between 3" and full design exposure.
8. For the purpose of this drawing, a curb ramp is considered "perpendicular" if the angle between the longitudinal axis of the ramp and a tangent to the curb at the ramp center is 75° or greater.
9. Toded joints are required at all sidewalk ramp slope break lines.
10. Sidewalk flare is not necessary where the ramp is protected from pedestrian cross-travel.

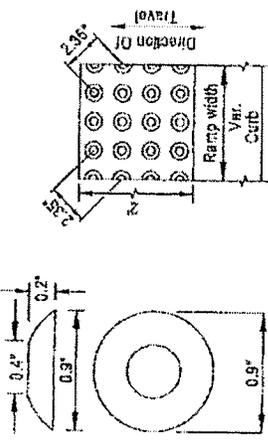


**OPTION 1  
PERPENDICULAR SIDEWALK RAMP DETAIL**

(Use "Parallel or Combined Ramp Detail" when reqd. landing cannot be obtained)



**OPTION 2  
PERPENDICULAR SIDEWALK RAMP  
THROUGH BUFFER STRIP**



**TRUNCATED DOME  
DETAIL**

**RAMP TEXTURE PATTERN  
DETAIL**

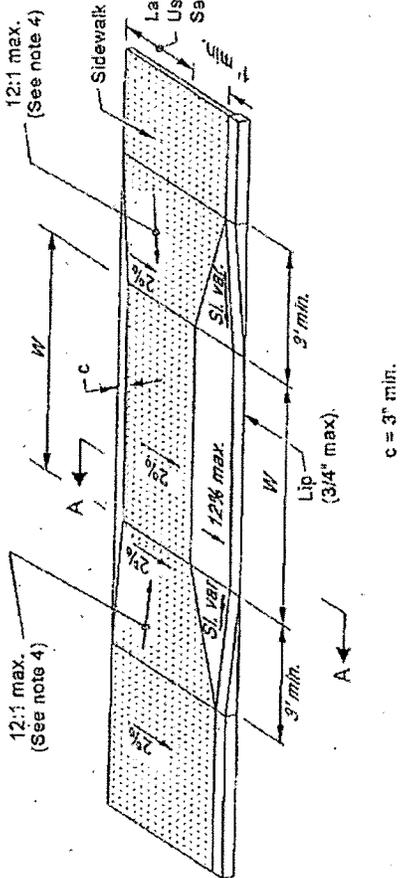
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

**NOTE:** All materials and workmanship shall be in accordance with the current Oregon Standard Specifications.

**OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SIDEWALK RAMP DETAILS  
SHEET 1**

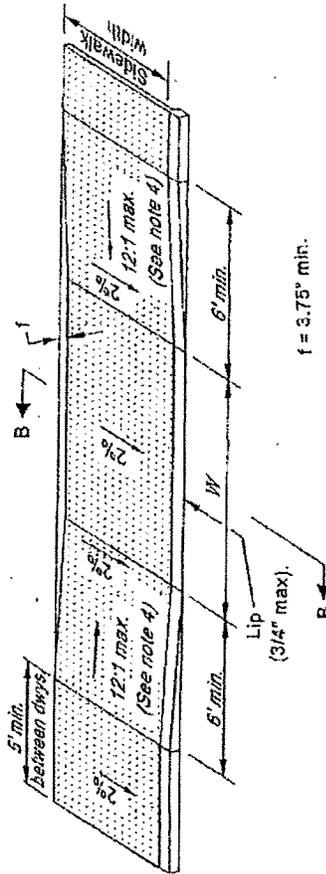
2002  
REVISED BY: [blank]  
DATE: 8-24  
City of Hood River, Oregon

**OPTION 1  
PARTIALLY LOWERED SIDEWALK**



c = 3" min.

**OPTION 2  
FULLY LOWERED SIDEWALK**

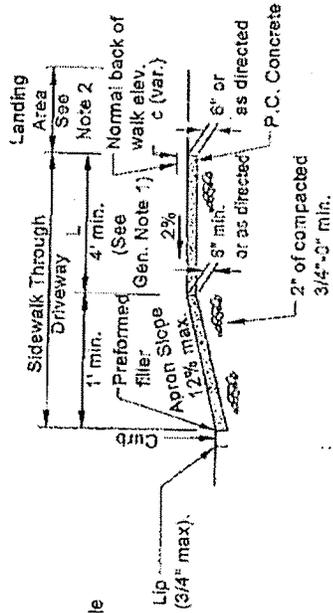


f = 3.75" min.

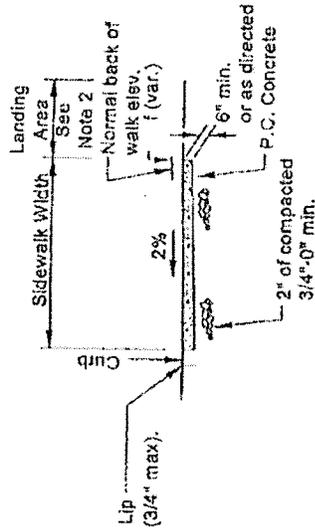
**GENERAL NOTES:**

1. 4' nom. width with slope of 2% is required through driveways.
2. Width of driveway (W) and length of landing area shall be as shown on plans or as directed.
3. Trenched joints are required at all driveway slope break lines.
4. Longitudinal slopes shown are relative to the running slope of the sidewalk.
5. Finish shall be medium broom, with no shine marks.

**SECTION A-A**



**SECTION B-B**



NOTE: All material and workmanship shall be in accordance with the current Oregon State Specifications.

**OREGON STANDARD DRAWINGS**

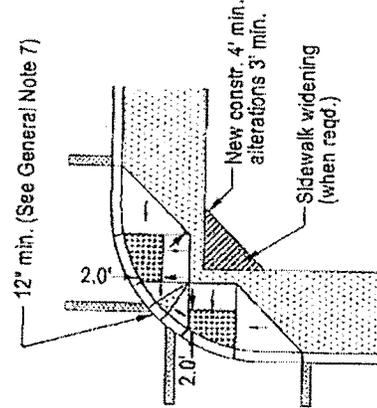
**CITY OF HOOD RIVER  
DRIVEWAY DETAIL**

DATE	DESCRIPTION
05/18/02	REVISION
05/18/02	REVISION
05/18/02	REVISION

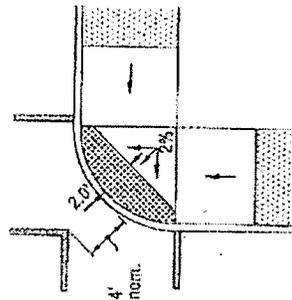
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

**General Notes**

1. Place truncated dome detectable warning texture in the lower 2' of throat of ramp only. Arrange domes using in-line pattern only as shown in detail right. Color of texture to be safety yellow. For construction of sidewalk ramps outside of public right-of-way, check with State Building Codes for requirements regarding texturing of flares.
2. Sidewalk curb ramp slopes shown are relative to the true level horizon (zero bubble).
3. In alterations curb ramp slope(s) may be 10% for a max. rise of 8" or 12.5% for a max. rise of 3/4". Curb ramps, in alterations, need not exceed 6' in length.
4. Side flares that are not part of the path of travel may be of any slope.
5. Do not slope landing more than 2% in any direction.
6. Ramps for paths intersecting a roadway should be full width of path. When a ramp is used to provide bicycle access from a roadway to a sidewalk, the ramp should be 8' wide, with no texturing.
7. Sidewalk ramp details are based on ORS 447.310 and proposed ADAAG Section 14, June 20, 1994.
8. When 2 curb ramps are immediately adjacent, the curb exposure (e) between the adjacent side flares may range between 3" and full design exposure.
9. For the purpose of this drawing, a curb ramp is considered "perpendicular" if the angle between the longitudinal axis of the ramp and a line tangent to the curb at the ramp center is 75° or greater.

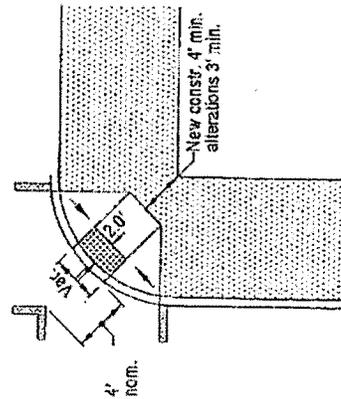


**OPTION 4**



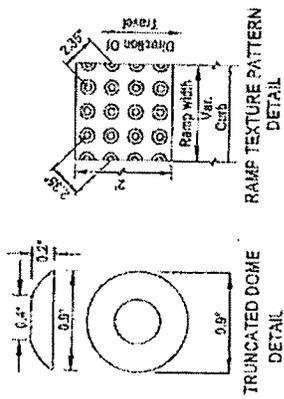
**OPTION 7**

**SINGLE PARALLEL RAMP**  
Use in alterations only and when site constraints prohibit installing two ramps



**OPTION 8**

**SINGLE DIAGONAL RAMP**  
Use in alterations only and when site constraints prohibit installing two ramps



Marked or Interlocked Crossing Location

NOTE: All materials and workmanship shall be in accordance with the current Oregon Standard Specifications.

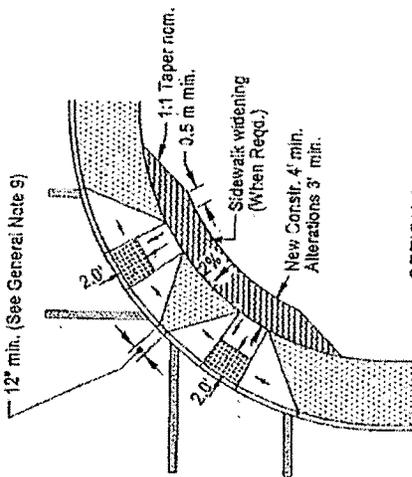
**OREGON STANDARD DRAWINGS**  
CITY OF HOOD RIVER  
SIDEWALK RAMP PLACEMENT  
FOR CURBSIDE SIDEWALKS  
ALTERATIONS

7602

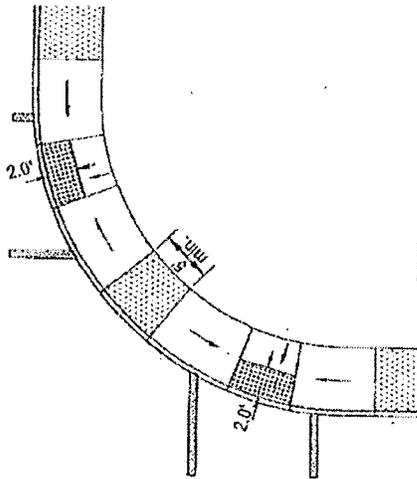
REV. 05/03  
REV. 05/03  
REV. 05/03  
ON CONTRACT PROJECT

The selection and use of this Standard Drawing while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

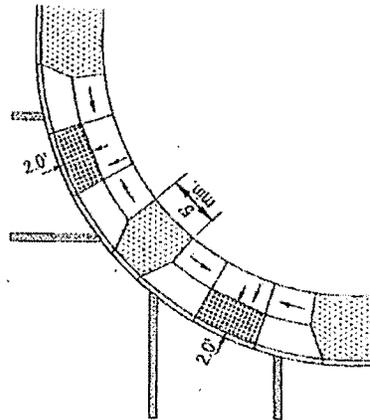
12" min. (See General Note 9)



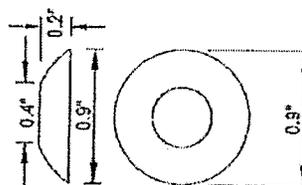
OPTION 1  
PERPENDICULAR RAMPS



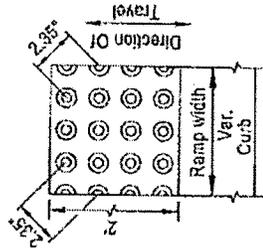
OPTION 2



OPTION 3  
COMBINATION RAMPS



TRUNCATED DOME  
DETAIL



RAMP TEXTURE PATTERN  
DETAIL

Marked or intended crossing location

General Notes

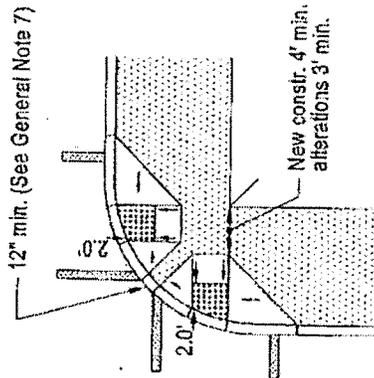
1. Place truncated dome detectable warning texture in the lower 2' of throat of ramp only. Arrange domes using in-line pattern only as shown in detail right. Color of texture to be safety yellow. For construction of sidewalk ramps outside of public right-of-way, check with State Building Codes for requirements regarding texturing of flares.
2. Sidewalk curb ramp slopes shown are relative to the true level horizon (zero bubble).
3. In alterations curb ramp slope(s) may be 10% for a max. rise of 8" or 12.5% for a max. rise of 3/4". Curb ramps, in alterations, need a not exceed 8' in length.
4. Side flares that are not part of the path of travel may be of any slope.
5. Do not slope landing more than 2% in any direction.
6. Ramps for paths intersecting a roadway should be full width of path. When a ramp is used to provide bicycle access from a roadway to a sidewalk, the ramp should be 8' wide, with no texturing.
7. Sidewalk ramp details are based on ORS 447.310 and proposed ADAAG Section 14, June 20, 1994.
8. When 2 curb ramps are immediately adjacent, the curb exposure (e) between the adjacent side flares may range between 3" and full design exposure.
9. For the purpose of this drawing, a curb ramp is considered "perpendicular" if the angle between the longitudinal axis of the ramp and a line tangent to the curb at the ramp center is 75° or greater.

NOTE: All technical responsibility shall be in accordance with the current Oregon Standard Specifications

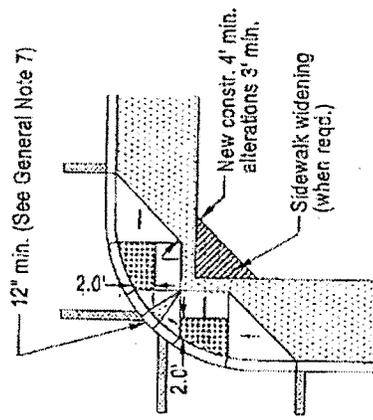
OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SIDEWALK RAMP PLACEMENT  
FOR CURBSIDE SIDEWALKS  
SHEET 1

DATE: 12-13-11  
DESIGNER: J. J. HARRIS  
CHECKER: J. J. HARRIS  
REGISTERED PROFESSIONAL ENGINEER

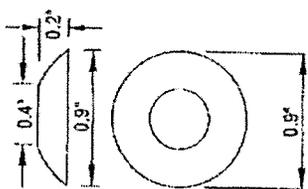
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



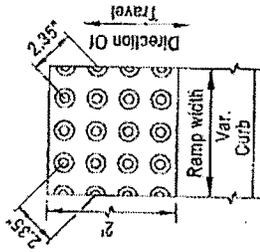
OPTION 4



OPTION 5



TRUNCATED DOME  
DETAIL



RAMP TEXTURE PATTERN  
DETAIL

Marked or intended crossing location

General Notes

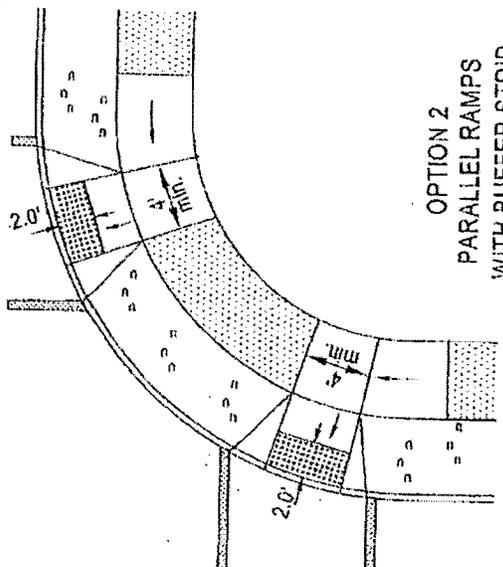
1. Place truncated dome detectable warning texture in the lower 2" of finish of ramp only. Arrange domes using in-line pattern only as shown in detail right. Color of texture to be safety yellow. For construction of sidewalk ramps outside of public right-of-way, check with State Building Codes for requirements regarding texturing of flares.
2. Sidewalk curb ramp slopes shown are relative to the true level horizon (zero bubble).
3. In alterations curb ramp slope(s) may be 10% for a max. rise of 6" or 12.5% for a max. rise of 3/4". Curb ramps, in alterations, need not exceed 6" in length.
4. Side flares that are not part of the path of travel may be of any slope.
5. Do not slope landing more than 2% in any direction.
6. Ramps for paths intersecting a roadway should be full width of path. When a ramp is used to provide bicycle access from a roadway to a sidewalk, the ramp should be 8' wide, with no texturing.
7. Sidewalk ramp details are based on ORS 447.310 and proposed ADAAG Section 14, June 20, 1994.
8. When 2 curb ramps are immediately adjacent, the curb exposure (e) between the adjacent side flares may range between 3" and full design exposure.
9. For the purposes of this drawing, a curb ramp is considered "perpendicular" if the angle between the longitudinal axis of the ramp and a line tangent to the curb at the ramp center is 75° or greater.

NOTE: All material and workmanship shall be in accordance with the current Oregon Building Specifications

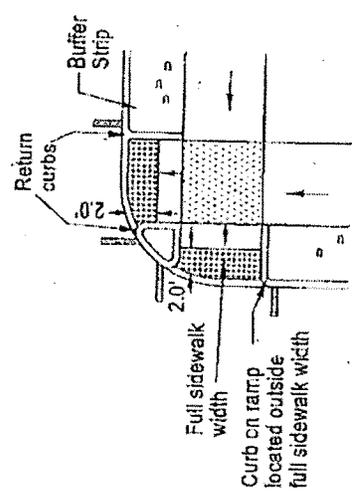
OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SIDEWALK RAMP PLACEMENT  
FOR CURBSIDE SIDEWALKS  
SHEET 2

DATE: 07/20  
BY: [Signature]  
CHECKED: [Signature]  
REGISTERED PROFESSIONAL ENGINEER

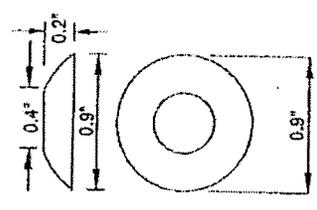
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



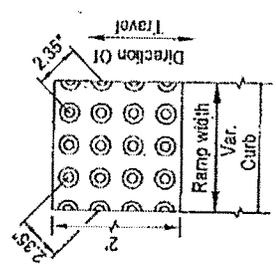
OPTION 2  
PARALLEL RAMP  
WITH BUFFER STRIP



OPTION 1  
RAMPS WITH BUFFER STRIP



TRUNCATED DOME  
DETAIL



RAMP TEXTURE PATTERN  
DETAIL

Marked or intended  
crossing location

General Notes

1. Place truncated dome detectable warning texture in the lower 2' of throat of ramp only. Arrange domes using in-line pattern only as shown in detail right. Color of texture to be safety yellow. For construction of sidewalk ramps outside of public right-of-way, check with State Building Codes for requirements regarding texturing of flares.
2. Sidewalk curb ramp slopes shown are relative to the true level horizon (zero bubble).
3. In alterations curb ramp slope(s) may be 10% for a max. rise of 6" or 12.5% for a max. rise of 3/4". Curb ramps, in alterations, need not exceed 6' in length.
4. Side flares, if used in Option A and I, that are not part of the path of travel may be of any slope.
5. Do not slope landing more than 2% in any direction.
6. Ramps for paths intersecting a roadway should be full width of path. When a ramp is used to provide bicycle access from a roadway to a sidewalk, the ramp should be 8' wide, with no texturing.
7. Sidewalk ramp details are based on ORS 447.310 and proposed ADAAG Section 14, June 20, 1994.
8. When 2 curb ramps are immediately adjacent, the curb exposure (e) between the adjacent side flares may range between 3" and full design exposure.
9. For the purpose of this drawing, a curb-ramp is considered "perpendicular" if the angle between the longitudinal axis of the ramp and a line tangent to the curb at the ramp center is 75° or greater.

NOTE: All materials and workmanship shall be in accordance with the current Oregon Standard Specifications

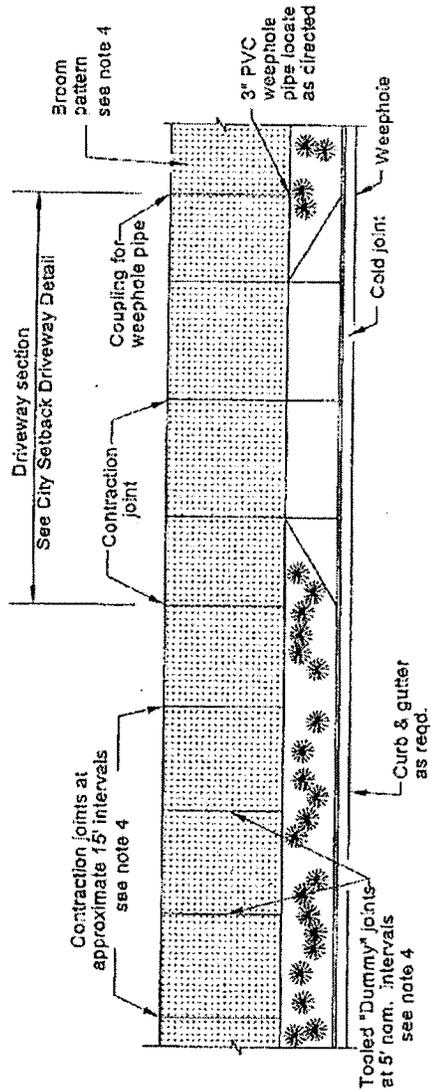
OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SIDEWALK RAMP PLACEMENT  
FOR SETBACK SIDEWALKS

DATE: 05/20/05  
DESIGNER: [blank]  
SCALE: [blank]  
PROJECT: [blank]

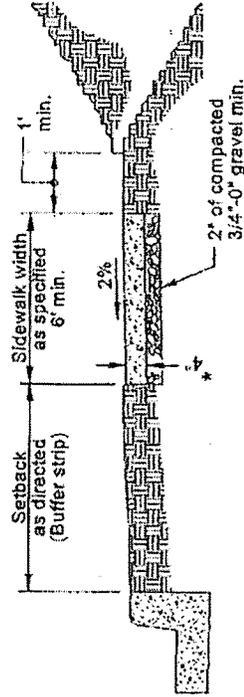
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



### TYPICAL PLAN VIEW - SETBACK SIDEWALK



### TYPICAL SETBACK SIDEWALK CROSS SECTION



\* As specified in plans. Minimum 4". If sidewalk is a portion of a driveway or mountable curb is used minimum thickness 8".

#### General notes:

1. Include additional paved or unpaved 2' clearance to vertical faces higher than 5' such as retaining walls, sound walls, fences and buildings.
2. On sidewalks 8' and wider, provide a longitudinal joint at the midpoint.
3. Install 3" pvc weephole pipes in sidewalks in locations as directed by engineer. Place contraction joint over top of pipe.
4. Finish shall be medium broom with no shine marks.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

CITY OF HOOD RIVER  
SETBACK SIDEWALK

2002

REVISIONS

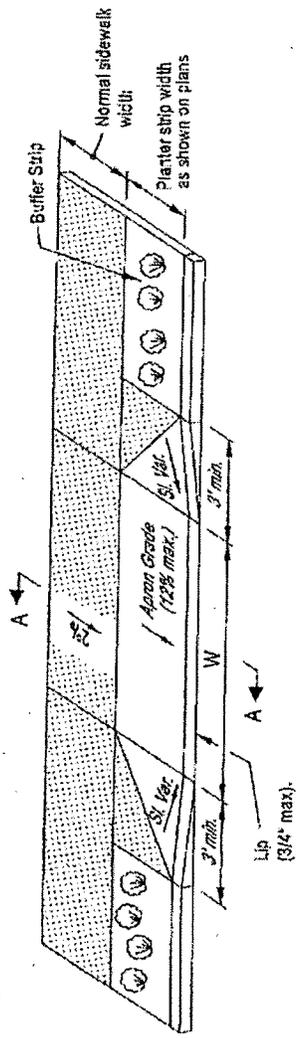
DATE

11.03

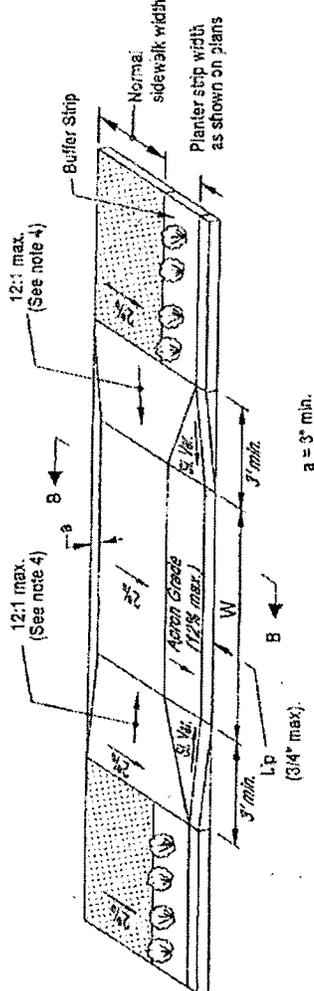
City of Hood River, Oregon

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TYPICAL SETBACK SIDEWALK DRIVEWAY



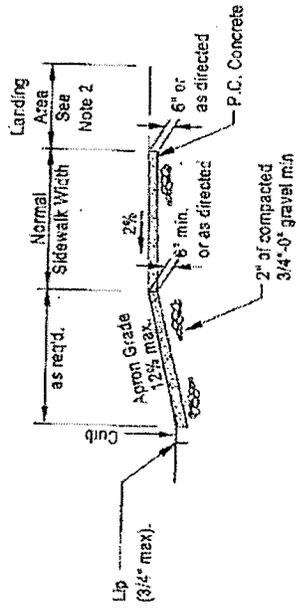
OPTIONAL LOWERED SIDEWALK



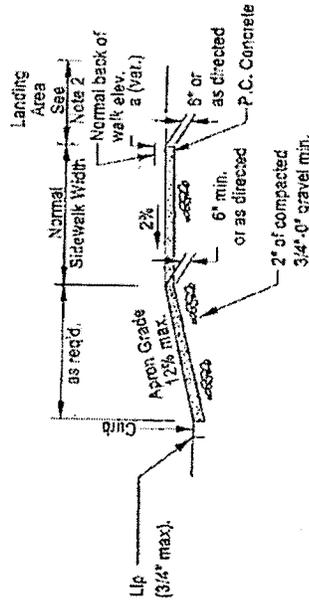
GENERAL NOTES:

- 4' norm. width with slope of 2% is required through driveways.
- Width of driveway (W) and length of landing area shall be as shown on plans or as directed.
- Tooled joints are required at all driveway slope break lines.
- Longitudinal slopes shown are relative to the running slope of the sidewalk.
- Finish shall be medium broom, with no shine marks.
- Maximum 6" square w/pe placed on 3" cove blocks is required in commercial driveways.

SECTION A-A



SECTION B-B



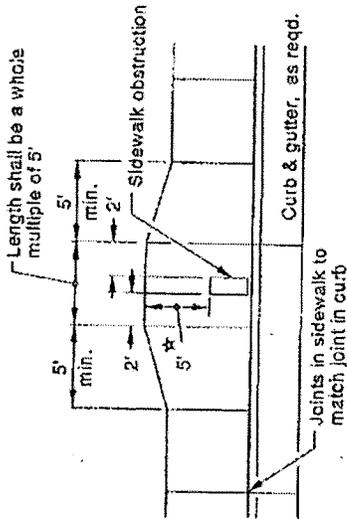
NOTE: All material & workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SETBACK SIDEWALK DRIVEWAYS

DATE: 12/28  
REVISED: 2002  
CITY of Hood River, Oregon

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

**REQUIRED SIDEWALK WIDENING  
AROUND OBSTRUCTIONS**

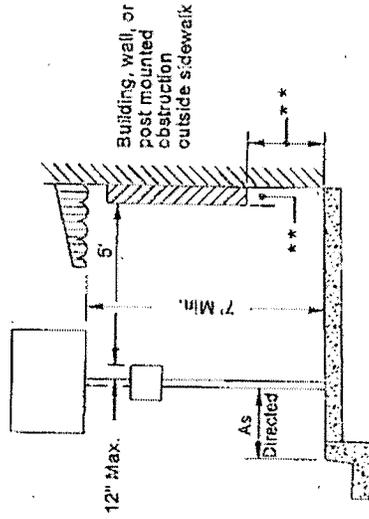


\* When site constraints prohibit a 5' passage, the Engineer may direct this to be reduced, but no less than 3'.

**General notes:**

1. Include additional paved or unpaved 2' clearance to vertical faces higher than 5' such as retaining walls, sound walls, fences and buildings.
2. On sidewalks 8' and wider, provide a longitudinal joint at the midpoint.
3. Install 3" pvc weephole pipes in sidewalks in locations as directed by engineer. Place contraction joint over top of pipe.

**CLEAR CIRCULATION PATH**



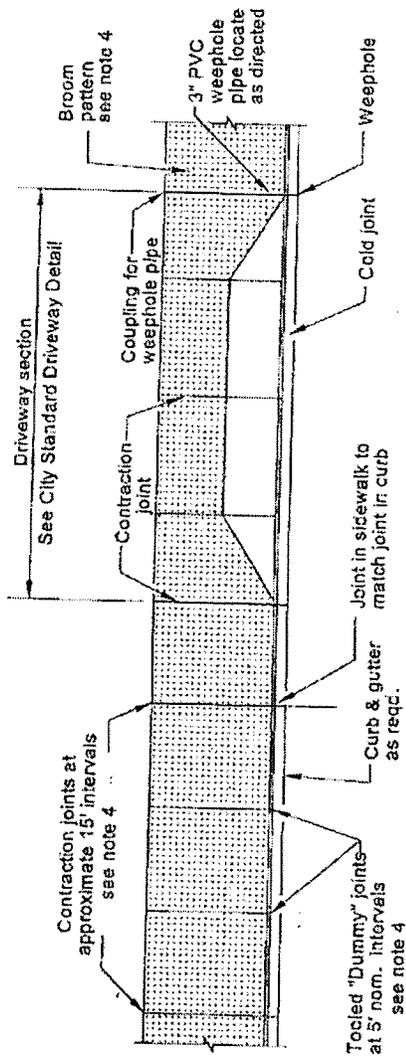
\* \* Objects with base below 2' 4" may protrude any distance as long as the 5' circulation path is maintained. When an object with a base higher than 2' 4" protrudes further than 4" provide a curb below protrusion to delineate edge.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SIDEWALK  
OBSTRUCTION STANDARDS**

DATE: 12-14-11  
DRAWN BY: [illegible]  
CHECKED BY: [illegible]  
REGISTERED PROFESSIONAL ENGINEER

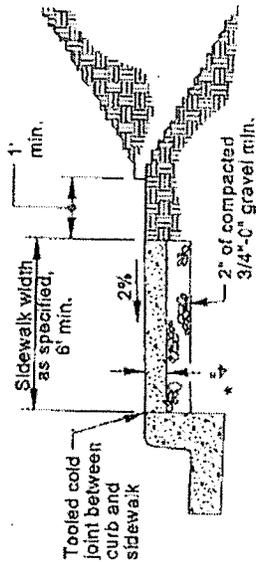
### TYPICAL PLAN VIEW - CURB SIDEWALK



#### General notes:

1. Include additional paved or unpaved 2' clearance to vertical faces higher than 5' such as retaining walls, sound walls, fences and buildings.
2. On sidewalks 8' and wider, provide a longitudinal joint at the midpoint.
3. Install 3" pvc weephole pipes in sidewalks in locations as directed by engineer. Place contraction joint over top of pipe.
4. Finish shall be medium broom with no shine marks.

### TYPICAL CURB SIDEWALK CROSS SECTION



\* As specified in plans. Minimum 4". If sidewalk is a portion of a driveway or mountable curb is used minimum thickness 6".

NOTE: ALL MATERIALS AND DIMENSIONS SHALL BE IN ACCORDANCE WITH THE STREET OPTION STANDARD SPECIFICATIONS

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
CURBSIDE SIDEWALK

2002

REVISED

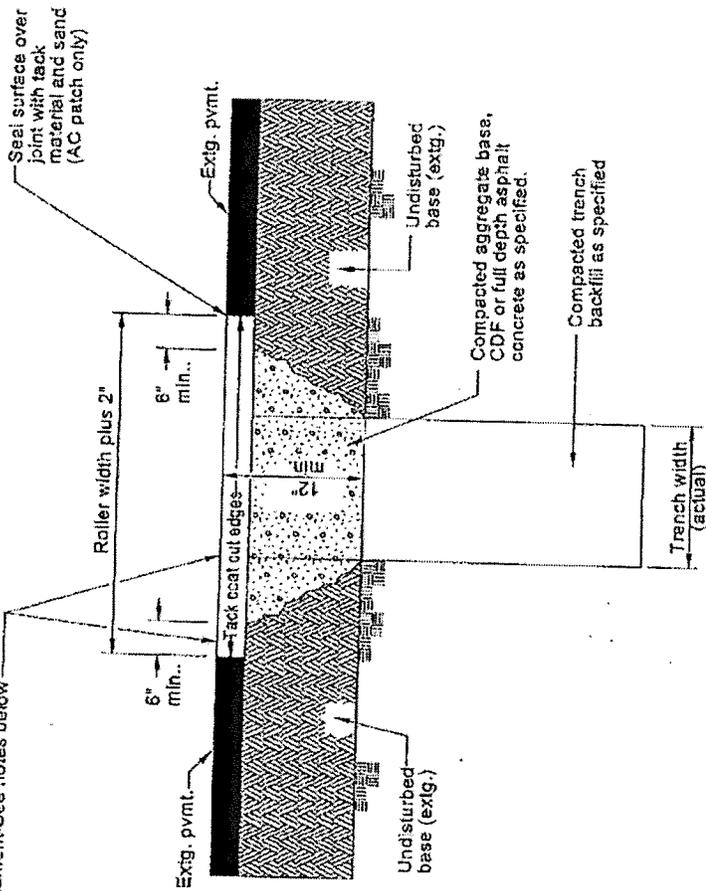
DATE

BY

CITY OF HOOD RIVER, OREGON

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

Pvmt. replacement-See notes below



Notes:

1. All existing AC or PCC pavement shall be sawcut prior to repaving.
2. Concrete pavement shall be replaced with concrete to a minimum thickness of 6" or to the thickness of removed pavement, whichever is greater.
3. Place AC mix minimum thkn. of 4" or the thkn. of the removed pavement, whichever is greater. Compact as specified

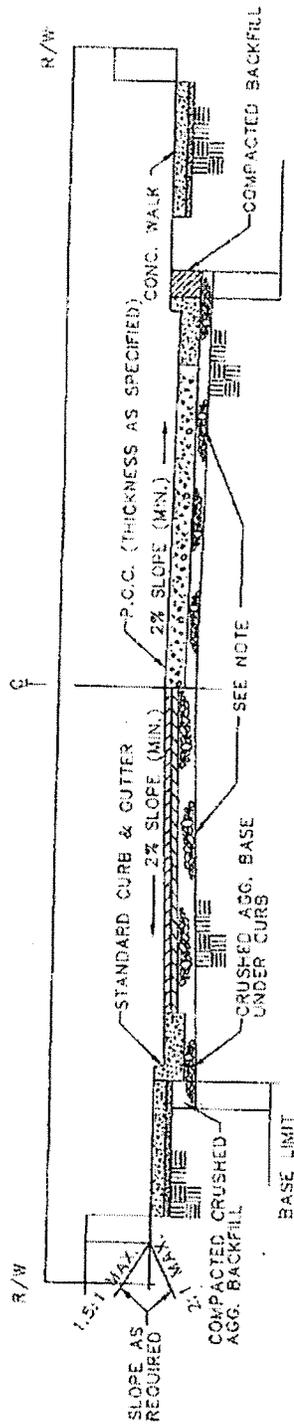
NOTE: All materials and values shall conform with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

CITY OF HOOD RIVER  
STREET CUT DETAIL

DATE	2007
BY	STC/BJP/TCV
REVISED	City of Hood River, Hood River, Oregon

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



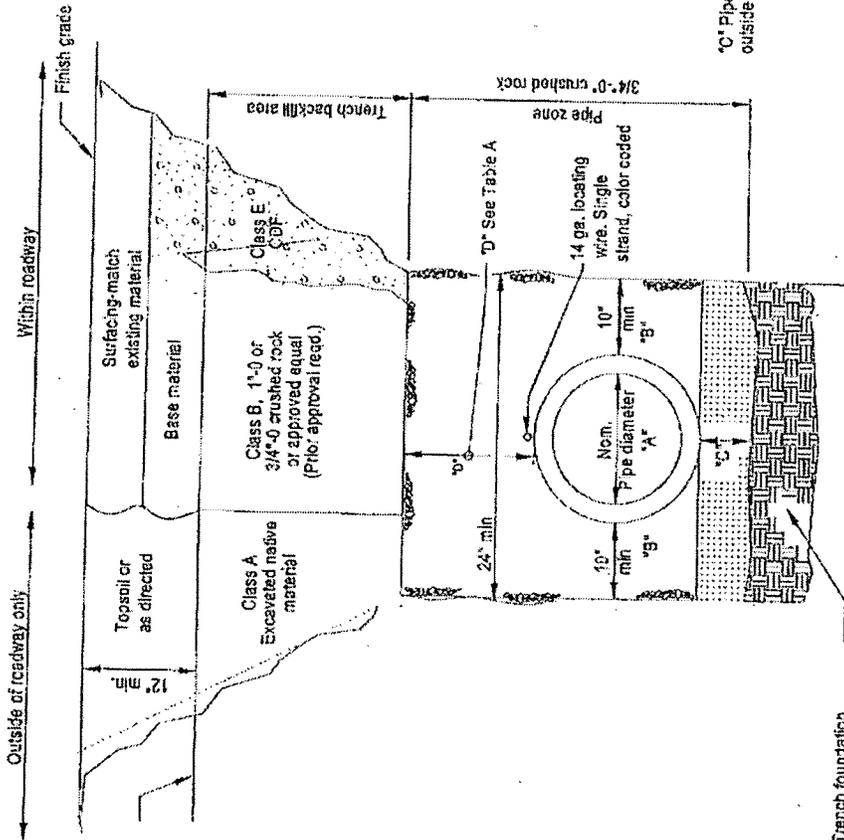
- NOTE:
- BASE ROCK SHALL BE 1 1/2" - 0"
  - CRUSHED AGGREGATE 8" COMPACTED DEPTH
  - FINISH COURSE SHALL BE 3/4" - 0"
  - CRUSHED AGGREGATE 2" COMPACTED DEPTH
  - ASPHALT SHALL BE 3" MINIMUM COMPACTED DEPTH DONE IN 2 1 1/2" LIFTS
  - COMPACTION SHALL BE A MINIMUM OF 95% AASHTO T-99

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
STREET DETAIL

DATE	2002
BY	AS/RS/MS
CHECKED	AS/RS/MS
DESIGNED	AS/RS/MS
IN CHARGE	AS/RS/MS

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



**MULTIPLE INSTALLATIONS (All Shapes)**

Diameter	Min. Space Between Pipe
Up to 48"	24"
48" to 72"	One Half (1/2) Dia. of Pipe
72" to 180"	36"

\*C\* Pipe bedding depth below outside of pipe bell see Table A

**TABLE A**

"A" (in)	"B" (in)	"C" (in)	"D" (in)
4	10	4	8
6	10	4	8
8	10	6	10
10	10	6	10
12	12	6	10
15	12	6	10
18	15	6	12
21	18	6	12
24	18	6	12
30	18	6	12
36	24	6	14
42	24	6	14
48	24	6	14
54	24	6	14
60	24	6	14
66	24	6	14
72	24	6	14

Note:

1. Surfacing of paved areas shall comply with street cut standard drawing.
2. For pipes  $\geq 36"$  dia., when placed in ar. embankment, increase dimension "B" to actual diameter.

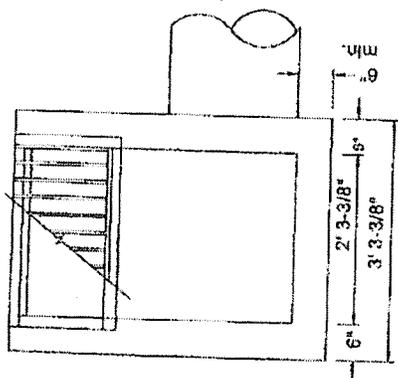
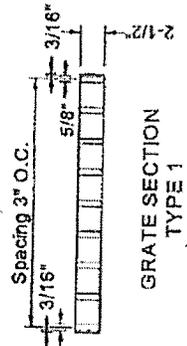
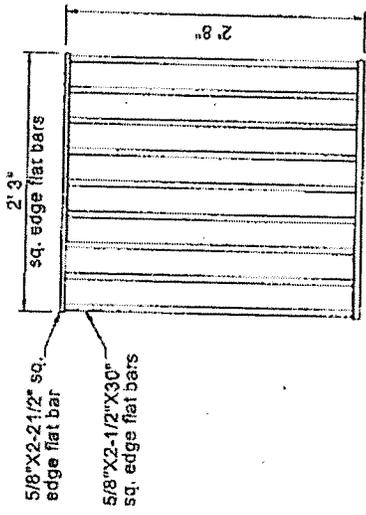
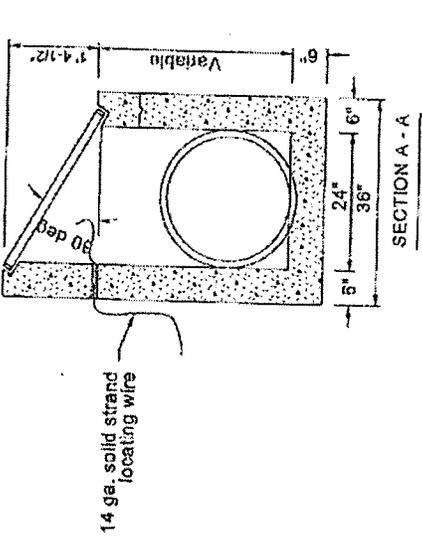
Trench foundation stabilization, as required

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

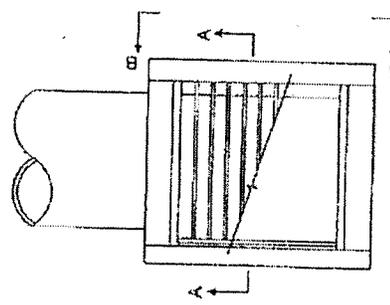
NOTE: All materials and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**  
**CITY OF HOOD RIVER**  
**TRENCH BACKFILL, BEDDING, PIPE ZONE AND MULTIPLE INSTALLATIONS**  
 2003

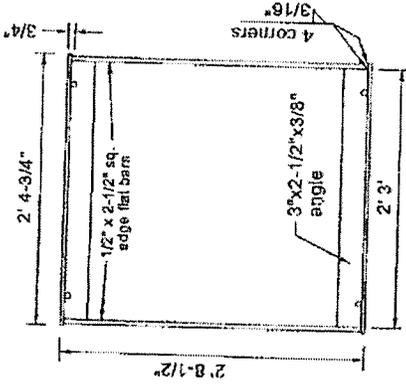
REV. 2003.3  
 12.12  
 City of Hood River



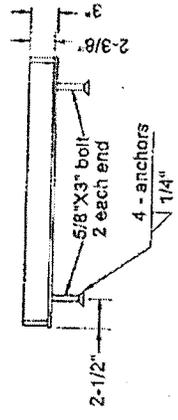
SECTION B - B



PLAN



FRAME PLAN



FRAME SECTION

Note:

3/8" cross bars shall be flush with the grate surface and may be fillet welded, resistance welded or electroforged to bearing bars.

Notes:

1. Concrete strength shall be Commercial Grade Concrete.
2. G-2 grates may be used if approved by the engineer.
3. Catch basin, frame, and grates shall meet H20 loading.
4. Inside frame dimensions: 2'-3-3/8" x 2'-8-1/2".

NOTE: All materials and dimensions shall be in accordance with the current Oregon Standard Specifications.

OREGON STANDARD DRAWINGS

CITY OF HOOD RIVER

DITCH INLET CATCHBASIN

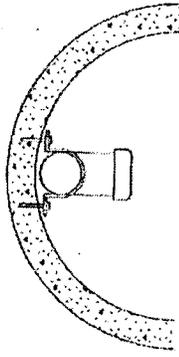
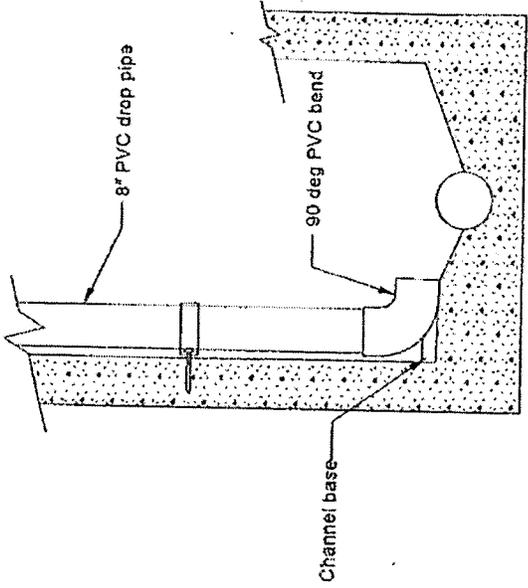
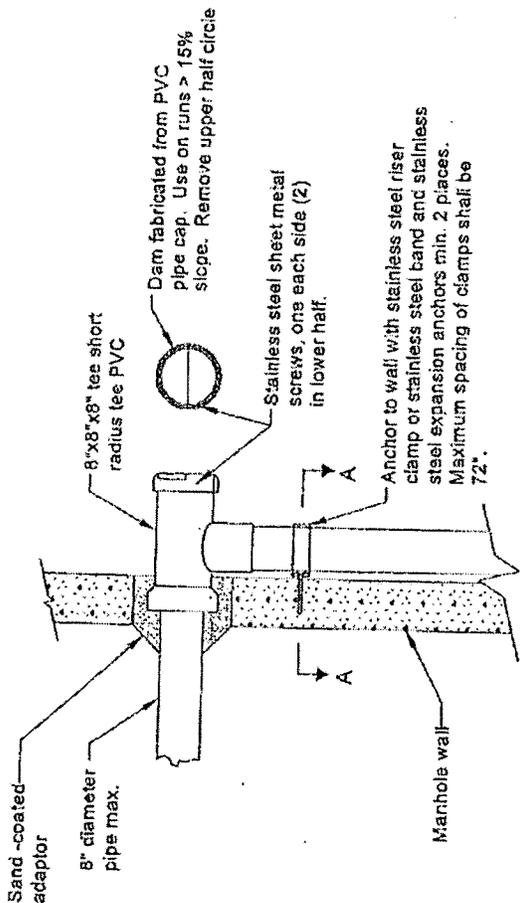
2002

DATE: 12.17

REGISTERED PROFESSIONAL ENGINEER

CITY OF HOOD RIVER, OREGON

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



SECTION A-A  
CLAMP DETAIL

NOTE:

1. Inside drop manholes are allowed only with prior approval.
2. Only one inside drop per 48" manhole.
3. PVC shall be ASTM D3034 SDR35

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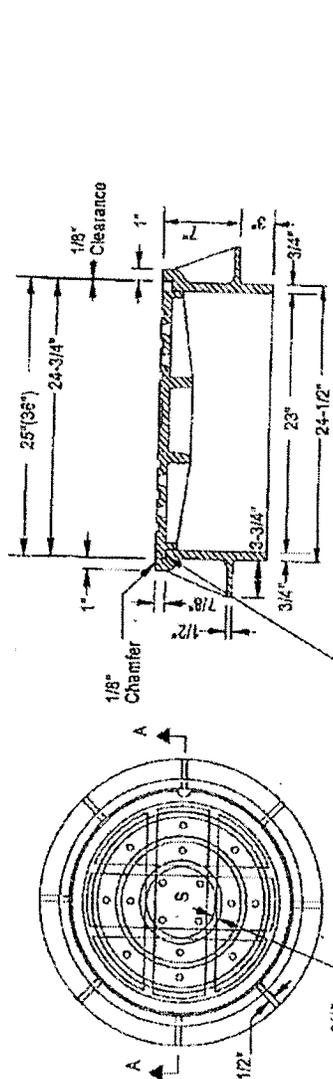
NOTE: All materials and methods shall be in accordance with the current Oregon Building Specifications

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SANITARY SEWER  
INSIDE DROP MANHOLE

DATE	REVISED	BY
3.1.02	REVISED	BY
CITY OF HOOD RIVER, OREGON		

**STANDARD MANHOLE COVER & FRAME**

Approximate weight  
Cover 140 lb  
Frame 240 lb



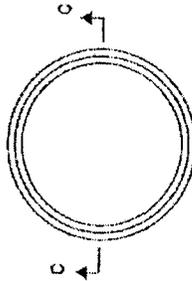
Note:  
Coat outside of frame with asphalt,  
where frame is to be placed in conc.  
pavt., conc. gutter, or walk.

**PLAN**

**SECTION A-A**

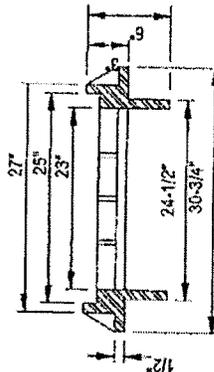
3/8" min. diameter cover is req'd.  
for manholes with depths of 20' or  
greater.

**MANHOLE  
ADJUSTMENT RING**



**SUBURBAN MANHOLE COVER & FRAME**

For use on local streets  
only, as specified  
(approx. wt. - 300 lb)

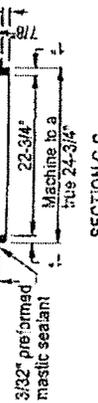


Sanitary  
2 holes max.



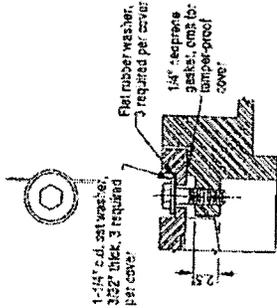
Storm

**SECTION C-C**



**Notes:**

- Covers for sanitary manholes shall have 2 holes maximum.
- Watertight covers required if located where cover may be submerged. (no holes)
- Frames and covers shall be stamped with manufacturer's initials, heat number and point of origin.



Note:  
3 req'd. 1/2" x 1/4" pentagonal or hexagonal  
head, bronze or stainless steel. Insert frame  
so that one bolt boss is located over the  
manhole cover.

**BOLT-DOWN DETAIL**

(FOR TAMPERPROOF AND WATERTIGHT)

Std. depths 1-1/2", 2", 2-5/8", 3"

Matl. to be grey cast iron ASTM A-48, Class 30

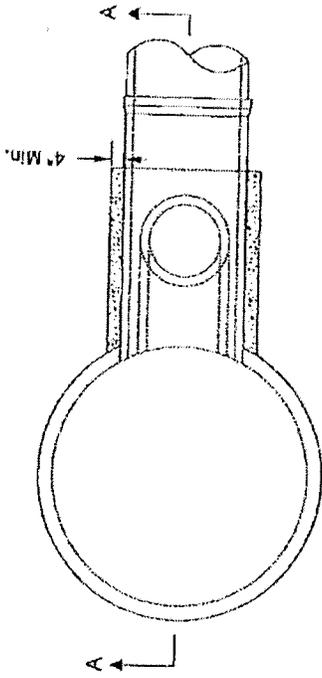
Tolerance on non-machined surfaces to be 1/16"

NOTE: All material and workmanship shall be in accordance  
with the current Oregon Standard Specifications

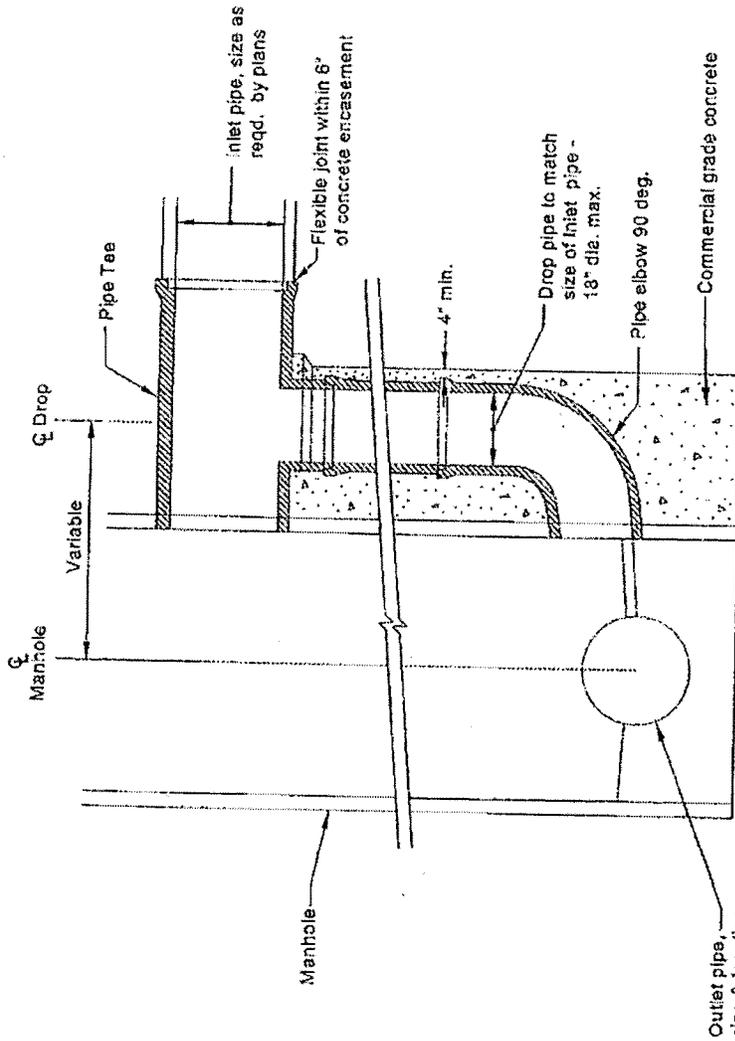
OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
MANHOLE COVER & FRAMES

DATE	REVISED BY	DATE
11-23	11/23/2011	11/23/2011
	City of Hood River, Hood River, Oregon	

The selection and use of this  
Standard Drawing, while designed  
in accordance with generally  
accepted engineering principles  
and practices, is the sole responsi-  
bility of the user and should not  
be used without consulting a  
Registered Professional Engineer.



PLAN



SECTION A-A

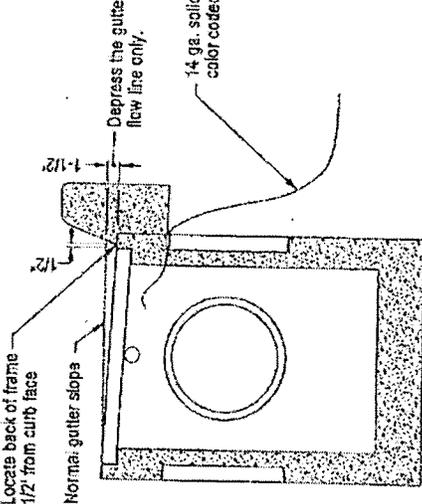
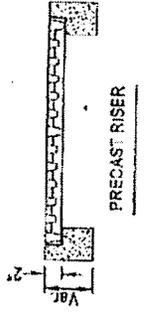
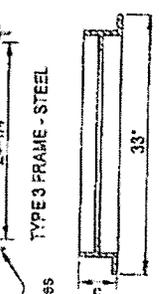
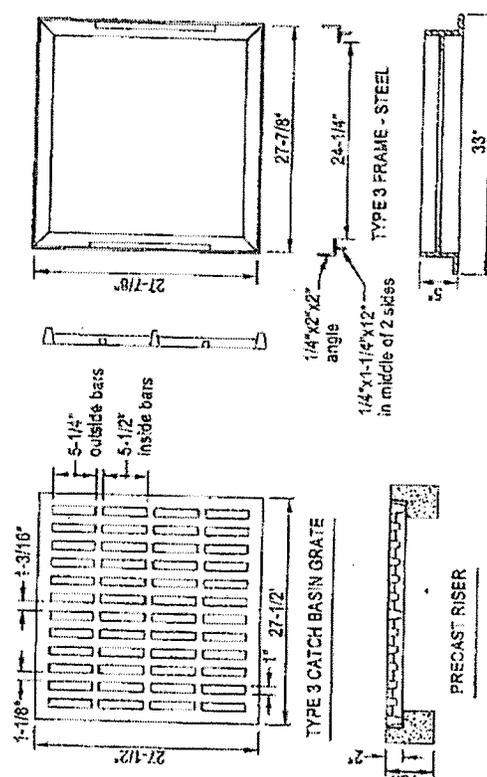
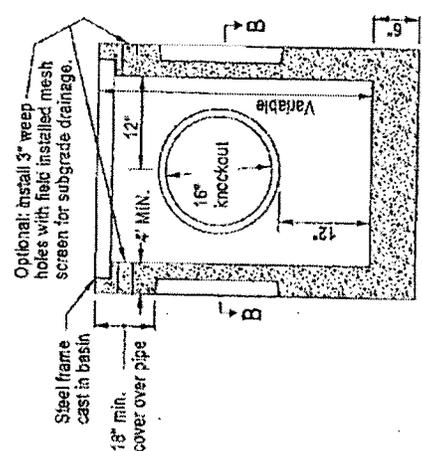
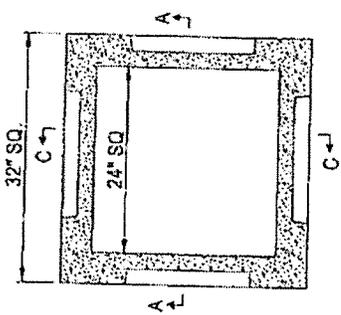
○ All dimensions are in inches unless otherwise noted.

NOTE: All materials and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
OUTSIDE DROP MANHOLE

DATE	2/20/02
DESIGNER	AW/MSJ
CHECKED	AW/MSJ

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



**NOTE:** All materials and workmanship shall be in accordance with the current Oregon Standard Specifications.

**OREGON STANDARD DRAWINGS**  
**CITY OF HOOD RIVER**  
**STANDARD CATCH BASIN**  
**FRAME AND GRATE**

2002  
 REVISION  
 DATE  
 12-17

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

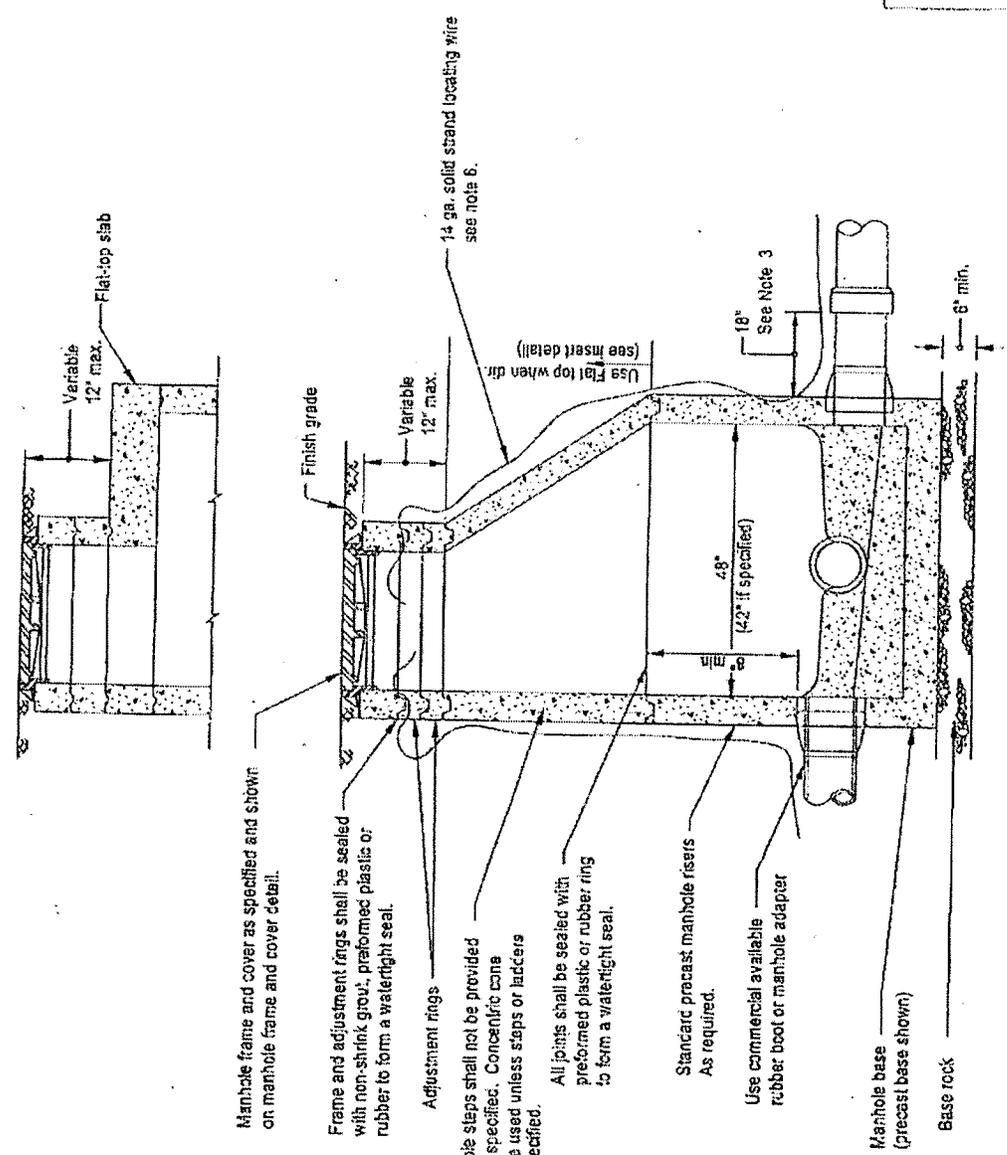
Notes:

1. Catch basin & grate shall meet M18 loading
2. Concrete strength shall be Commercial Grade Concrete.
3. Precast walls shall be a minimum of 4" thick.
4. For use by local agencies as directed
5. Depress gutter flowline only.

SECTION C-C

SECTION A-A

- Notes:
1. All precast sections shall conform to requirements of ASTM C478M.
  2. Standard precast manhole section diameter shall be 48". Use 42" if specified by engineer. Prior approval required. Maximum pipe diameter 24".
  3. All connecting pipes shall have a flexible joint within 18" of manhole wall.
  4. This detail limited to interior drop of 24". See drop manhole detail for drops in excess of 24".
  5. Use flat top for shallow manhole where directed.
  6. 14 ga. solid strand, color coded, locating wire shall enter manhole no more than 10" below finish grade and protrude into manhole at least 18".



Manhole frame and cover as specified and shown on manhole frame and cover detail.

Frame and adjustment rings shall be sealed with non-shrink grout, preformed plastic or rubber to form a watertight seal.

Adjustment rings

Manhole steps shall not be provided unless specified. Concretite cone may be used unless steps or ladders are specified.

All joints shall be sealed with preformed plastic or rubber ring to form a watertight seal.

Standard precast manhole risers As required.

Use commercial available rubber boot or manhole adapter

Manhole base (precast base shown)

Base rock

NOTE: All materials and workmanship shall be in accordance with the current Oregon Standard Specifications

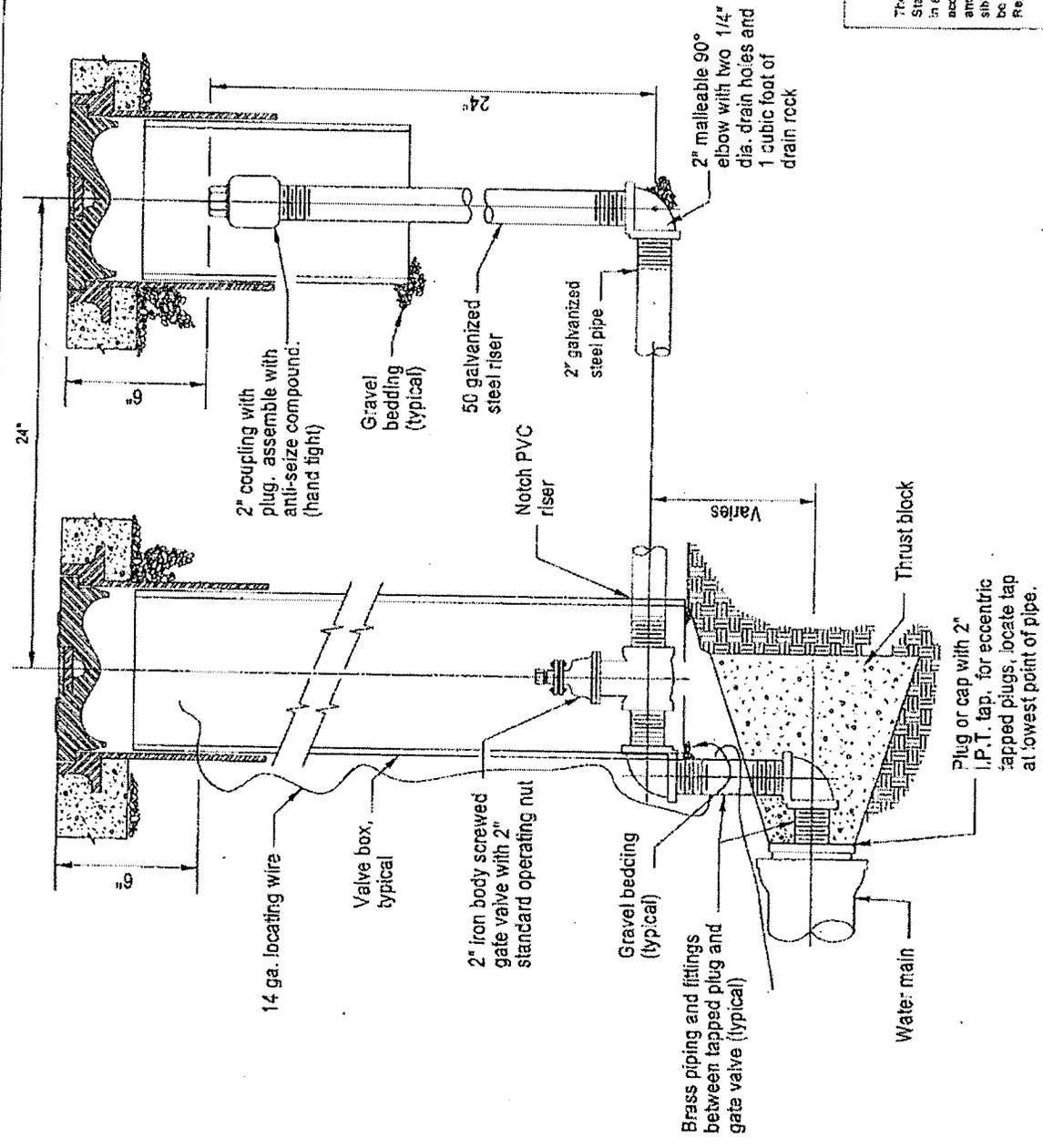
**OREGON STANDARD DRAWINGS**

**CITY OF HOOD RIVER**

**STANDARD MANHOLE**

DATE: 11.18.08  
 DRAWN BY: [blank]  
 CHECKED BY: [blank]  
 CITY OF HOOD RIVER ADDRESS: [blank]

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



**NOTES:**

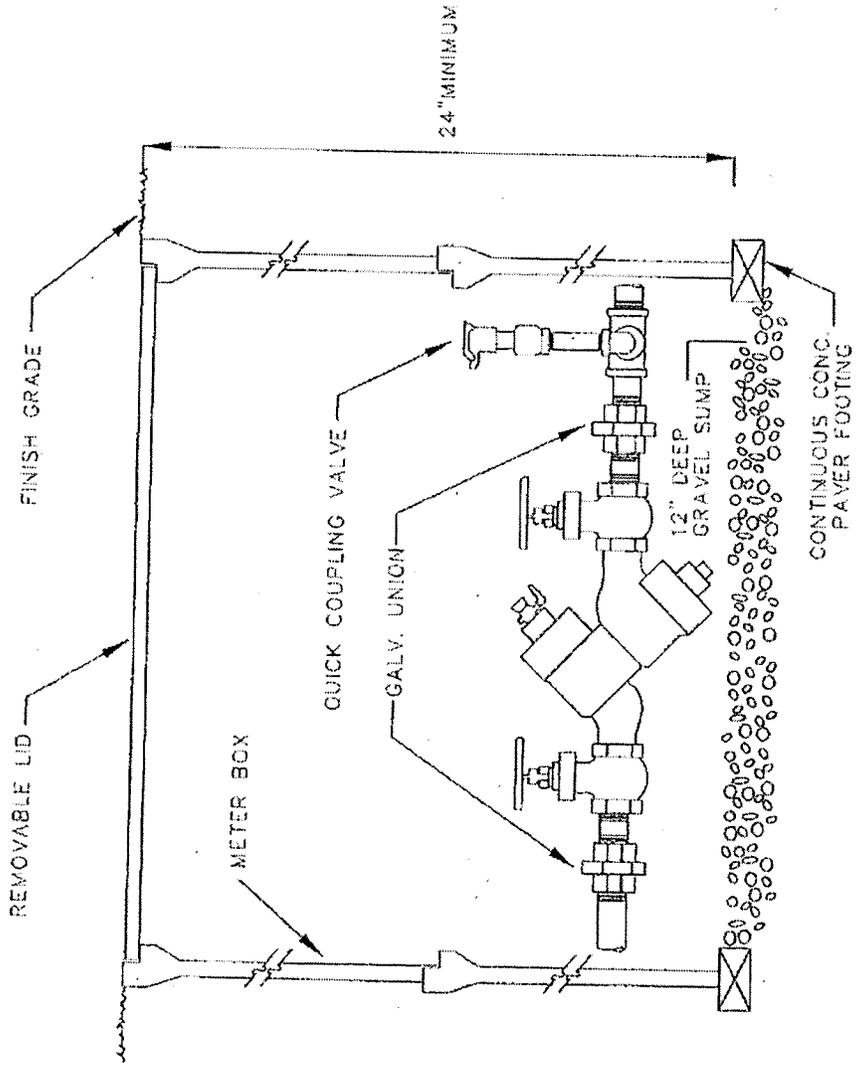
1. Wrap main and fittings in thrust block zone with two layers of polyethylene film to facilitate future removal.
2. In lieu of concrete thrust block, restrain pipe or pour concrete straddle block.

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

**OREGON STANDARD DRAWINGS**  
**CITY OF HOOD RIVER**  
**WATER MAIN DEAD-END BLOWOFF ASSEMBLY**

DATE: 12-22  
 REVISED: 2002  
 City of Hood River, Oregon

NOTE: All projects and workmanship shall be in accordance with the current Oregon Standard Specifications.



- NOTES:
1. DEVICE MUST BE SET PLUMB INSIDE METER BOX.
  2. METER BOX MUST BE SIZED TO PROVIDE A MINIMUM CLEARANCE OF 6 INCHES ON TEST COCK SIDE OF DEVICE.
  3. DEVICES LARGER THAN 2 INCHES MUST CONFORM TO OREGON HEALTH DIVISION INSTALLATION SPECIFICATIONS.
  4. METER BOXES SET IN DRIVEWAYS SHALL HAVE TRAFFIC LOS.

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

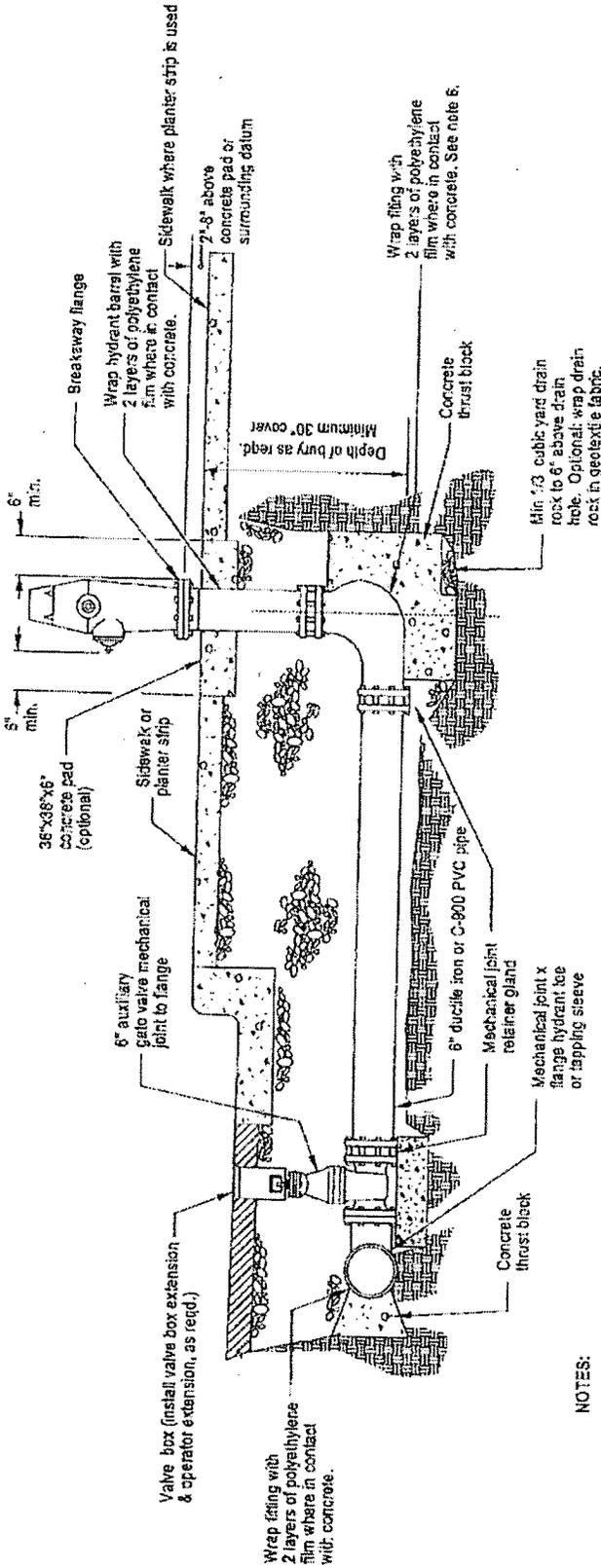
NOTE: All materials and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS  
 CITY OF HOOD RIVER  
 DOUBLE CHECK VALVE ASSEMBLY  
 INSTALLATION DETAIL

2002  
 REVISIONS  
 DATE: 11.17.02  
 SCALE: AS SHOWN

DOUBLE CHECK VALVE ASSEMBLY  
 BACKFLOW PREVENTOR

# HYDRANT ASSEMBLY



## NOTES:

- Hydrants are to be Mueller Centurion, or Kennedy Construction.
- When pipe is shorter than 18', no joints allowed. Use mechanical joint retainer glands. Two 3/4" galvanized iron rods may be used in lieu of thrust blocks for installations less than 18' long. Coat the rods with two coats of coal tar epoxy.
- When pipe is longer than 18' retainer glands not required.
- There shall be a minimum of 18" horizontal clearance around hydrant.
- When placed adjacent to curb, hydrant port shall be 24" from face of curb.
- Concrete thrust blocks shall be constructed as per thrust block standard drawing. Do not block drain holes.
- Extensions required for hydrant systems shall be installed to the manufacturer's specifications.
- Hydrants shall be placed to provide a minimum of 5' clearance from driveways, poles, and other obstructions.
- Hydrant pumper port shall face direction of access.
- Set hydrant plumb in all directions.

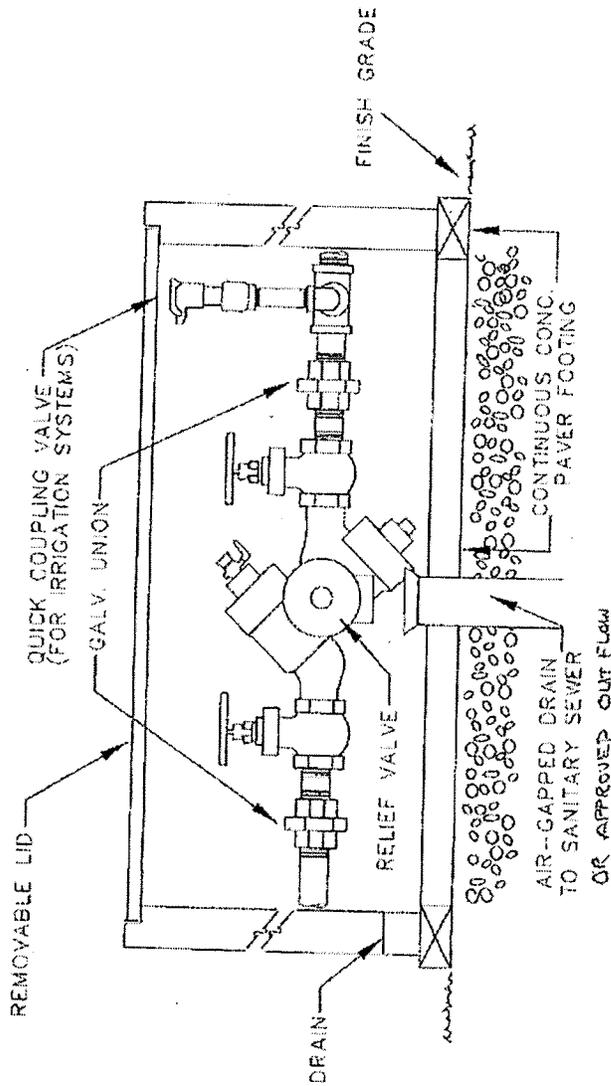
NOTE: All material specifications shall be in accordance with the current Oregon Standard Specifications.

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
HYDRANT INSTALLATION

DATE: 12-28  
DRAWN BY: [Name]  
CHECKED BY: [Name]  
City of Hood River, Oregon

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

- NOTES:**
1. DEVICE MUST BE SET PLUMB INSIDE ENCLOSURE.
  2. DEVICES PLACED INSIDE OF BUILDING MUST PROVIDE A MINIMUM OF 24 INCHES CLEARANCE ON TEST COCK SIDE OF DEVICE AND AIR GAPPED DRAIN TO SANITARY SEWER.
  3. DEVICES LARGER THAN 2 INCHES MUST CONFORM TO OREGON HEALTH DIVISION INSTALLATION SPECIFICATIONS.
  4. ABOVE GROUND ENCLOSURE MUST HAVE A BORE-SIGHTED DRAIN TO DAYLIGHT AND ABILITY TO ACCESS TEST COCK SIDE OF DEVICE.



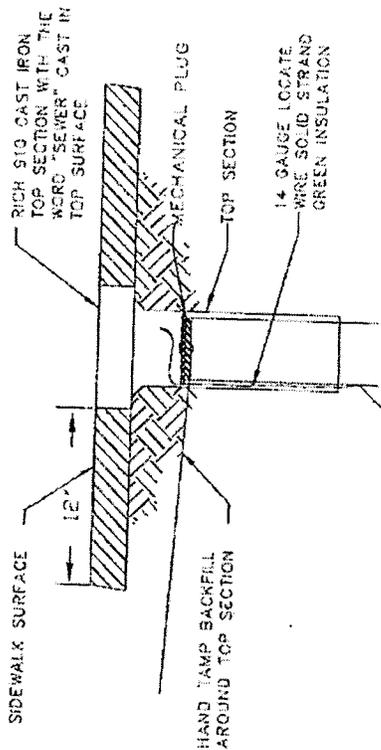
## REDUCED PRESSURE BACKFLOW DEVICE

NOTE: All patents and trademarks are in accordance with the current Oregon Standard Specifications

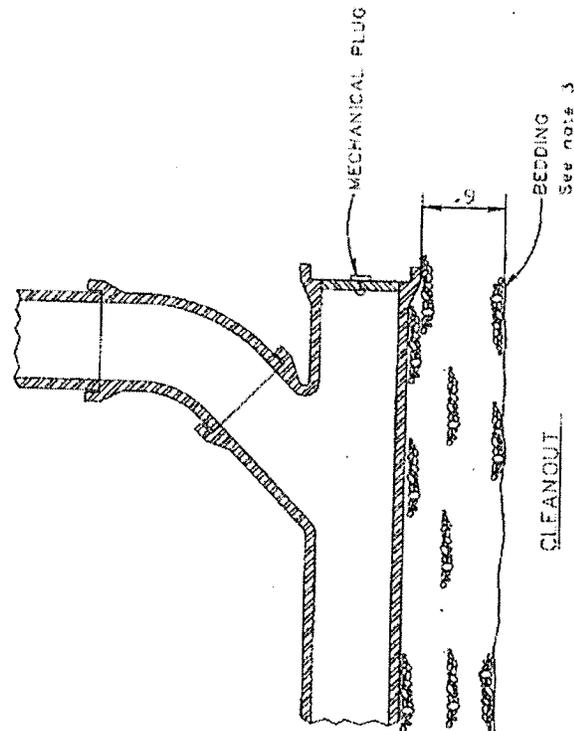
OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
REDUCED PRESSURE  
BACKFLOW DEVICE

DATE: 11-15-03  
REV: 0003  
DESIGNATION: 20002  
CITY OF HOOD RIVER STANDARD SPECIFICATIONS

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.



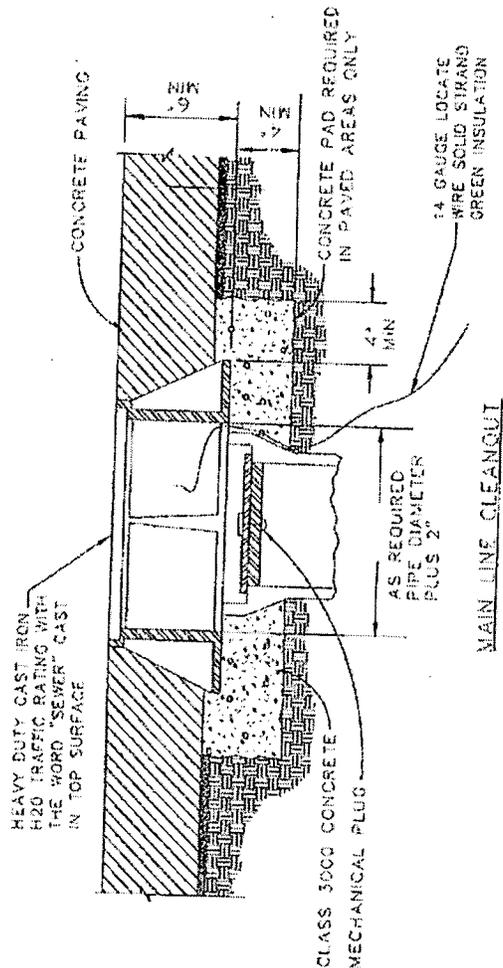
SERVICE LINE CLEAN OUT



CLEANOUT



CAST IRON COVER



MAIN LINE CLEANOUT

- NOTE:
1. ALL CLEANOUT MATERIAL TO BE SAME AS CARRIER PIPE.
  2. CLEANOUT TO BE PLACED 12" FROM BACK OF SIDEWALK.
  3. BEDDING MATERIAL TO BE COMPACTED 3/4" - C CRUSHED ROCK

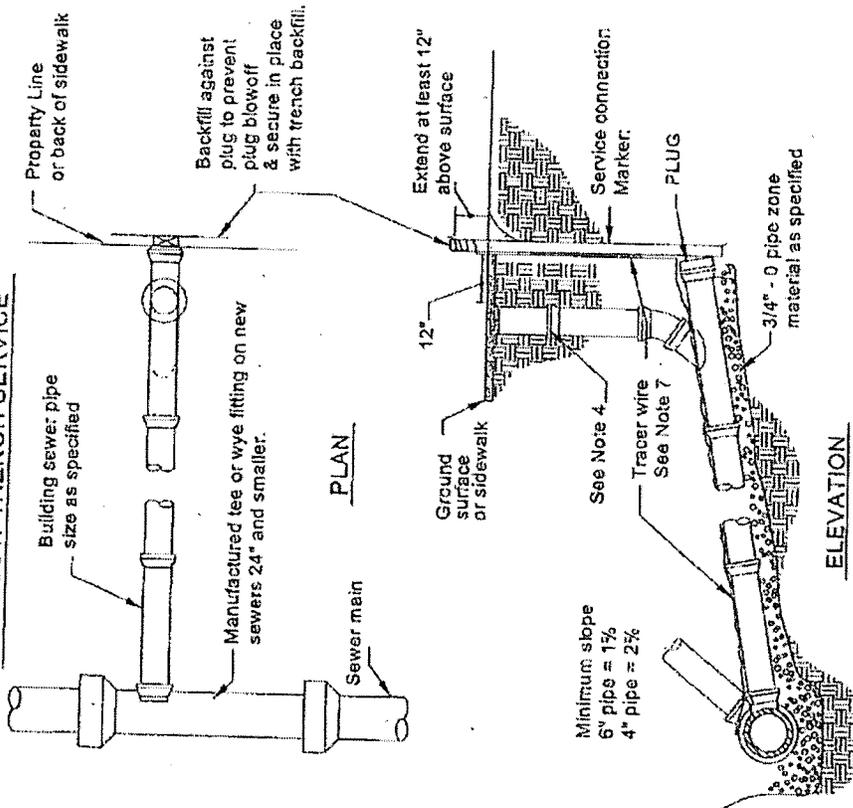
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications.

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
SANITARY SEWER CLEANOUT

DATE: 11-17  
DRAWN BY: [illegible]  
CHECKED BY: [illegible]  
SCALE: [illegible]

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

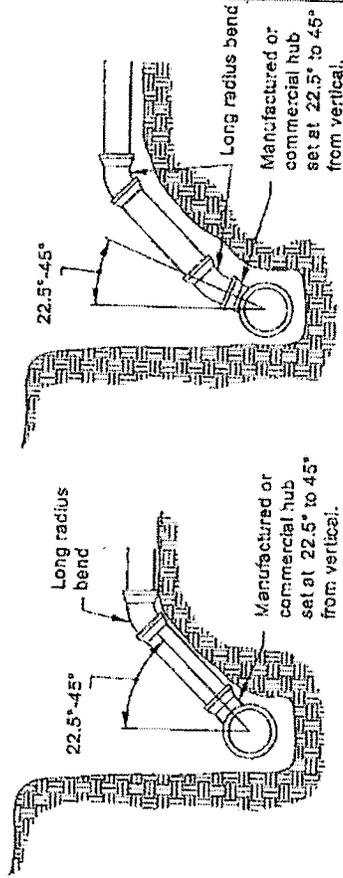
### SHALLOW TRENCH SERVICE



**Notes:**

1. Pipe and fittings shall be compatible. Only manufactured fittings shall be used.
2. Minimum depth at right of way or easement line shall be 4'.
3. Marker posts and blocking shall be 2" schedule 40 PVC. Post to extend 12" minimum above exposed area shall be white
4. Cleanout shall be placed at property line, or 12" from back of sidewalk where applicable.
5. Lay building sewer at max. 45° from horizontal to achieve required depth at property line when minimum slope results in excessive depth.
6. For bedding and backfill see trench detail.
7. Locate wire to be 14 ga., solid strand, color coded.

### DEEP TRENCH SERVICE



**Notes:**

1. Pipe and fittings shall be compatible. Only manufactured fittings shall be used.
2. For details not shown see shallow trench service connection drawing.
3. Vertical trench walls are required. If it is not possible to maintain vertical trench walls, use alternate connection method to maintain 6" maximum distance between riser pipe and trench walls. Replace all excavated or disturbed material with full depth granular backfill compacted to 95% relative density.
4. Where deep connection is at an angle less than 45° from vertical, ductile iron pipe and fittings should be used.
5. For bedding and backfill see trench detail.

NOTE: All materials and workmanship shall be in accordance with the latest Oregon Standard Specifications

OREGON STANDARD DRAWINGS

CITY OF HOOD RIVER  
SEWER CONNECTION

2022

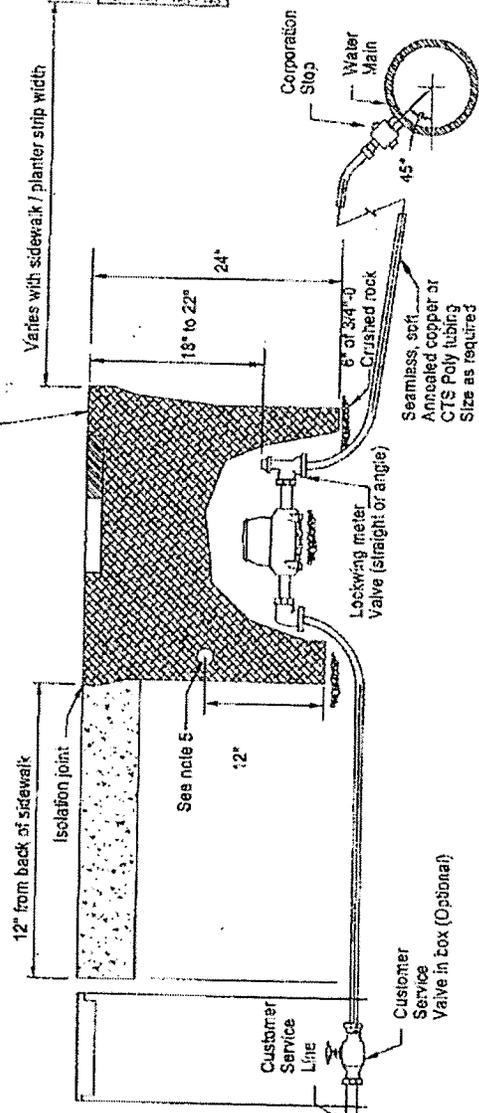
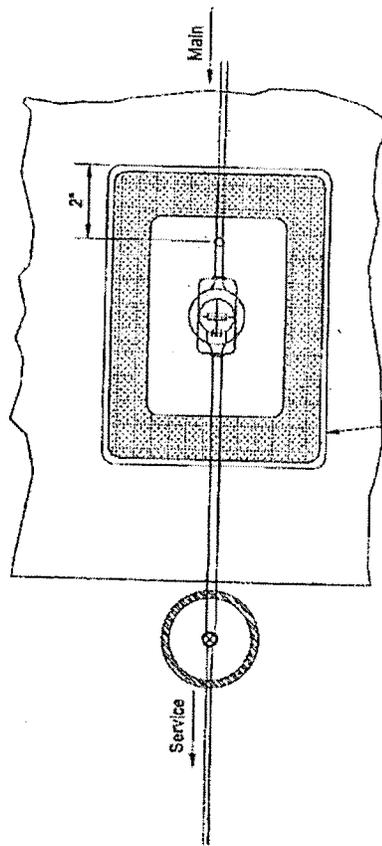
REVISED

DATE

On School Street

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

PLAN



Notes:

1. Meter box to be 12"x20"x24" manufactured by Armrcast Products Company or approved equal.
2. Meter box lid and cover must provide for drop in read cavity.
3. Meter boxes set in driveways must have traffic rated lids & covers.
4. All fittings to be copper tube size compression Mueller 110 or approved equal.
5. When meter boxes are set side by side, a hole must be drilled into each side and 1/2" PVC conduit ran to connect all boxes.

BOXES MUST HAVE 3' SEPARATION  
C TO C

NOTE: All materials and specifications shall be in accordance with the current Oregon Standard Specifications.

OREGON STANDARD DRAWINGS  
CITY OF HOOD RIVER  
WATER SERVICE CONNECTION

DATE	2/7/77
REVISIONS	2002
DESCRIPTION	City of Hood River Water Service

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

SECTION